

Technical

Documentation



NORDENHAM

# Technology in Motion

FLAMEPROOF  
THREE-PHASE MOTORS





We don't just manufacture motors. We turn our customer's ambitious ideas into modern, innovative products which are as unique as they are revolutionary. We get you there with our blend of reliability, creativity and flexibility.

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Safety, longevity and eco-friendliness have always been deeply rooted in our corporate philosophy. This has led us to develop energy-efficient motors a long time ago, independent of the latest European directives regarding responsible use of energy and resources.

## IEC 60034-30

In an effort to harmonize the many different national efficiency requirements, the international standard IEC 60034-30:2008 is a first step to achieve consistent international efficiency standards for three-phase low voltage motors in the output range from 0.75 kW and 375kW. There are now three International Efficiency classes: IE1, IE2, and IE3. IE3 has the strictest requirements, and even stricter requirements are being defined.

The main difference between the former voluntary commitment of CEMEP, the European sector committee for electrical drives, from the year 1998 and today's international requirements is - apart from the reversed numbering - also the obligation to measure efficiency using the new procedures defined by IEC 60034-2-1:2007.

The scope of IEC 60034-30 includes motors with the following properties:

- 50 Hz and/or 60 Hz
- Rated voltages up to 1000 V
- Rated power from 0.75 kW to 375 kW
- 2, 4 or 6 poles
- S1 - continuous operation
- S3 - Periodic operation with operating periods > 80%.

This does not include motors

- which have been specifically designed for inverter operation or
- which are an integral part of an assembly and can therefore not be tested separately.

## EuP Directive 2005/32/EC and ErP Directive 2009/125/EC

The EuP directive is the legal basis for implementing the political objective to reduce CO<sub>2</sub> emissions in Europe (2005/32/EG, energy using products). It was modified in 2009 to focus on eco-friendly design of all products consuming energy (ErP directive; 2009/125/EG). The directive contains a number of different product-related implementing regulations.

## Motor regulation No. 640/2009

This regulation defines requirements for eco-friendly design of electrical motors and the use of electronic speed controls

with respect to placing them on the market and commissioning them.

These requirements also apply when the motors are incorporated into other products.

The scope of application is limited compared with the IEC 60034-30 standard and there is a schedule for implementing the requirements.

The ErP motor regulation does not apply to motors

- designed for use in a liquid;
- which are an integral part of an assembly and can therefore not be tested separately;
- which are operated in altitudes of more than 1000 meters above sea level;
- which are operated in ambient temperatures of more than 40 °C;
- which reach operating temperatures exceeding 400 °C;
- which are operated at ambient temperatures below -15 °C (any type of motor);
- whose coolant temperatures are below 5 °C or above 25 °C at the inlet of a product;
- which are operated in potentially explosives atmospheres according to directive 94/9/EC (ATEX);
- brake motors.

The different motor requirements will come into force according to the following schedule:

- On 16 June 2011, motors must meet at least the requirements of IE2.
- From 1 January 2015, motors with a rated power of 7.5 to 375 kW must either reach IE3 or IE2 and feature speed control.
- From 1 January 2017, motors with a rated power of 0.75 to 7,5 kW must either reach IE3 or IE2 and feature speed control.

The statutory requirements only apply when the European manufacturer or importer introduces the motor to the market for the first time.

Motors that are already available on the market may continue to be sold and commissioned after the effective date.

While this is not mandatory for explosion-proof motors, our motors already meet the efficiency classes specified by IE 60034-30 today.

Depending on the design, our energy-saving motors are conform with the following efficiency requirements:

1. IE2 Level - High Efficiency according to IEC 60034-30 for international use (introduction on 16 June 2011).
2. IE3 Level - Premium Efficiency according to IEC 60034-30 for international use (introduction on 1 January 2011).
3. Minimum Energy Performance Standard (MEPS) according to AS/NZS 1359.5 for Australia and New Zealand.
4. High efficiency (Heff) according to AS/NZS 1359.5 for Australia and New Zealand.
5. Level 2 according to the China Energy Label base on GB 18613-2006.

### Identification

These types of motors have the letter Y in their designation and are labeled with the associated efficiency class IE and the rated efficiency, e.g. CD 80M1-2Y3 IE3 - 82.8%.

The high level of efficiency is achieved by:

1. Larger diameters and longer stator cores with identical IEC mounting dimensions with respect to shaft height
2. Increased use of copper
3. Use of higher-quality electrical sheets
4. Use of shaft seals for protection types IP 55 and 56 with lower losses
5. Modified ventilation system for standard and low-noise versions (CD...A)

| Type designation | CD...Y2        | CD...Y3 | CD...Y      | CD...Y2        | CD...Y3 | CD...Y      | CD...Y2        | CD...Y3 | CD...Y      | CD...Y             |
|------------------|----------------|---------|-------------|----------------|---------|-------------|----------------|---------|-------------|--------------------|
| Output [kW]      | IEC IE2 2-pole | IEC IE3 | AS/NZS MEPS | IEC IE2 4-pole | IEC IE3 | AS/NZS MEPS | IEC IE2 6-pole | IEC IE3 | AS/NZS MEPS | AS/NZS MEPS 8-pole |
| 0,75             | 77,4           | 80,7    | 78,5        | 79,6           | 82,5    | 80,5        | 75,9           | 78,9    | 76,0        | 71,8               |
| 1,1              | 79,6           | 82,7    | 80,6        | 81,4           | 84,1    | 82,2        | 78,1           | 81      | 78,3        | 74,7               |
| 1,5              | 81,3           | 84,2    | 82,6        | 82,8           | 85,3    | 83,5        | 79,8           | 82,5    | 79,9        | 76,8               |
| 2,2              | 83,2           | 85,9    | 84,1        | 84,3           | 86,7    | 84,9        | 81,8           | 84,3    | 81,9        | 79,4               |
| 3                | 84,6           | 87,1    | 85,3        | 85,5           | 87,7    | 86,0        | 83,3           | 85,6    | 83,5        | 81,3               |
| 4                | 85,8           | 88,1    | 86,3        | 86,6           | 88,6    | 87,0        | 84,6           | 86,8    | 84,7        | 82,8               |
| 5,5              | 87             | 89,2    | 87,2        | 87,7           | 89,6    | 87,9        | 86             | 88      | 86,1        | 84,5               |
| 7,5              | 88,1           | 90,1    | 88,3        | 88,7           | 90,4    | 88,9        | 87,2           | 89,1    | 87,3        | 86,0               |
| 11               | 89,4           | 91,2    | 89,5        | 89,8           | 91,4    | 89,9        | 88,7           | 90,3    | 88,7        | 87,7               |
| 15               | 90,3           | 91,9    | 90,3        | 90,6           | 92,1    | 90,8        | 89,7           | 91,2    | 89,6        | 88,9               |
| 18,5             | 90,9           | 92,4    | 90,8        | 91,2           | 92,6    | 91,2        | 90,4           | 91,7    | 90,3        | 89,7               |
| 22               | 91,3           | 92,7    | 91,2        | 91,6           | 93      | 91,6        | 90,9           | 92,2    | 90,8        | 90,2               |
| 30               | 92             | 93,3    | 92,0        | 92,3           | 93,6    | 92,3        | 91,7           | 92,9    | 91,6        | 91,2               |
| 37               | 92,5           | 93,7    | 92,5        | 92,7           | 93,9    | 92,8        | 92,2           | 93,3    | 92,2        | 91,8               |
| 45               | 92,9           | 94      | 92,9        | 93,1           | 94,2    | 93,1        | 92,7           | 93,7    | 92,7        | 92,4               |
| 55               | 93,2           | 94,3    | 93,2        | 93,5           | 94,6    | 93,5        | 93,1           | 94,1    | 93,1        | 92,9               |
| 75               | 93,8           | 94,7    | 93,9        | 94             | 95      | 94,0        | 93,7           | 94,6    | 93,7        | 93,7               |
| 90               | 94,1           | 95      | 94,2        | 94,2           | 95,2    | 94,4        | 94             | 94,9    | 94,2        | 94,1               |
| 110              | 94,3           | 95,2    | 94,5        | 94,5           | 95,4    | 94,7        | 94,3           | 95,1    | 94,5        | 94,5               |
| 132              | 94,6           | 95,4    | 94,8        | 94,7           | 95,6    | 94,9        | 94,6           | 95,4    | 94,8        | 94,8               |
| 160              | 94,8           | 95,6    | 95,0        | 94,9           | 95,8    | 95,2        | 94,8           | 95,6    | 95,1        | 95,2               |
| ≥200             | 95             | 95,8    | -           | 95,1           | 96      | -           | 95             | 95,8    | -           | -                  |

Examples of different efficiency requirements (50 Hz)

# Certificates and Standards

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We apply the most stringent quality criteria, which are checked annually by official government agencies. The certification of the quality assurance was implemented for the first time in 1992. Today we have certifications in accordance with:

- **DIN EN ISO 9001:2008** for the Quality Management System and
- **ATEX 95** according to **94/9/EG, Appendix IV** for the production of totally enclosed flameproof motors.



The conservation of our environment through the promotion of non-polluting manufacturing methods, materials and chemicals in energy-saving motors and drives was identified at an early stage and has been incorporated into the products. These activities, up to the employment of VOC-optimized paint, resulted in the following certification:

- **DIN EN ISO 14001:2005** for the Environmental Management System



In order to ensure the universal application of the motors within future global markets, conformity certificates have been issued for the motors through various domestic and foreign certifications authorities.

## ● Explosion protection certifications e.g.:

- PTB for Europe
- GOST for Russia
- GOST for Belarus
- NEPSI for China
- TestSafe for Australia
- IECEx worldwide



## ● Ship classification authorities e.g.:

- Germanischer Lloyd
- Lloyd's Register
- Nippon Kaiji Kyokai
- American Bureau of Shipping
- Russian Maritime Register of Shipping



All motors meet the following international standards and specifications.

Apart from these guidelines, the motors also meet many customer specifications from the chemical and petrochemical and machine building industries.

On request, motors can also be supplied according to the recommendations of the VIK (German association of industrial energy businesses). This makes our motors particularly suitable for the special service conditions of the basic materials industry or refineries. These motor types are labeled with VIK on the rating plate.

## Standards

| Country<br>Title                                                                                                                                      | International<br>IEC International<br>Electrotechnical<br>Commission | Europe<br>EN – CENELEC<br>European<br>Committee for<br>Electrotechnical<br>Standardisation | Germany<br>DIN/VDE<br>German Industrial Standard<br>Association of<br>German<br>Electrotechnicians |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Rotating electrical machines<br>Rating and operating behavior                                                                                         | IEC 60034-1                                                          | EN 60034-1                                                                                 | DIN EN 60034-1/<br>VDE 0530 Part 1                                                                 |
| Process for determining losses and<br>efficiency of rotating electrical<br>machines by means of testing                                               | IEC 60034-2-1                                                        | EN 60034-2-1                                                                               | DIN EN 60034-2-1<br>VDE 0530 Part 2                                                                |
| Protection types of rotating electrical machines<br>based on overall construction<br>(IP code) - Introduction                                         | IEC 60034-5                                                          | EN 60034-5                                                                                 | DIN EN 60034-5/<br>VDE 0530 Part 5                                                                 |
| Classification of the cooling processes (IC code)                                                                                                     | IEC 60034-6                                                          | EN 60034-6                                                                                 | DIN EN 60034-6/<br>VDE 0530 Part 6                                                                 |
| Classification of the design types,<br>the installation types and the<br>terminal box location (IM-Code)                                              | IEC 60034-7                                                          | EN 60034-7                                                                                 | DIN EN 60034-7/<br>VDE 0530 Part 7                                                                 |
| Terminal markings and direction of rotation                                                                                                           | IEC 60034-8                                                          | EN 60034-8                                                                                 | DIN EN 60034-8/<br>VDE 0530 Part 8                                                                 |
| Noise emission limit values                                                                                                                           | IEC 60034-9                                                          | EN 60034-9                                                                                 | DIN EN 60034-9/<br>VDE 0530 Part 9                                                                 |
| Starting performance of three-phase motors with<br>squirrel-cage rotor,<br>except for pole-changing motors                                            | IEC 60034-12                                                         | EN 60034-12                                                                                | DIN EN 60034-12/<br>VDE 0530 Part 12                                                               |
| Mechanical vibrations of certain machines with a<br>shaft height of 56 mm and higher;<br>measurement, evaluation and limit<br>values of the vibration | IEC 60034-14                                                         | EN 60034-14                                                                                | DIN EN 60034-14/<br>VDE 0530 Part 14                                                               |
| Efficiency classification of three-phase motors<br>with squirrel-cage rotors,<br>except for pole-changing motors (IE code)                            | IEC 60034-30                                                         | EN 60034-30                                                                                | DIN EN 60034-30/<br>VDE 0530 Part 30                                                               |
| Balancing value                                                                                                                                       | ISO 1940                                                             | -                                                                                          | DIN ISO 1940                                                                                       |
| IEC standard voltages                                                                                                                                 | IEC 60038                                                            | -                                                                                          | DIN IEC 60038                                                                                      |
| Evaluation and classifications of electric<br>insulation according to its thermal behavior                                                            | IEC 60085                                                            | -                                                                                          | DIN IEC 60085                                                                                      |
| Three-phase induction motors for general use with<br>standardized dimensions and powers                                                               | IEC 60072-1 <sup>1)</sup>                                            | EN 50347 <sup>2)</sup>                                                                     | DIN EN 50347 <sup>2)</sup>                                                                         |
| Explosive atmosphere - Part 0:<br>Equipment General requirements                                                                                      | IEC 60079-0                                                          | EN 60079-0                                                                                 | DIN EN 60079-0<br>VDE 0170 Part 1                                                                  |
| Explosive atmosphere - Part 1:<br>Equipment protection through flameproof enclosure "d"                                                               | IEC 60079-1                                                          | EN 60079-1                                                                                 | DIN EN 60079-1<br>VDE 0170 Part 5                                                                  |
| Explosive atmosphere - Part 7:<br>Equipment protection through increased safety "e"                                                                   | IEC 60079-7                                                          | EN 60079-7                                                                                 | DIN EN 60079-7<br>VDE 0170 Part 6                                                                  |
| Electrical equipment for use in areas with<br>inflammable dust - general requirements                                                                 | IEC 61241-0                                                          | EN 61241-0                                                                                 | DIN EN 61241-0<br>VDE 0170 Part 15                                                                 |
| Electrical equipment for use<br>in areas with inflammable dust - protection of the housing                                                            | IEC 61241-1                                                          | EN 61241-1                                                                                 | DIN EN 61241-1<br>VDE 0170 Part 15-1                                                               |

### Note:

**Motors series dBD..., CD ... and BD ... meet the EN... and VDE ... standards and specifications.**

As a result of compliance with the above-mentioned IEC publications, special adaptation to foreign specifications is not required.

1) Applies only for dimensions and frame sizes

2) Concerns only single-speed motors of the Basic Series CD ... and BD to 315M for temperature class T4

# Explosion Protection

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## Explosion protection types of electrical machines

| Ignition protection type<br>Letter symbol                                           | Construction Requirements                                                       | Protection concept                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Type of electrical machine                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flameproof enclosure "d"                                                            | DIN EN 60079-1, VDE 0170 Part 5                                                 | All potential ignition sources are housed inside a flameproof enclosure whose unavoidable sealing surfaces are therefore designed as flameproof joints, so that, in case of ignition of an explosive atmosphere inside the enclosure, the explosive atmosphere is not transferred to the potentially explosive atmosphere surrounding the enclosure.                                                                                                                         | All types of motors, e.g. <ul style="list-style-type: none"> <li>● squirrel-cage motors</li> <li>● slipring motors</li> <li>● commutator motors</li> </ul> For all modes of operation (S1 to S10) for severe starting conditions and variable-speed drive units, e.g. by means of frequency inverters.                                                                                                                                                                            |
|    | Equipment for use in zones 1+2 <sup>1)</sup>                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Increased safety "e"                                                                | DIN EN 60079-7, VDE 0170 Part 6                                                 | Here, steps must be taken to ensure that the creation of sparks, electric arcs and inadmissible heating processes is prevented during proper operation of the equipment.                                                                                                                                                                                                                                                                                                     | Only squirrel-cage motors with adapted motor protection switch. $t_E$ -time requirement!                                                                                                                                                                                                                                                                                                                                                                                          |
|  | Equipment for use in zones 1+2 <sup>1)</sup>                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Protection type "n"                                                                 | DIN EN 60079-15, VDE Part 16<br>Electrical equipment for explosive atmospheres. | Ignition protection type for electrical equipment ensuring that equipment cannot ignite the surrounding explosive atmosphere under normal operating conditions and under certain abnormal conditions.<br><br>Common motor protection methods are: <ul style="list-style-type: none"> <li>- non-sparking apparatus (nA) designed to minimize the risk of arcs or sparks;</li> <li>- vapor-proof housings (nR) designed to restrict access of gases, vapors and fog</li> </ul> | Squirrel-cage motors of protection type IP20 for enclosed areas. For installation outdoors, protection type P44 or IPW24 motor protection switch.<br><br>All types of motors, e.g. <ul style="list-style-type: none"> <li>● slipring motors</li> <li>● commutator motors etc with motor protection switches and overpressure monitoring.</li> </ul> Prevention of discharge of sparks created under normal operating conditions. Manufacturers' information about these measures. |
|  | Equipment for use in zone 2 <sup>1)</sup><br>(Zone 2 equipment)                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Dust protection                                                                     | DIN EN 61241-1,<br>VDE 0170 Part 15-1                                           | The ignition protection type is based on the limitation of the maximum surface temperature of the casing and on the restriction of the dust entry, through the utilization "dust-sealed" or "dustproof" housings.                                                                                                                                                                                                                                                            | All electrical motors with protection through housings with limitation of the surface temperature                                                                                                                                                                                                                                                                                                                                                                                 |
|  | Equipment for Zone 21 + 22 <sup>2)</sup>                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Note

1) DIN EN 60079-14, VDE 0165 Part 1, Electrical equipment for use in areas with gas explosion hazards (with the exception of mines)

2) DIN EN 61241-1, VDE 0170 Part 15-1, Electrical equipment for use in areas with inflammable dust.

### Explosion protection of flameproof motors

The motors have been tested and certified in accordance with the new European Directive 94/9/ EC (ATEX 95) by the German Federal Institute of Physics and Metrology (PTB). They therefore comply with the latest European regulations. The directive regulates the type of devices and protective systems suitable for use in hazardous areas and has been applicable throughout Europe for the marketing of this equipment since 30 June 2003.

IECEx scheme certifications are available for all motors for international applications.

The three-phase motors of the version series dBD, CD and BD have the explosion protection category "flameproof enclosure", in accordance with IEC 60079-1 for the groups IIC and IIB and temperature classes T3 to T6.

The standard version of the CD series motors complies with the requirements of the highest explosion protection group (IIC) and temperature class T4, which also cover all lower groups and temperature classes. The BD and dBD series comply with the requirements of explosion protection group IIB and temperature class T4.

This certification does not contain electrical data for the tested motor. It merely confirms that the motor is inherently protected against explosion due to its flameproof construction. The specification of electrical data is the sole responsibility of the manufacturer. The observation of temperature limits is certified by means of appropriate tests.

Motors of temperature class T4 have the same output as standard, non-explosion-proof motors given equal dimensions. The rated output of temperature class T5 and T6 motors must be modified so that permissible enclosure temperatures are not exceeded.

The terminal box is, as standard the explosion protection rating "increased safety" (e.g. motor construction designation Ex de). To cater for the various installation methods used in different countries, motors can also be supplied with a terminal box with "flameproof enclosure" (motor designation Ex d IIC). The terminal compartment is designed according to the same explosion-proof group as the motor.

The motor chamber and the terminal compartment of both versions are isolated from each other to prevent explosion. The winding end leads are fed into the terminal compartment through flameproof cable entries.

Due to their high degree of protection, the motors can be used under all operating conditions in all zone 1 and 2 areas.

They can be used in hazardous areas in which the local and operational conditions can cause dangerous volume of gases and vapors to accumulate and mix with air to form a flammable mixture. Due to their construction, the motors are protected against ingress of water and against electrical, chemical, thermal and mechanical influences, to the extent that their explosion protection remains intact under normal use.

Construction designation of the motor – example:

CE 0044  II 2G Ex de IIC T4

# Explosion Protection

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## Explosion protection types and categories of electrical machines

### Dust explosion protection EN 61241-1

| Workplace           | Presence of an explosive dust atmosphere | Sometimes                                             | Seldom or short-term                                  | Seldom or short-term                          |
|---------------------|------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------|
|                     | Dust type                                | All types                                             | Conductive                                            | Non-conductive                                |
| Operating resources | Zone                                     | 21                                                    | 22                                                    | 22                                            |
|                     | Device group                             | II                                                    | II                                                    | II                                            |
|                     | Device category                          | 2D                                                    | 3D                                                    | 3D                                            |
|                     | Protection type                          | IP65                                                  | IP65                                                  | IP55                                          |
|                     | Temperature                              | max. 120 °C                                           | max. 120 °C                                           | max. 120 °C                                   |
|                     | Housing temperature                      |                                                       |                                                       |                                               |
|                     | Certificate                              | EG type examination certificate of the testing agency | EG type examination certificate of the testing agency | EG conformity declaration of the manufacturer |
| Identification      |                                          | II 2D Ex tD A21 IP65 T120°C                           | II 3D Ex tD A22 IP65 T120°C                           | II 3D Ex tD A22 IP55 T120°C                   |

#### Dust explosion protection

Dust-explosion-protected motors are certified by PTB according to the new Directive 94/9/EC and meet DIN EN 61241-1.

A significant feature of the dust explosion protection is the IP protection type. Depending on environmental conditions, different requirements are placed on the dust sealing of the motor. The limitation of the surface temperature of the motors to a value which is below the ignition and glow temperature of the surrounding dust is also an important factor for dust explosion protection.

The user must determine the category and maximum permissible surface temperature according to frequency and probability of occurrence and the dust type.

Caution: Conducting and/or non-conducting dust changes the device category.

Construction designation of the motor:

  II 2D Ex tD A21 IP65 T120°C

The motors are also available in versions that are both dust and gas explosion proof.

#### Information on the introduction of the directive 94/9/EG (ATEX 95)

The regulations concerning the construction and operation of electrical equipment in hazardous areas have been laid down for many years in European standards under the directive 76/117/EC and several supplements. The transition to the two new directives 94/9/EC (ATEX 95) and 99/92/EC (ATEX 137) has involved a thorough revision and harmonizing of the European regulations.

Directive 94/9/EC harmonizes the regulations of the individual member states with regard to the previously differing requirements of apparatus and protective systems. Through these measures, the objectives of removing commercial barriers within the EC and of standardizing basic safety features have been achieved. In specialist circles, the directive is often referred to by the abbreviation "ATEX 95" (abbreviation of the French name for the directive).

In future, the construction requirements for operation in hazardous areas will be specified by the directive 99/92/EC (ATEX 137).

The integration of the directives into German law was implemented in 1996 with the same two-part structure: the Device Safety Law with the explosion protection law (ExVO) for ATEX 95, and through the operational safety ordinance (BetrSichV) for the ATEX 137. With this, a number of well-known specifications, including ElexV, have become invalid.

An essential feature of ATEX 95 is that devices and protective systems are classified and identified according to different categories. These categories were defined according to the zone divisions of operating areas, which is based on the likelihood of the presence of explosive atmosphere.

The external CE mark and the device group specified on the rating plate, such as "II 2G" for Zone 1 apparatus in explosive atmospheres consisting of gases, indicate that the motors are compliant with the requirements of the new directive. The affixing of the CE mark and the issuing of the relevant declaration of conformity by the manufacturer are subject to the following requirements:

- The manufacturer must have a certified quality assurance system in accordance with ISO 9000, with an additional certificate for quality assurance in the production of explosion-proof equipment in accordance with ATEX 95.
- The apparatus concerned must have an EC type testing certificate from an accredited test authority (not required for category 3 apparatus).

During the transition period (up to 30.06.2003) the manufacturer and the user had the right to proceed in accordance with both the old and the new regulations.

### Permissible temperatures for electrical equipment

| DIN EN 60079, VDE 0170<br>explosion groups IIA; IIB; IIC             |                   |                                                                                                                   |
|----------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------|
| Ignition temperature of the medium relative to the limit temperature | Temperature class | Permissible surface temperature of device incl. ambient temperature of 40 °C in separate test (temperature limit) |
| über 450 °C                                                          | T1                | 450 °C                                                                                                            |
| 300–450 °C                                                           | T2                | 300 °C                                                                                                            |
| 200–300 °C                                                           | T3                | 200 °C                                                                                                            |
| 135–200 °C                                                           | T4                | 135 °C                                                                                                            |
| 100–135 °C                                                           | T5                | 100 °C                                                                                                            |
| 85–100 °C                                                            | T6                | 85 °C                                                                                                             |

Since 1 July 2003 all new products that are brought into the market must comply with the new ATEX 95 Directive. The supply of spares for the old versions must be ensured for a further ten years at least.

Existing equipment may still be operated, however, this must be upgraded by 30 June 2006 to comply with the minimum requirements of ATEX 137.

### Permissible employment of motors according to their classification by zone division

| Device group                                 | Device Category classification | Zone | Definition acc. to Safety Ordinance (BetrSichV)                                                                                                                                               | Certification compulsory |
|----------------------------------------------|--------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>For flammable gases, vapors and mists</b> |                                |      |                                                                                                                                                                                               |                          |
| II                                           | 1G*                            | 0    | Zone 0 covers areas in which an explosive atmosphere, consisting of a mixture of air and gases, vapors or mist is present frequently, for long periods of time, or permanently.               | yes                      |
| II                                           | 2G                             | 1    | Zone 1 covers areas in which an explosive atmosphere consisting of gases, vapors or mist is likely to occur from time to time.                                                                | yes                      |
| II                                           | 3G                             | 2    | Zone 2 covers areas in which an explosive atmosphere consisting of gases, vapors or mist is not likely to occur, and if it does, is likely to occur only rarely and for short periods of time | no                       |
| <b>For combustible dust</b>                  |                                |      |                                                                                                                                                                                               |                          |
| II                                           | 1D*                            | 20   | Zone 20 covers areas in which an explosive atmosphere, consisting of a mixture of dust and air is present frequently, for long periods of time, or permanently.                               | yes                      |
| II                                           | 2D                             | 21   | Zone 21 covers areas in which an explosive atmosphere consisting of a mixture of dust and air is likely to occur from time to time.                                                           | yes                      |
| II                                           | 3D                             | 22   | Zone 22 covers areas in which an explosive atmosphere consisting of airborne dust is not likely to occur, and if it does, is likely to occur only rarely and for short periods of time.*      | no                       |

\* Not common for electrical motors

# Explosion Protection

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## Explosion protection types and categories of electrical machines

### Examples of the classification of flammable gases and vapors according to temperature class and explosion group DIN VDE 0165

|                      | Group | Temperature classes                                                                                                                                            |                                                                                                        |                                                                                      |                      |    |                  |
|----------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------|----|------------------|
|                      |       | T1                                                                                                                                                             | T2                                                                                                     | T3                                                                                   | T4                   | T5 | T6               |
| Firedamp-protection  | I     | Methane (firedamp)                                                                                                                                             | -                                                                                                      | -                                                                                    | -                    | -  | -                |
| Explosion protection | IIA   | Acetone, ammonia, benzene, acetic acid, ethane, ethyl acetate, ethyl-chloride, carbon monoxide, methane (firedamp) methanol, methyl-chloride, Propane, toluole | I amyl acetate, n butane, n butyl alcohol, cyclo-hexanon, acetic anhydride, natural gas, liquefied gas | Hexane, gasoline, Diesel fuels, aviation fuel, domestic oil, petroleum <sup>1)</sup> | Acetatedehyde, ether | -  | -                |
|                      | IIB   | Coke-oven gas, water gas (carburetted)                                                                                                                         | 1.3 butadiene ethyl alcohol, ethylene, ethylene oxyd                                                   | Petroleum <sup>1)</sup> , isoprene, hydrogen sulphide                                | Ethyl ether          | -  | -                |
|                      | IIC   | Hydrogen                                                                                                                                                       | Acetylene                                                                                              | -                                                                                    | -                    | -  | Carbon disulfide |

#### Note

1) depending on composition

Flammable gases and vapors are classified by groups and temperature classes which are designated using short alphanumeric codes. Codes IIA to IIC refer to the group that defines the nature of the flameproof joint in the machines and codes T1-6 indicate the temperature class which stipulates the machine's permissible external temperature.

The group/temperature classes assigned to various gases and vapors are summarized in the table on top.

Note about the table:

Additional examples are provided in the publication "Safety engineering characteristics of combustible gases and vapors" by Nabert/Schön, Deutscher Eichverlag, Berlin.

Table of conformity certificates

| Frame size/series | CD ... <sup>1)</sup> |                   | BD ... <sup>2)</sup> | BD ... B(R) <sup>3)</sup> | CEIGL ... <sup>4)</sup> |
|-------------------|----------------------|-------------------|----------------------|---------------------------|-------------------------|
| 63                | 08 ATEX 1045 X       | IECEX PTB 06.0021 | 09 ATEX 1010 X       |                           |                         |
| 71                | 08 ATEX 1045 X       | IECEX PTB 06.0021 | 09 ATEX 1010 X       |                           |                         |
| 80                | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       | 08 ATEX 1110 X            | 08 ATEX 1111 X          |
| 90                | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       | 08 ATEX 1110 X            | 08 ATEX 1111 X          |
| 100               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       | 08 ATEX 1110 X            | 08 ATEX 1111 X          |
| 112               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       | 08 ATEX 1110 X            | 08 ATEX 1111 X          |
| 132               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       | 08 ATEX 1110 X            | 08 ATEX 1111 X          |
| 160               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       |                           | 08 ATEX 1111 X          |
| 180               | 08 ATEX 1056 X       | IECEX PTB 06.0022 | 09 ATEX 1012 X       |                           |                         |
| 200               | 08 ATEX 1081 X       | IECEX PTB 06.0023 | 09 ATEX 1013 X       |                           |                         |
| 225               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       |                           |                         |
| 250               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       |                           |                         |
| 280               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       |                           |                         |
| 315               | 08 ATEX 1087 X       | IECEX PTB 06.0009 | 09 ATEX 1011 X       |                           |                         |
| 355               | 08 ATEX 1082 X       | IECEX PTB 06.0024 | 09 ATEX 1014 X       |                           |                         |
| 400               | 08 ATEX 1083 X       | IECEX PTB 06.0036 | 09 ATEX 1015 X       |                           |                         |
| 450               | 08 ATEX 1085 X       | IECEX PTB 06.0037 | 09 ATEX 1006 X       |                           |                         |
| 500 <sup>5)</sup> |                      |                   | 09 ATEX 1008 X       |                           |                         |

**Notes on ATEX certificate (IECEX not a dust certificate)**

1) Standard series group IIC: II 2G Ex de IIC T3...T6 or Ex d IIC T3...T6 and/or II 2D Ex tD A21 IP6X T200 °C - T85 °C

2) Standard series group IIB: II 2G Ex de IIC T3...T6 or Ex d IIC T3...T6 and/or II 2D Ex tD A21 IP6XT200 T200 °C - T85 °C

3) Motors with integrated brake/rotary encoder group IIB incl. hydrogen: II 2G Ex de IIB+H2 T3...T6 or Ex d IIB + H2 T3...T6 and/or II 2D Ex tD A21 IP6X T200 °C - T85 °C

4) Inverter box of compact drive

5) Type dBD

**Conformity certificate for the explosion-protection rating "flameproof enclosure", temperature class T3...6 and dust protection through casings**

There are EC version-type conformity certificates for the version series CD ..., BD ..., dBD... and BD...B/R according to the Directive 94/9/EC (ATEX 95) as well as certificates according to the IECEX scheme. These certificates, issued up to temperature class T6 for three-phase asynchronous motors of the explosion protection rating "d", do not include any ratings for the motor type. They merely confirm that the motor is explosion protected due to its tested flameproof construction. In addition, the following ratings, which differ from the standard versions, are certified. These figures must be stated on the motor's rating plate:

- Rated voltages up to 1000 V, from frame size 355 up to 6600 V
- Rated frequency under or over 50 Hz, e.g. 60 Hz
- Pole-changing motors, e.g. 4/2 or 6/4 poles
- Ambient temperatures from -55 °C to 60 °C
- below -20 °C also without heating
- Altitude of installations above 1000 m m.s.l.
- Installation of TF (thermistors acc. to DIN 44081) as sole protection against inadmissible heating with operating mode S1, S2, S3, S4, S5, S6, S7, S8, S9 or S10. The sole protection is achieved only through a combination of TF and tripping devices with conformity mark II (2)G.
- If built-in TF is the only means of protection, power can be fed using any frequency inverter with variable frequency for the motor speed regulation.
- Temperature classes T3 to T6
- Dust explosion protection II 2D for zone 21 and II 3D for use in zone 22

It is permissible to design the motors for several of the aforementioned deviations (e.g. for operating mode S2 and ambient temperature 60 °C).

# Type Code

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Example:

| C |   |   | D |   |   | 112 |   |   | M  |    | -  | 2  |    |    |    |    |    | S  |    |    |
|---|---|---|---|---|---|-----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7   | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7   | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |

## Type Code

| No. | Feature                   | Code                                                         | Meaning                                                                                                                                                                                                             |
|-----|---------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Explosion protection type | d<br>B<br>C                                                  | <b>d</b> flameproof enclosure<br><b>B</b> -series<br><b>C</b> -series                                                                                                                                               |
| 2   | Explosion protection type | C<br>CE<br>B<br>e (E)<br>n                                   | flameproof enclosure <b>IIC</b><br>flameproof enclosure <b>IIC</b> + increased safety <b>e</b><br>flameproof <b>IIB</b><br><b>e</b> increased safety<br><b>n</b> non sparking version                               |
| 3   | Type of motor             | AR<br>D<br>DP<br>E<br>IGL                                    | <b>A</b> compartment<br><b>d</b> three-phase motor; production site<br><b>d</b> three-phase motor; production site Tamel, Poland<br><b>e</b> single-phase AC motor<br><b>IGL</b> Integrated inverter housing, Lenze |
| 4   | Height of shaft           | - 63<br>- 71<br>...                                          | Shaft height <b>63</b><br>etc.                                                                                                                                                                                      |
| 5   | Core length               | K, S<br>M<br>L<br>L1<br>...                                  | <b>k</b> short<br><b>m</b> edium<br>long<br>etc..                                                                                                                                                                   |
| -   | Hyphen                    |                                                              |                                                                                                                                                                                                                     |
| 6   | No. of poles              | 4<br>8/4<br>12/8/4<br>...                                    | <b>4</b> -pole<br><b>8/4</b> -pole<br><b>12/8/4</b> -pole                                                                                                                                                           |
| 7   | Version                   | The naming sequence must be as follows:                      |                                                                                                                                                                                                                     |
|     | X                         | increased power                                              |                                                                                                                                                                                                                     |
|     | Y                         | High efficiency according to Australian MEPS standard        |                                                                                                                                                                                                                     |
|     | Y2                        | High efficiency IE2 acc. to EN 60034-30                      |                                                                                                                                                                                                                     |
|     | Y3                        | High efficiency IE3 acc. to EN 60034-30                      |                                                                                                                                                                                                                     |
|     |                           | High-voltage motor                                           |                                                                                                                                                                                                                     |
|     | A                         | Axial fan, dependent on direction of rotation, noise class 2 |                                                                                                                                                                                                                     |
|     | AR                        | Axial fan reduced, noise class 3                             |                                                                                                                                                                                                                     |
|     | W                         | Water-cooled, noise class 4                                  |                                                                                                                                                                                                                     |
|     | B                         | B Spring-loaded brake (quiescent current)                    |                                                                                                                                                                                                                     |
|     | D                         | D Terminal box - flameproof enclosure                        |                                                                                                                                                                                                                     |
|     | E                         | E Terminal box - increased safety                            |                                                                                                                                                                                                                     |
|     | F                         | F axial fan with external drive                              |                                                                                                                                                                                                                     |
|     | I                         | I integrated inverter                                        |                                                                                                                                                                                                                     |
|     | T                         | IT network                                                   |                                                                                                                                                                                                                     |
|     | K                         | K Cable type                                                 |                                                                                                                                                                                                                     |
|     | O                         | O without fan                                                |                                                                                                                                                                                                                     |
|     | R                         | R integrated sensor (resolver)                               |                                                                                                                                                                                                                     |
|     | S                         | Special brake type K (attached brake)                        |                                                                                                                                                                                                                     |
|     | SV                        | Special brake type V (DS-attached)                           |                                                                                                                                                                                                                     |
|     | SVN                       | Special brake type V non drive end (NS-attached)             |                                                                                                                                                                                                                     |
|     | U                         | U peak voltage stability 2.15 kV                             |                                                                                                                                                                                                                     |
|     | 0, 1, 2, ...              | Design No.                                                   |                                                                                                                                                                                                                     |

If not specified, single-position could be dropped.

# Mountings

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Up to frame size 355 - any number of poles - the motor bearings are designed so that they can be used as described below without modification:

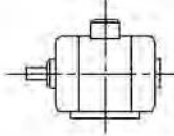
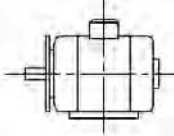
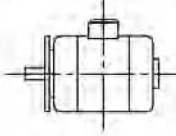
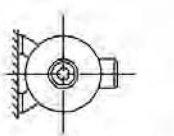
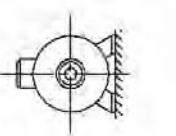
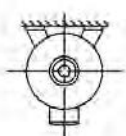
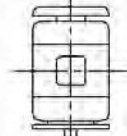
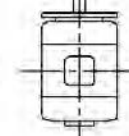
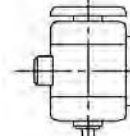
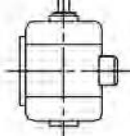
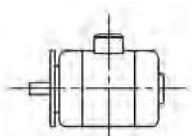
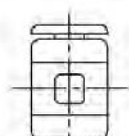
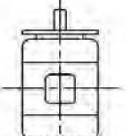
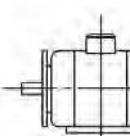
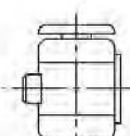
- IM B3 as IM B6, IM B7, IM B8, IM V5\*, IM V6\*
- IM B5 as IM V1\*, IM V3\*
- IM B35 as IM V15\*, IM V35\*
- IM B14 as IM V18, IM V19

Exception: For the vertical version types marked with \*, protective devices must be fitted to provide protection against dripping water and to prevent foreign bodies from falling into the units.

High-voltage motors from size 400 are available in the versions IM B3, IM B35 and IM V1.

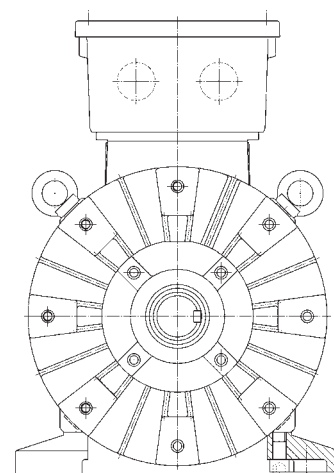
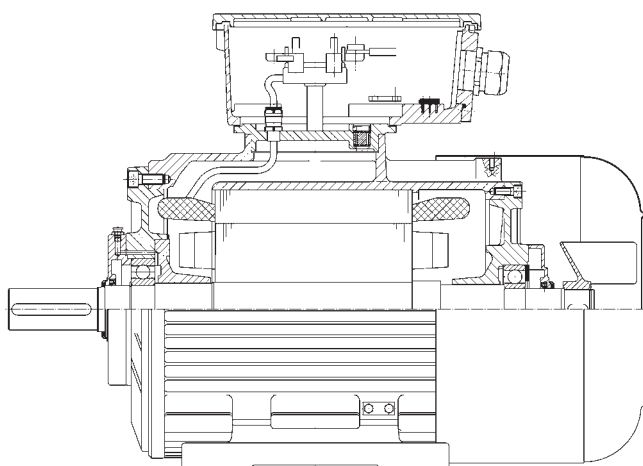
## Available versions according to DIN IEC 60034 Part 7

## Other designs on request

|                                                                                     |                                                                                                        |                                                                                                                                  |                                                                                                                               |                                                                                                                                                    |                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                      |                                                |                                            |                                                                |                                                                                                                                                                                   |
| IEC Code I<br>IEC Code II<br>Explanation                                            | IM B3<br>IM 1001<br>Foot mounting,<br>feet at bottom                                                   | IM B35<br>IM 2001<br>Foot mounting, feet<br>at bottom, with additional<br>flange, with access<br>from housing side               | IM B5<br>IM 3001<br>Flange bearing plate<br>on drive side, with<br>access from<br>housing side                                | IM B6<br>IM 1051<br>Foot mounting, feet<br>to the left side (viewed<br>from drive side)                                                            | IM B7<br>IM 1061<br>Foot mounting, feet<br>to the right side (viewed<br>from drive side)                                                                                          |
|  |                     |                                               |                                           |                                                               |                                                                                                                                                                                   |
| IEC Code I<br>IEC Code II<br>Explanation                                            | IM B8<br>IM 1071<br>Foot mounting,<br>feet on top                                                      | IM V1<br>IM 3011<br>Flange mounting on<br>drive side of the flange,<br>with access from housing<br>side, drive side<br>at bottom | IM V3<br>IM 3031<br>Flange mounting on<br>drive side of the flange,<br>with access from housing<br>side, drive side<br>on top | IM V5<br>IM 1011<br>Foot mounting,<br>drive side at bottom                                                                                         | IM V6<br>IM 1031<br>Foot mounting,<br>drive side on top                                                                                                                           |
|  |                     |                                               |                                           |                                                               |                                                                                                                                                                                   |
| IEC Code I<br>IEC Code II<br>Explanation                                            | IM B14<br>IM 3601<br>Flange mounting on<br>drive side of the flange,<br>no access from<br>housing side | IM V18<br>IM 3611<br>Flange mounting on<br>drive side of the flange,<br>no access from housing<br>side, drive side<br>on top     | IM V19<br>IM 3631<br>Flange mounting on drive<br>side of the flange,<br>no access from housing<br>side, drive side<br>on top  | IM B34<br>IM 2101<br>Foot mounting, feet<br>at bottom, with additional<br>flange on drive side of<br>the flange, no access<br>from housing<br>side | IM V15 / IM V35<br>IM 2011 / IM 2031<br>Foot mounting, with<br>additional flange on<br>drive side of the<br>flange, drive side at<br>bottom/top, with access<br>from housing side |

# Materials and Labeling

for housings, end shields, terminal boxes  
and fans



## Materials for housings, end shields, terminal boxes, and fans

| Frame size | Housing type   | End shield     | Terminal compartment | Fan cowl       | Radial-flow fan |                | Axial-flow fan          |                         |
|------------|----------------|----------------|----------------------|----------------|-----------------|----------------|-------------------------|-------------------------|
|            | Material       | Feet           |                      | Ex e           | Ex d            |                | 2-pole                  | 4, 6, 8-pole            |
| 63         | Grey cast iron | Steel          | Grey cast iron       | Grey cast iron | Grey cast iron  | not applicable | not applicable          | not applicable          |
| 71         |                | Grey cast iron |                      | bolted         | bolted          | Sheet steel    | Plastic <sup>1)</sup>   | Plastic <sup>1)</sup>   |
| 80         |                | bolted         |                      |                |                 |                |                         |                         |
| 90         |                |                |                      |                |                 |                |                         |                         |
| 100        |                |                |                      |                |                 |                |                         |                         |
| 112        |                |                |                      |                |                 |                |                         |                         |
| 132        |                |                |                      |                |                 |                |                         | Plastic                 |
| 160        |                |                |                      |                |                 |                |                         |                         |
| 180        |                |                |                      |                |                 |                |                         |                         |
| 200        |                |                |                      |                |                 |                |                         |                         |
| 225        |                |                |                      |                |                 |                | Cast-alumi-             | Cast-alumi-             |
| 250        |                |                |                      |                |                 |                | num-alloy <sup>2)</sup> | num-alloy <sup>2)</sup> |
| 280        |                |                |                      |                |                 |                |                         |                         |
| 315        |                |                |                      |                |                 |                |                         |                         |
| 355        |                |                |                      |                | Welded          |                | Welded                  | Welded                  |
| 400        | Welded         | Welded         |                      |                | steel           |                | steel                   | steel                   |
| 450        | steel          | steel          | Welded Steel         |                |                 |                |                         |                         |

### Note

1) For special operating conditions, e.g. low temperature, fans made of cast aluminum or steel can also be supplied for the frame size range 63 to 160.

2) Fans of steel on request

### Labeling

Rating and test information is contained on a single name plate attached to the housing. The Ex e terminal compartment cover contains a duplicate as per VIK regulations. The name plates are made of stainless steel (material 1.4300).

# Installation at Normal, High and Low Temperatures

The standard motors are suitable for installation outdoors, in humid and dusty atmospheres (industrial climate) at ambient temperatures from -20 °C to +40 °C. Special-purpose versions for an extended ambient temperature range from -55 °C to +60 °C are available. In these cases a corresponding construction designation is made on the test label.

At ambient temperatures of more than +30 °C, the motors must not be exposed to direct sunlight. The motors can be fitted with an optional sunroof for this purpose.

At ambient temperatures of more than +40 °C performance can be impaired depending on the motor version (see page 51).

For temperatures lower than -20 °C, the motors are supplied in two versions, with or without heating. In case of implementations with heating, the heating must be used to prevent a drop of the motor temperature below -20 °C (see page 48). The motor is heated through the motor winding.

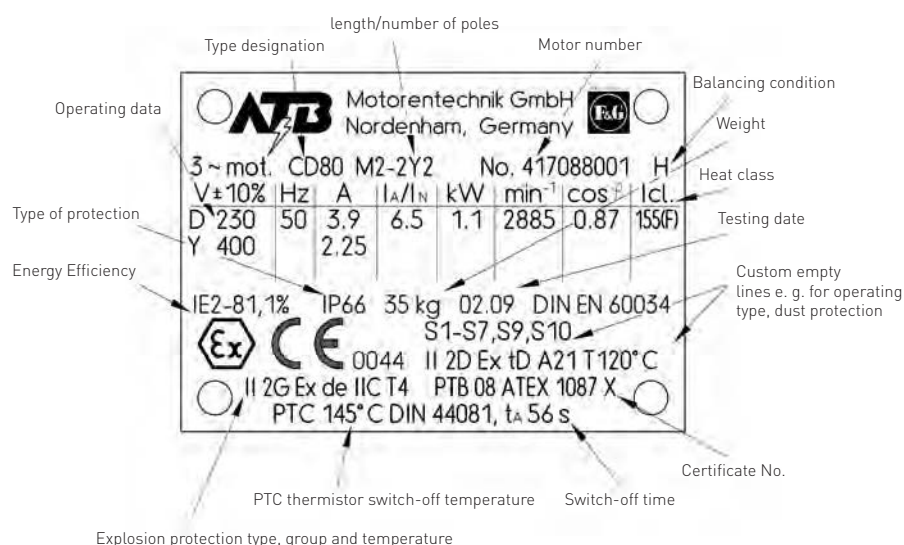
Motors intended for on-board or offshore installation can be manufactured according to the regulations of the respective classification authorities. To ensure safe on-deck installation, the motors have a series of additional design features (see page 37). For motors of this type, construction-type conformity certificates from different ship classification authorities, e.g. Germanischer Lloyd, are available.

## Use at low temperatures with heating through the motor winding

| Component              | - 40 °C  |
|------------------------|----------|
| Identification         | normal   |
| Heater                 | required |
| Fan                    | special  |
| Cable entry            | special  |
| Plug                   | special  |
| Temperature monitoring | special  |

## Use at low temperatures without heating

| Component                 | - 40 °C   | - 55 °C   |
|---------------------------|-----------|-----------|
| Identification            | special   | special   |
| Item testing - components | increased | increased |
| Steel parts               | sonder    | special   |
| Fastening screws          | sonder    | special   |
| Fan                       | sonder    | special   |
| Eye bolts                 | special   | special   |
| shaft seal                | normal    | special   |
| Bearing grease            | normal    | special   |
| Bearing                   | normal    | special   |
| Cable entry               | special   | special   |
| Plug                      | special   | special   |
| Paintwork                 | normal    | special   |



Example of a rating plate

# Protection Types, Paintwork, Tropicalized Version

20

| Paintwork systems     | Standard paintwork                                                                                                                                         | Standard paintwork, special colors according to RAL       | Special interior paintwork                                      | Acid protection + Inshore                                  | Offshore Standard (ST)                                                                             | Offshore Spezial (SP)                                            | Offshore acc. to NORSOK (NO)                                            |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------|
| Pretreatment of parts | All parts cleaned and degreased, sandblasted according to SA 2,5 ISO 8501-1)                                                                               |                                                           |                                                                 |                                                            |                                                                                                    |                                                                  |                                                                         |
| 1. Primer             | For cast surfaces<br>Single component alkyd resin base<br>min. 20 µm<br>Steel surfaces<br>Single component product based on polyvinylbutyral<br>min. 25 µm |                                                           |                                                                 |                                                            |                                                                                                    | Two-component zinc epoxy paint<br>min. 70 µm                     | Two-component Zinc epoxy primer with high zinc content<br>min. 75 µm    |
| 2. Primer             |                                                                                                                                                            |                                                           | Two-component polyacrylic base, low solvent, content min. 60 µm | Two-component epoxy primer, min. 120 µm                    |                                                                                                    | Two-component, polyacrylic base, low solvent content, min. 60 µm | Two-component epoxy primer/coat with high solids content<br>min. 175 µm |
| Top coat              | Two-component acrylic resin, single coat paint, min. 60 µm                                                                                                 | Two-component acrylic resin, single coat paint min. 60 µm |                                                                 | Two-component acrylic resin, single coat paint, min. 80 µm |                                                                                                    |                                                                  | Two-component acrylic top coat min. 60 µm                               |
| Paint thickness       | min. 80 µm                                                                                                                                                 | min. 80 µm                                                | min. 80 µm                                                      | min. 160 µm                                                | min. 200 µm                                                                                        | min. 210 µm                                                      | min. 310 µm                                                             |
| Color                 | RAL 5009                                                                                                                                                   | RAL                                                       |                                                                 | RAL 7031, 7032 ...                                         |                                                                                                    |                                                                  | RAL 7038                                                                |
| Mechanical strength   | Non-abrasive, elastic, scratch-resistant impact-resistant                                                                                                  |                                                           |                                                                 |                                                            |                                                                                                    |                                                                  |                                                                         |
| Corrosion resistance  | resistant to water, steam and saltwater                                                                                                                    |                                                           |                                                                 |                                                            | Highly resistant to water, steam and saltwater                                                     |                                                                  |                                                                         |
| Chemical resistance   | Resistant to solvents, chemicals, synthetic coolants, hydraulic liquids and cleaning agents                                                                |                                                           |                                                                 |                                                            | Highly resistant to solvents, chemicals, synthetic coolants, hydraulic liquids and cleaning agents |                                                                  |                                                                         |
| Temperature range     | -40 °C to +130 °C                                                                                                                                          |                                                           | -55 °C to +130 °C                                               |                                                            |                                                                                                    |                                                                  |                                                                         |

**Note:** Custom paintwork available on request.

## Available protection types to DIN IEC 60034-5

| Temperature class<br>Height of shaft | T4<br>RT ≤ 40 °C   | T4<br>RT > 40 ≤ 60 °C | T6<br>RT ≤ 40 °C |
|--------------------------------------|--------------------|-----------------------|------------------|
| 63-450                               | IP55               | IP55 <sup>2)</sup>    | IP55             |
| 63-450                               | IP56               | -                     | -                |
| 63-355 <sup>3)</sup>                 | IP66 <sup>1)</sup> | -                     | -                |
| 63-315 <sup>4)</sup>                 | IP55               | IP55 <sup>2)</sup>    | -                |

**Note:**

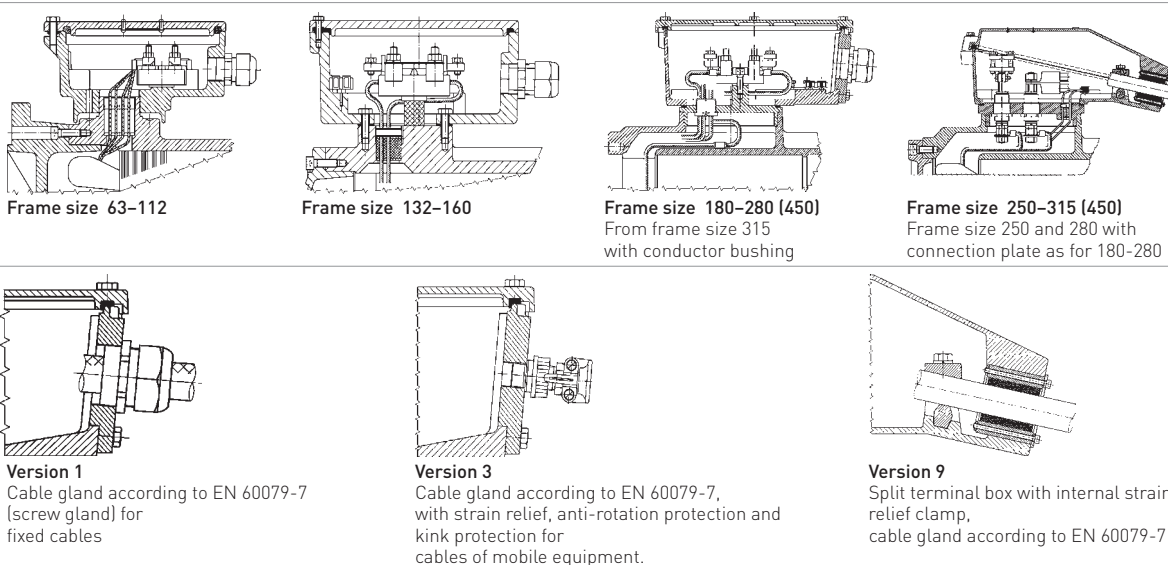
- 1) IP66 not covered by DIN EN 60034 Part 5
- 2) Output adaptation required
- 3) Larger motors available on request
- 4) Type CD ... X

## Tropicalized version

We recommend the following version for use in the special climatic conditions of the tropics:

- Protection type IP56
- Stainless steel screws
- Double impregnated stator winding
- Special interior paintwork
- Inshore Paintwork

This ensures optimum protection against humidity and mildew.



## Protection type

For the gas explosion protection according to EN 60079-7 of the explosion protection rating "increased safety" Ex e II, as well as the protection type IP56 according to DIN EN 60034 Part 5 or according to EN 60079-1, the terminal boxes meet the explosion protection rating Ex d IIC. For dust explosion protection they are implemented in the protection type IP 66 according to EN 61241-1. In case of explosion protection Ex e II and dust explosion protection they are provided with a cable entry corresponding to the protection type and an oil-resistant cover seal. The cover fixing screws are protected against corrosion and captive mounted (not for high voltage). Cable entries with Ex d IIC explosion protection available on request.

## Position

The terminal boxes in the standard version are fitted to the top of the machine. On request they can also be fitted from the side. From frame size 63, they can be rotated by 4 x 90 degrees to enable connection from all directions. From frame size 132, this can be achieved without rotating the connection plate. The rotation of the main terminal box may be restricted if additional terminal boxes are fitted.

## Power line bushings and terminals

The winding end leads are fed into the terminal box through flameproof cable entries.

For low-voltage motors multiple penetration or single penetration systems are used for AC voltages up to at least 690 V.

Special versions for 1100 V are also available (extra-cost option). High-voltage motors are fitted with single penetration systems according to the rated voltage. For frame sizes 315-450, the terminals for connection without cable lugs are placed directly on the conductor bushings.

## Terminal boxes, standard version Ex e II

The terminal boxes of the low voltage motors have metric threads, assigned in accordance with DIN 42 925 with cable glands to DIN EN 50 262, certified to DIN EN 60079-7. For frame size 180 and above, they are equipped with a screw-on plate. Above frame size 250, longitudinally split terminal boxes are also available. An additional terminal box for thermal monitoring or anti-condensation heaters is also available above frame size 132. It is bolted to the motor terminal box or, on frame sizes 355 to 450, fitted to the housing. The high-voltage motor terminal boxes conform to DIN 42 962. On request, the star point can be located in a second terminal box. The boxes are protected to Ex e II "increased safety", as defined by EN 60079-7, and are supplied in Version 9. The various cable gland components (extra-cost option) and their thread sizes are listed in the table on page 22.

# Terminal Boxes

22

## Mains cable entries for Ex e terminal boxes

| Ver-<br>sion | Size                             | 63            | 71 | 80 | 90 | 100         | 112 | 132 | 160         | 180 | 200         | 225                            | 250         | 280 | 315                            | 355           | 400–450       | high<br>voltage |
|--------------|----------------------------------|---------------|----|----|----|-------------|-----|-----|-------------|-----|-------------|--------------------------------|-------------|-----|--------------------------------|---------------|---------------|-----------------|
| 1            | Thread<br>type                   | 1x M25 x1,5   |    |    |    | 1x M32 x1,5 |     |     | 1x M40 x1,5 |     | 1x M50 x1,5 |                                | 1x M63 x1,5 |     |                                | not available |               |                 |
|              | For Cable<br>External dia.<br>mm | 13–19         |    |    |    | 12–21       |     |     | 17–28       |     | 21–35       |                                | 27–48       |     |                                | not available |               |                 |
| 3            | Thread<br>type                   | 1x M25 x1,5   |    |    |    | 1x M32 x1,5 |     |     | 1x M40 x1,5 |     | 1x M50 x1,5 |                                | 1x M63 x1,5 |     |                                | 1x M80 x 2    |               | on request      |
|              | For Cable<br>External dia.<br>mm | 11–16         |    |    |    | 15–20       |     |     | 19–27       |     | 26–34       |                                | 35–46       |     |                                | 64–68         |               | on request      |
| 9            | For Cable<br>External dia.<br>mm | not available |    |    |    |             |     |     |             |     |             | 1x dia. 48–70<br>2x dia. 26–48 |             |     | 1x dia. 48–70<br>2x dia. 48–70 |               | 1x dia. 26–48 |                 |

### Notes

From size 132 in pole-changing version or Y/A startup 2 cable entries for each box. For thermal monitoring with all versions there is 1 additional cable gland (M25 x 1.5). For heating with all versions there is 1 additional screw gland (M25 x 1.5). For rated currents in excess of 400A the terminal boxes are fitted with 2 cable entries.

 = Standard version

## Possible cross-sections with Ex e for low voltage

| Frame size | Max. cross-section<br>[mm²] | Max. rated current<br>[A] | Terminal type                    | Number of<br>terminals | Thread size |
|------------|-----------------------------|---------------------------|----------------------------------|------------------------|-------------|
| 63–112     | 4                           | 25                        | Clamp terminal <sup>2)</sup>     | 6                      | M5          |
| 132, 160   | 10                          | 63                        | Clamp terminal <sup>2)</sup>     | 6                      | M6          |
| 180–225    | 70                          | 100                       | Saddle terminal <sup>2)</sup>    | 6                      | M8          |
| 250–280    | 120                         | 250                       | Saddle terminal <sup>2)</sup>    | 6                      | M12         |
| 315        | 150                         | 315 <sup>1)</sup>         | Round terminal <sup>2)</sup>     | 6                      | M12         |
| 355–450    | 300                         | 400 <sup>1)</sup>         | Round terminal <sup>2)</sup>     | 6                      | M16         |
| 355–450    | 400                         | 630 <sup>1)</sup>         | Universal terminal <sup>3)</sup> | 6                      | M20         |

### Note

1) Material: Cu

2) suitable for connection with and without cable lugs

3) suitable for connection with cable lugs

## Terminal box Ex d IIC

The terminal boxes have the explosion protection rating Ex d IIC according to EN 60079-1. A threaded bore to DIN ISO 13 is standard on all terminal boxes. On request, different thread types can also be supplied, e.g. NPT. Please specify the required thread dimensions when placing your order.

**Note:** Cable gland parts in protection type Ex d IIC housings must also conform with and be certified to EN 60079-1. These parts are not included in the scope of delivery. Explosion-proof terminal boxes can be supplied for high-voltage motors.

## Entry thread for Ex d terminal boxes for low-voltage motors

| Frame size                   | 63           | 71 | 80 | 90 | 100          | 112 | 132 | 160          | 180 | 200           | 225 | 250          | 280 | 315 | 355–450    |
|------------------------------|--------------|----|----|----|--------------|-----|-----|--------------|-----|---------------|-----|--------------|-----|-----|------------|
| Thread<br>type<br>ISO-DIN 13 | 1 x M25 x1,5 |    |    |    | 1 x M32 x1,5 |     |     | 1 x M40 x1,5 |     | 1 x M50 x 1,5 |     | 1 x M63 x1,5 |     |     | 1 x M80 x2 |
| Nema<br>type NPT             | 3/4"         |    |    |    | 1"           |     |     | 1 1/4"       |     | 1 1/2"        |     | 2"           |     |     | 3"         |

**Note:** For thermal monitoring with all versions an additional thread 1 x M25 x1.5 or 1 x NPT 1/2" is available on request.

# Direct Cable Connection

Connecting cable, Series ...K

23

## 3 ends 400 V<sup>1)</sup>, 6 ends 400/690 V<sup>1)</sup> - Cable NSSHöu

| Frame size | Number of poles | 3 winding end leads + PE 6 winding end leads<br>- starting DOL |                                   | + PE<br>- Y / Δ startup<br>- pole-changing |                                   |
|------------|-----------------|----------------------------------------------------------------|-----------------------------------|--------------------------------------------|-----------------------------------|
|            |                 | without temperature monitoring                                 | with temperature monitoring       | without temperature monitoring             | with temperature monitoring       |
| 63         | 2-4             | 1 cable                                                        | 1 cable                           | 1 cable                                    | 1 cable                           |
| 71         | 2-8             | 4 strands                                                      | 7 strands                         | 7 strands                                  | 10 strands                        |
| 80         | 2-8             | cross-section 1,5 mm <sup>2</sup>                              | cross-section 1,5 mm <sup>2</sup> | cross-section 1,5 mm <sup>2</sup>          | cross-section 1,5 mm <sup>2</sup> |
| 90         | 2-8             | max. 20 A                                                      | max. 20 A                         | max. 20 A                                  | max. 20 A                         |
| 100        | 2-8             | outer dia approx. 13 mm                                        | outer dia approx. 17,5 mm         | outer dia approx. 17,5 mm                  | outer dia approx. 19,5 mm         |
| 112        | 2-8             |                                                                |                                   |                                            |                                   |
| 132        | 2-8             | 1 cable                                                        | 2nd additional                    | 2 cables                                   |                                   |
| 160        | 2-8             | 4 strands                                                      | cable with 4 strands              | 4 strands each                             |                                   |
|            |                 | cross-section 4 mm <sup>2</sup>                                | cross-section 1,5 mm <sup>2</sup> | cross-section 4 mm <sup>2</sup>            |                                   |
|            |                 | max. 36 A                                                      | max. 20 A                         | max. 36 A                                  |                                   |
|            |                 | outer dia approx. 18 mm                                        | outer dia approx. 13 mm           | outer dia approx. 18 mm                    |                                   |
| 180        | 2-8             | 1 cable                                                        |                                   |                                            | third additional                  |
| 200        | L1-2            | 4 strands                                                      |                                   |                                            | cable with 4 strands              |
|            | 4-8             | cross-section 10 mm <sup>2</sup>                               |                                   |                                            | cross-section 1,5 mm <sup>2</sup> |
|            |                 | max. 65 A                                                      |                                   |                                            | max. 20 A                         |
|            |                 | outer dia approx. 24 mm                                        |                                   |                                            | outer dia approx. 13 mm           |
|            | L2-2            | 1 cable                                                        |                                   | 2 cables                                   |                                   |
| 225        | 2-4             | 4 strands                                                      |                                   | 4 strands each                             |                                   |
|            |                 | cross-section 16 mm <sup>2</sup>                               |                                   | cross-section 16 mm <sup>2</sup>           |                                   |
|            |                 | max. 87 A                                                      |                                   | max. 87 A                                  |                                   |
|            |                 | outer dia approx. 28 mm                                        |                                   | outer dia approx. 28 mm                    |                                   |
| 250        | 2-4             | only for 500 V                                                 |                                   |                                            |                                   |
|            |                 | 1 cable                                                        |                                   |                                            |                                   |
|            |                 | 4 strands                                                      |                                   |                                            |                                   |
|            |                 | cross-section 16 mm <sup>2</sup>                               |                                   |                                            |                                   |
|            |                 | max. 87 A                                                      |                                   |                                            |                                   |
|            |                 | outer dia approx. 28 mm                                        |                                   |                                            |                                   |
| 280        | 2-8             | only for 690 V                                                 |                                   |                                            |                                   |

### Note:

Cable included. Cable length 1.5 m. Special lengths on request.

1) Standard rating 50 Hz. Admissible currents must be taken into account for different specifications.

Motor with direct cable connection

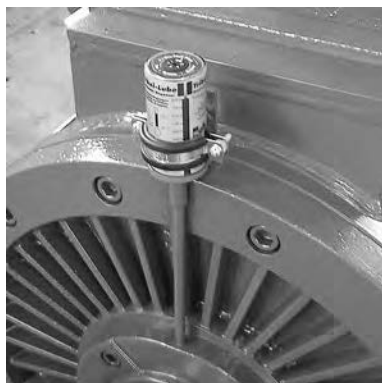


## Bearing seals

The motors are fitted with external radial or axial seals. Vertical construction types with upward-facing shaft can be fitted with a combined radial and axial seal on request. The seals prevent ingress of water along the shaft into the bearing housing. They have good abrasion resistance and thermal stability and are also resistant to mineral oils, saline solutions and diluted acids. Seals for media not listed above are available on request.

## Lubrication

The bearings of motors up to frame size 280 have lifetime lubrication. The deep-groove ball bearings, which are sealed on both sides, are pre-packed with polyurea fiber grease by the bearing manufacturer. They are therefore maintenance-free for the time specified in the upper table on page 31.



Long-term dispenser

## Relubrication and relubrication schedules

Motors above frame size 315 are equipped with relubrication devices with grease distributors. Relubrication devices are also fitted to motors from frame size 225 that are equipped with roller bearings for heavy loads.

Bearings with relubrication devices are packed with lithium-saponified grease. The relubrication intervals are listed in the lower table on page 31.

Lubrication intervals must be halved for vertical designs (V design).

The relubrication must be implemented with the same grease type, i.e. grease with same saponification component and same consistency. ATB employs a lithium-saponified anti-friction roller bearing grease with a drop point above 185 °C (e.g. Esso Unirex N 3), see also motor label.

The collecting chamber in the bearing cover is large enough to contain the used grease accumulating during normal service life. Flat grease nipples to DIN 3404 with thread size M10 x 1 are used for lubrication.

It is possible to employ long-term dispensers for relubrication. They remain free from maintenance for max. 12 months, according to case of application. The explosion protection rating of the dispensers is II 2 G Ex ib IIC T6.

## Nominal service life

In pure coupling operation, the theoretical service life is more than 50,000 operating hours.

The max. admissible radial and axial loads are specified in the tables on pages 27 to 29. The calculations are based on a service life of the roller bearings of 20,000 hours.

Drives with higher radial loads such as belt drives can be designed with roller bearings on request, see page 29. The minimum radial load specified must be maintained in order to ensure that the bearings roll correctly. For higher axial bearing loads such as occurring with helical gear, special solutions are available on request.

## IE1 Version

| Frame size series CD ... | Number of poles | Drive-end bearing, all construction types                  |                                  |        | Non-drive end (all construction types) floating bearings) |
|--------------------------|-----------------|------------------------------------------------------------|----------------------------------|--------|-----------------------------------------------------------|
|                          |                 | Standard (fixed bearings)                                  | reinforced bearing <sup>2)</sup> |        |                                                           |
| 63                       | 2, 4            | 6202 2ZR                                                   | -                                | -      | 6004 2ZR                                                  |
| 71                       | 2, 4, 6, 8      | 6202 2ZR                                                   | -                                | -      | 6004 2ZR                                                  |
| 80                       | 2, 4, 6, 8      | 6204 2ZR                                                   | -                                | -      | 6204 2ZR                                                  |
| 90                       | 2, 4, 6, 8      | 6205 2ZR                                                   | -                                | -      | 6205 2ZR                                                  |
| 100                      | 2, 4, 6, 8      | 6206 2ZR C3                                                | -                                | NU 206 | 6206 2ZR C3                                               |
| 112                      | 2, 4, 6, 8      | 6306 2ZR C3                                                | -                                | NU 306 | 6206 2ZR C3                                               |
| 132                      | 2, 4, 6, 8      | 6308 2ZR C3                                                | -                                | NU 308 | 6308 2ZR C3                                               |
| 160                      | 2, 4, 6, 8      | 6309 2ZR C3                                                | -                                | NU 309 | 6309 2ZR C3                                               |
| 180                      | 2, 4, 6, 8      | 6310 2ZR C3                                                | -                                | NU 310 | 6310 2ZR C3                                               |
| 200                      | 2, 4, 6, 8      | 6312 2ZR C3                                                | -                                | NU 312 | 6312 2ZR C3                                               |
| 225                      | 2, 4, 6, 8      | 6313 2ZR C3                                                | -                                | NU 313 | 6313 2ZR C3                                               |
| 250                      | 2, 4, 6, 8      | 6315 2ZR C3                                                | -                                | NU 315 | 6313 2ZR C3                                               |
| 280                      | 2, 4, 6, 8      | 6316 2ZR C3                                                | -                                | NU 316 | 6315 2ZR C3                                               |
| 315                      | 2               | 6316 C3                                                    | -                                | NU 316 | 6316 C3                                                   |
|                          | 4, 6, 8         | 6318 C3                                                    | -                                | NU 318 | 6316 C3                                                   |
| 355                      | 2               | 6318 C3                                                    | -                                | NU 318 | 6318 C3                                                   |
|                          | 4, 6, 8         | 6320 C3                                                    | -                                | NU 320 | 6318 C3                                                   |
|                          |                 | Only construction type V1 <sup>1)</sup> , V3 <sup>1)</sup> |                                  |        | Construction type B3, B5                                  |
| 400                      | 2               | 6318 C3                                                    | 7318 B                           | NU 318 | 6318 C4                                                   |
|                          | 4, 6, 8         | 6322 C3                                                    | 7322 B                           | NU 322 | 6320 C3                                                   |
| 450                      | 2               | 6318 C3                                                    | 7318 B                           | NU 318 | 6318 C4                                                   |
|                          | 4, 6, 8         | 6324 C3                                                    | 7324 B                           | NU 324 | 6322 C3                                                   |

## Hinweis

1) for vertical operation only

2) Min. radial load required.

See page 29. Non-drive end designed as fixed bearing.

## Bearing-type codes:

example 6315.2Z.WT.C3

6315 = bearing size

2Z (2ZR) = non-rubbing

double seal

C3 = bearing clearance

WT = Polyurea grease

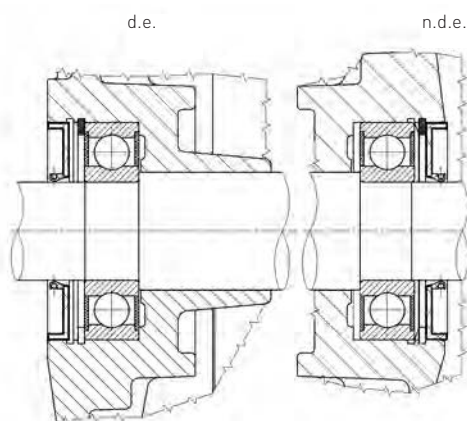
## IE2, IE3 and MEPS

| Series CD ...Y2,Y3,Y | Number of poles | Drive-end bearing all construction types |                                  |  | Non-drive-end bearings all construction types (floating bearings) |
|----------------------|-----------------|------------------------------------------|----------------------------------|--|-------------------------------------------------------------------|
|                      |                 | Standard (fixed bearings)                | reinforced bearing <sup>2)</sup> |  |                                                                   |
| 80                   | 2, 4, 6, 8      |                                          |                                  |  | 6205 2Z                                                           |
| 90                   | 2, 4, 6, 8      | 6206 2Z C3                               |                                  |  | 6206 2Z C3                                                        |
| 100                  | 2, 4, 6, 8      | 6306 2Z C3                               | NU 306                           |  | 6206 2Z C3                                                        |
| 112                  | 2, 4, 6, 8      | 6308 2Z C3                               | NU 308                           |  | 6308 2Z C3                                                        |
| 132                  | 2, 4, 6, 8      | 6308 2Z C3                               | NU 308                           |  | 6308 2Z C3                                                        |
| 160                  | 2, 4, 6, 8      | 6309 2Z C3                               | NU 309                           |  | 6309 2Z C3                                                        |
| 180                  | 2, 4, 6, 8      | 6310 2Z C3                               | NU 310                           |  | 6310 2Z C3                                                        |
| 200                  | 2, 4, 6, 8      | 6312 2Z C3                               | NU 312                           |  | 6312 2Z C3                                                        |
| 225                  | 2, 4, 6, 8      | 6313 2Z C3                               | NU 313                           |  | 6313 2Z C3                                                        |
| 250                  | 2, 4, 6, 8      | 6315 2Z C3                               | NU 315                           |  | 6313 2Z C3                                                        |
| 280                  | 2, 4, 6, 8      | 6316 2Z C3                               | NU 316                           |  | 6315 2Z C3                                                        |
| 315                  | 2               | 6316 C3                                  | NU 316                           |  | 6316 C3                                                           |
|                      | 4, 6, 8         | 6318 C3                                  | NU 318                           |  | 6316 C3                                                           |
| 355                  | 8               | 6320 C3                                  | NU 320                           |  | 6318 C3                                                           |
| Series CD ...XY      | Number of poles | Drive-end bearing all construction types |                                  |  | Non-drive-end bearings all construction types (floating bearings) |
|                      |                 | Standard (fixed bearings)                | reinforced bearing <sup>2)</sup> |  |                                                                   |
| 250S                 | 2, 4, 6, 8      | 6315 2Z C3                               | NU 315                           |  | 6313 2Z C3                                                        |
| 250M                 | 2, 4, 6, 8      | 6316 2Z C3                               | NU 316                           |  | 6315 2Z C3                                                        |
| 280S                 | 2, 4, 6, 8      | 6316 2Z C3                               | NU 316                           |  | 6315 2Z C3                                                        |
| 280M                 | 2               | 6316 C3                                  | NU 316                           |  | 6316 C3                                                           |
|                      | 4, 6, 8         | 6318 C3                                  | NU 318                           |  | 6316 C3                                                           |
| 315                  | 2               | 6316 C3                                  | NU 316                           |  | 6316 C3                                                           |
|                      | 4, 6, 8         | 6318 C3                                  | NU 318                           |  | 6316 C3                                                           |

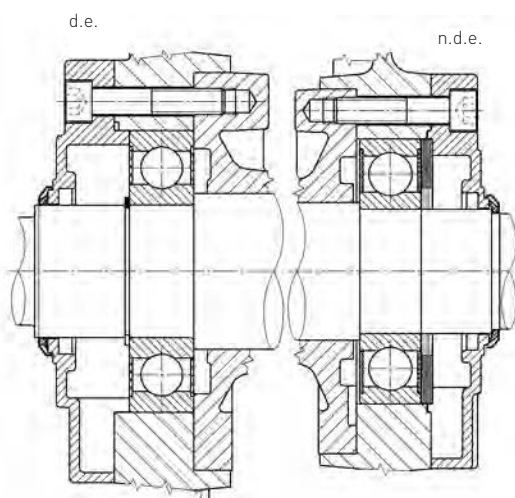
# Bearing

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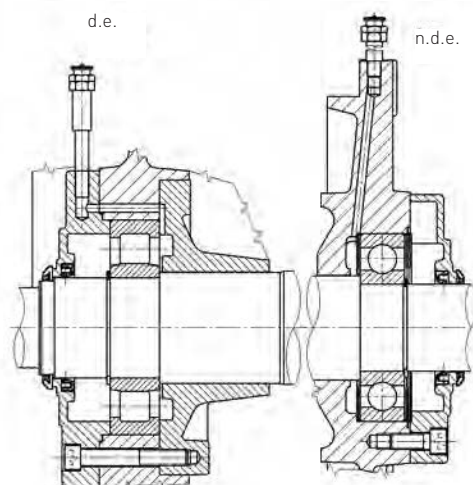
## Bearing and seal arrangement



Fixed bearing d.e. with radial shaft seal ring  
Standard for sizes 63 to 160

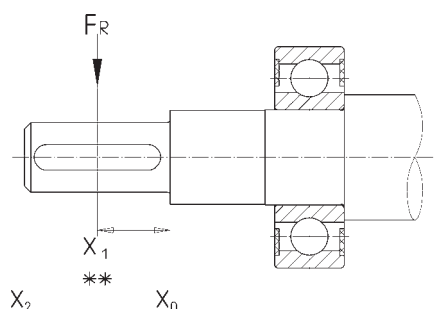


Fixed bearing d.e. with axial shaft seal ring  
Standard for sizes from 180



Reinforced bearing d.e. (floating bearing; optional from size 100)  
with relubrication (optional from size 225) and  
combination seal (optional from size 80)

## Permissible radial load, deep groove ball bearing



The distance of the point of application of force  $F_R$  from the shaft collar should be no greater than the length of the shaft end.

$F_R$  = max. radial axle load (e.g. overhung belt load + weight of belt pulley) [N]

$F$  = Belt pull [N] =  $\frac{2 \times K \times M}{D}$

$M$  = Torque [Nm] =  $\frac{9550 \times P}{n}$

$P$  = Rated motor output [kW]

$n$  = Rated motor speed [rpm]

$D$  = Pulley diameter [m]

$K$  = Pre-tension factor, dependent on belt type and approximated as follows:

$K = 3$  for normal flat belts without tensioning pulley

$K = 2$  for normal flat belts with tensioning

$K = 2.2$  for V-belts or special-purpose flat belts

Specifications from size 400 only apply to horizontal shafts.

Permissible radial bearing load  $F_R$  [N] (deep groove bearing)

| Frame size | Poles | $x_2$ | $x_1$ | $x_0$ |
|------------|-------|-------|-------|-------|
| 63         | 2     | 400   | 420   | 450   |
|            | 4     | 500   | 540   | 570   |
| 71         | 2     | 390   | 420   | 450   |
|            | 4     | 490   | 530   | 570   |
|            | 6     | 560   | 600   | 650   |
|            | 8     | 610   | 660   | 720   |
| 80         | 2     | 650   | 710   | 780   |
|            | 4     | 830   | 900   | 980   |
|            | 6     | 940   | 1020  | 1120  |
|            | 8     | 1040  | 1130  | 1240  |
| 80 Y       | 2     | 700   | 770   | 840   |
| 90         | 4     | 880   | 970   | 1060  |
|            | 6     | 1010  | 1100  | 1220  |
|            | 8     | 1110  | 1220  | 1340  |

| Frame size | Poles | $x_2$ | $x_1$ | $x_0$ |
|------------|-------|-------|-------|-------|
| 90 Y       | 2     | 950   | 1050  | 1160  |
| 100        | 4     | 1200  | 1310  | 1460  |
|            | 6     | 1360  | 1500  | 1670  |
|            | 8     | 1510  | 1660  | 1840  |
| 100 Y      | 2     | 1400  | 1540  | 1700  |
| 112        | 4     | 1760  | 1930  | 2130  |
|            | 6     | 2010  | 2200  | 2440  |
|            | 8     | 2220  | 2430  | 2690  |
| 112 Y      | 2     | 1960  | 2160  | 2400  |
| 132 (Y)    | 4     | 2450  | 2700  | 3000  |
|            | 6     | 2810  | 3090  | 3430  |
|            | 8     | 3110  | 3430  | 3810  |
| 160 (Y)    | 2     | 2340  | 2590  | 2890  |
|            | 4     | 2960  | 3270  | 3650  |
|            | 6     | 3370  | 3730  | 4160  |
|            | 8     | 3720  | 4110  | 4590  |
| 180 (Y)    | 2     | 3180  | 3530  | 3970  |
|            | 4     | 3970  | 4410  | 4960  |
|            | 6     | 4550  | 5060  | 5700  |
|            | 8     | 5010  | 5570  | 6270  |
| 200 (Y)    | 2     | 3900  | 4280  | 4700  |
|            | 4     | 4930  | 5410  | 6000  |
|            | 6     | 5650  | 6190  | 6900  |
|            | 8     | 6210  | 6800  | 7500  |
| 225 (Y)    | 2     | 4400  | 4800  | 5200  |
|            | 4     | 5300  | 5800  | 6500  |
|            | 6     | 6000  | 6700  | 7500  |
|            | 8     | 6700  | 7400  | 8300  |
| 250 (Y)    | 2     | 5300  | 5800  | 6400  |
|            | 4     | 6600  | 7200  | 8000  |
|            | 6     | 7600  | 8300  | 9200  |
|            | 8     | 8300  | 9100  | 10100 |
| 280 (Y)    | 2     | 5800  | 6200  | 6800  |
| 250M XY    | 4     | 7200  | 7800  | 8500  |
|            | 6     | 8400  | 9100  | 9900  |
|            | 8     | 7700  | 8700  | 10000 |
| 315 (Y)    | 2     | 5200  | 5600  | 5900  |
| 280M XY    | 4     | 7500  | 8100  | 8800  |
|            | 6     | 8400  | 9100  | 9900  |
|            | 8     | 7600  | 8232  | 8979  |
| 355 (Y)    | 2     | 6300  | 6600  | 7000  |
|            | 4     | 9200  | 9800  | 10400 |
|            | 6     | 10300 | 10900 | 11700 |
|            | 8     | 10280 | 10941 | 11692 |
| 400        | 2     | 5100  | 5400  | 5700  |
|            | 4     | 9300  | 10000 | 10800 |
|            | 6     | 10500 | 11300 | 12100 |
|            | 8     | 11400 | 12200 | 13100 |
| 450        | 2     | 4100  | 4400  | 4600  |
|            | 4     | 8300  | 8800  | 9500  |
|            | 6     | 9200  | 9900  | 10600 |
|            | 8     | 10100 | 10700 | 11500 |

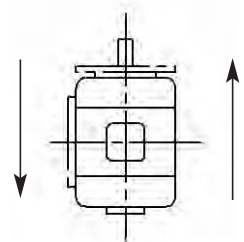
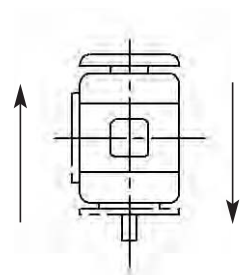
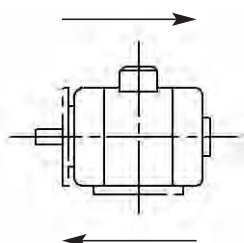
# Bearing

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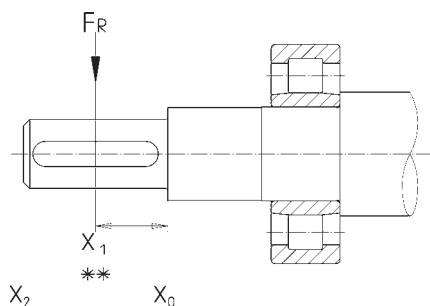
## Permissible axial load, deep groove ball bearing

permissible axial bearing load  $F_A$  [N]. 50 Hz

| For construction types | Frame size      | 3000 rpm<br>Load to |       | 1500 rpm<br>Load to |       | 1000 rpm<br>Load to |       | 750 rpm<br>Load to |       |
|------------------------|-----------------|---------------------|-------|---------------------|-------|---------------------|-------|--------------------|-------|
|                        |                 | ← N                 | → N   | ← N                 | → N   | ← N                 | → N   | ← N                | → N   |
| IM B3, IM B5, IM B35   | 63              | 200                 | 500   | 300                 | 600   | -                   | -     | -                  | -     |
|                        | 71              | 200                 | 500   | 300                 | 600   | 400                 | 700   | 500                | 800   |
|                        | 80              | 500                 | 700   | 700                 | 800   | 800                 | 1000  | 1000               | 1100  |
|                        | 80 Y / 90       | 500                 | 700   | 700                 | 900   | 900                 | 1100  | 1000               | 1200  |
|                        | 90 Y / 100      | 900                 | 1000  | 1200                | 1300  | 1400                | 1500  | 1500               | 1700  |
|                        | 100 Y / 112     | 1300                | 1400  | 1700                | 1800  | 2000                | 2200  | 2300               | 2400  |
|                        | 112 Y / 132 (Y) | 1700                | 2100  | 2300                | 2700  | 2800                | 3200  | 3100               | 3600  |
|                        | 160 (Y)         | 2100                | 2700  | 3000                | 3500  | 3500                | 4100  | 4000               | 4600  |
|                        | 180 (Y)         | 2500                | 3200  | 3400                | 4100  | 4100                | 4800  | 4600               | 5400  |
|                        | 200 (Y)         | 3200                | 4100  | 4400                | 5300  | 5300                | 6200  | 6100               | 6900  |
|                        | 225 (Y)         | 3400                | 4900  | 4800                | 6300  | 5700                | 7300  | 6600               | 8100  |
|                        | 250 (Y)         | 4300                | 5800  | 5900                | 7400  | 7100                | 8600  | 8100               | 9600  |
|                        | 280 (Y)         | 4500                | 6300  | 6200                | 8000  | 7600                | 9400  | 8500               | 10300 |
|                        | 315 (Y)         | 4100                | 5900  | 6600                | 8600  | 7800                | 9800  | 9100               | 11100 |
|                        | 355 (Y)         | 4700                | 6700  | 6800                | 10400 | 8400                | 12000 | 9900               | 13500 |
|                        | 400             | 4200                | 6200  | 7300                | 11300 | 8700                | 12700 | 9900               | 13900 |
|                        | 450             | 3700                | 5700  | 6300                | 10700 | 7900                | 12300 | 9100               | 13500 |
|                        |                 | ↓ N                 | ↑ N   | ↓ N                 | ↑ N   | ↓ N                 | ↑ N   | ↓ N                | ↑ N   |
| IM V1, IM V5, IM V15   | 63              | 200                 | 500   | 600                 | 400   | -                   | -     | -                  | -     |
|                        | 71              | 200                 | 500   | 300                 | 600   | 400                 | 700   | 500                | 800   |
|                        | 80              | 500                 | 700   | 700                 | 900   | 800                 | 1000  | 900                | 1200  |
|                        | 80 Y / 90       | 500                 | 800   | 700                 | 1000  | 800                 | 1200  | 900                | 1300  |
|                        | 90 Y / 100      | 800                 | 1100  | 1100                | 1400  | 1300                | 1600  | 1400               | 1800  |
|                        | 100 Y / 112     | 1200                | 1500  | 1600                | 2000  | 1900                | 2400  | 2200               | 2600  |
|                        | 112 Y / 132 (Y) | 1500                | 2300  | 2100                | 3000  | 2500                | 3500  | 2900               | 3900  |
|                        | 160 (Y)         | 1800                | 3100  | 2600                | 4000  | 3100                | 4700  | 3500               | 5200  |
|                        | 180 (Y)         | 2100                | 3700  | 2800                | 4900  | 3400                | 5600  | 4000               | 6300  |
|                        | 200 (Y)         | 2600                | 4900  | 3700                | 6300  | 4500                | 7300  | 5100               | 8200  |
|                        | 225 (Y)         | 2600                | 5900  | 3700                | 7700  | 4500                | 8900  | 5400               | 9800  |
|                        | 250 (Y)         | 3300                | 7100  | 4500                | 9300  | 5500                | 10700 | 6300               | 12000 |
|                        | 280 (Y)         | 3000                | 8300  | 4100                | 10800 | 5500                | 12100 | 6100               | 13700 |
|                        | 315 (Y)         | 600                 | 10400 | 1800                | 14900 | 2000                | 17600 | 3300               | 18900 |
|                        | 355 (Y)         | 100                 | 12800 | 700                 | 18800 | 1100                | 21900 | 2500               | 23400 |
|                        | 400             | 7300                | 0     | 19400               | 0     | 22100               | 0     | 23600              | 0     |
|                        | 450             | 4800                | 0     | 14700               | 0     | 16900               | 0     | 18000              | 0     |
|                        |                 | ↓ N                 | ↑ N   | ↓ N                 | ↑ N   | ↓ N                 | ↑ N   | ↓ N                | ↑ N   |
| IM V3, IM V6, IM V35   | 63              | 500                 | 200   | 600                 | 400   | -                   | -     | -                  | -     |
|                        | 71              | 500                 | 200   | 600                 | 400   | 700                 | 500   | 700                | 500   |
|                        | 80              | 600                 | 500   | 800                 | 700   | 900                 | 900   | 1100               | 1000  |
|                        | 80 Y / 90       | 700                 | 600   | 900                 | 800   | 1000                | 1000  | 1100               | 1100  |
|                        | 90 Y / 100      | 900                 | 900   | 1200                | 1300  | 1400                | 1500  | 1600               | 1700  |
|                        | 110 Y / 112     | 1300                | 1400  | 1700                | 1900  | 2000                | 2200  | 2300               | 2500  |
|                        | 112 Y / 132 (Y) | 2000                | 1900  | 2500                | 2600  | 2900                | 3100  | 3300               | 3400  |
|                        | 160 (Y)         | 2400                | 2600  | 3100                | 3500  | 3600                | 4200  | 4000               | 4700  |
|                        | 180 (Y)         | 2800                | 3000  | 3600                | 4100  | 4200                | 4900  | 4700               | 5600  |
|                        | 200 (Y)         | 3500                | 4100  | 4600                | 5400  | 5300                | 6500  | 5900               | 7300  |
|                        | 225 (Y)         | 4100                | 4400  | 5200                | 6200  | 6000                | 7400  | 6900               | 8300  |
|                        | 250 (Y)         | 4800                | 5600  | 6100                | 7700  | 7100                | 9200  | 7800               | 10500 |
|                        | 280 (Y)         | 4800                | 6500  | 5900                | 9000  | 7300                | 10300 | 7900               | 11900 |
|                        | 315 (Y)         | 2400                | 8600  | 3800                | 12900 | 4000                | 15600 | 5300               | 16900 |
|                        | 355 (Y)         | 2100                | 10800 | 4300                | 15200 | 4700                | 18300 | 6100               | 19800 |
|                        | 400             | 7300                | 0     | 19400               | 0     | 22100               | 0     | 23600              | 0     |
|                        | 450             | 4800                | 0     | 14700               | 0     | 16900               | 0     | 18000              | 0     |



## Permissible radial bearing load, cylindrical roller bearing



The distance of the point of application of force  $F_R$  from the shaft collar should be no greater than the length of the shaft end.

$F_R$  = max. radial axle load (e.g. overhung belt load + weight of belt pulley) [N]

$F$  = Belt load [N] =  $\frac{2 \times K \times M}{D}$

$M$  = Torque [Nm] =  $\frac{9550 \times P}{n}$

$P$  = Rated motor output [kW]

$n$  = Rated motor speed [rpm]

$D$  = Pulley diameter [m]

$K$  = Pre-tension factor, dependent on belt type and approximated as follows:

$K = 3$  for normal flat belts without tensioning pulley

$K = 2$  for normal flat belts with tensioning

$K = 2.2$  for V-belts or special-purpose flat belts

Specifications from size 400 only apply to horizontal shafts.

Permissible radial bearing load  $F_R$  [N] cylindrical roller bearing, min. load

| Frame size | Number of poles | $x_2$ | $x_1$ | $x_0$ | $F_{R \min}$ at $x_0$ |
|------------|-----------------|-------|-------|-------|-----------------------|
| 90 Y       | 2               | 2759  | 3033  | 3367  | 220                   |
|            | 4               | 3392  | 3729  | 4139  | 205                   |
| 100        | 6               | 3826  | 4206  | 4669  | 200                   |
|            | 8               | 4176  | 4590  | 5095  | 198                   |
| 100 Y      | 2               | 3702  | 4054  | 4480  | 277                   |
|            | 4               | 3766  | 4984  | 5507  | 255                   |
| 112        | 6               | 3766  | 5621  | 6212  | 248                   |
|            | 8               | 3766  | 6137  | 6780  | 245                   |
| 112 Y      | 2               | 5782  | 6363  | 7073  | 475                   |
|            | 4               | 6451  | 7814  | 8686  | 428                   |
| 132 (Y)    | 6               | 6451  | 8818  | 9802  | 412                   |
|            | 8               | 6451  | 9641  | 10717 | 404                   |
| 160 (Y)    | 2               | 3900  | 5582  | 7958  | 599                   |
|            | 4               | 3900  | 5582  | 9803  | 536                   |
|            | 6               | 3900  | 5582  | 9803  | 515                   |
|            | 8               | 3900  | 5582  | 9803  | 505                   |
| 180 (Y)    | 2               | 7912  | 8735  | 9749  | 748                   |
|            | 4               | 8900  | 10715 | 11959 | 662                   |
|            | 6               | 8900  | 12108 | 13513 | 633                   |
|            | 8               | 8900  | 13196 | 14727 | 619                   |
| 200 (Y)    | 2               | 10869 | 11918 | 13191 | 1102                  |
|            | 4               | 12180 | 14680 | 16248 | 957                   |
|            | 6               | 12180 | 16575 | 18345 | 909                   |
|            | 8               | 12180 | 18050 | 19978 | 885                   |
| 225 (Y)    | 2               | 12850 | 14319 | 15672 | 1302                  |
|            | 4               | 12850 | 17158 | 19220 | 1124                  |
|            | 6               | 12850 | 19377 | 21706 | 1065                  |
|            | 8               | 12850 | 19392 | 23719 | 1035                  |
| 250 (Y)    | 2               | 12300 | 18385 | 20871 | 1795                  |
|            | 4               | 12300 | 18385 | 25620 | 1519                  |
|            | 6               | 12300 | 18385 | 28920 | 1427                  |
|            | 8               | 12300 | 18385 | 31497 | 1381                  |
| 280 (Y)    | 2               | 15300 | 20423 | 22313 | 2060                  |
|            | 4               | 15300 | 22611 | 27359 | 1733                  |
|            | 6               | 15300 | 22611 | 31044 | 1624                  |
|            | 8               | 15300 | 22611 | 31044 | 1570                  |
| 315 (Y)    | 2               | 9800  | 14183 | 21892 | 2060                  |
|            | 4               | 5800  | 8394  | 15187 | 2060                  |
| L3         | 6               | 13500 | 20566 | 32744 | 2228                  |
|            | 8               | 8500  | 12949 | 27171 | 2228                  |
| L3         | 6,8             | 12500 | 19043 | 36426 | 2073                  |
|            | 6,8             | 7600  | 11578 | 24294 | 2073                  |
| 355 (Y)    | 2               | 16800 | 24127 | 25751 | 2692                  |
|            | 4               | 15000 | 21542 | 25481 | 2692                  |
| L3         | 6               | 12400 | 18475 | 36219 | 2930                  |
|            | 8               | 12000 | 17879 | 35051 | 2930                  |
|            | 6               | 10280 | 15316 | 30027 | 2698                  |
|            | 8               | 10280 | 15316 | 30027 | 2698                  |
| 400        | 2               | 22171 | 23265 | 24472 | 2581                  |
|            | 4               | 20000 | 30096 | 45197 | 3675                  |
|            | 6               | 19000 | 28591 | 50501 | 3369                  |
|            | 8               | 18000 | 27087 | 54618 | 3216                  |
| 450        | 2               | 20598 | 21823 | 23202 | 2692                  |
|            | 4               | 40000 | 47774 | 51495 | 4409                  |
| L2         | 6               | 34200 | 47537 | 50949 | 4409                  |
|            | 8               | 32500 | 49311 | 56917 | 4023                  |
|            |                 |       |       |       | 3829                  |

### Minimum loading $F_{R \min}$ at $x_0$

Due to their reinforced design, the bearings must be loaded with at least the forces indicated in the table. Even a test operation without a load can result in damage.

# Bearings

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Rotor weights for CD series, ..(Y2,Y3,Y)

Rotor weights [kg]

| Frame size | Typ-Y | 2p = 2<br>3000 rpm | 2p = 4<br>1500 rpm | 2p = 6<br>1000 rpm | 2p = 8<br>750 rpm |
|------------|-------|--------------------|--------------------|--------------------|-------------------|
| 63         | M1    | 1,5                | 1,8                |                    |                   |
|            | M2    | 1,5                | 1,8                |                    |                   |
| 71         | M1    | 1,4                | 1,5                |                    |                   |
|            | M2    | 1,6                | 1,9                | 2,6                | 2,6               |
| 80         | M1    | 2,2                | 2,7                | 3,7                | 3,7               |
|            | M2    | 2,7                | 3,3                | 4,5                | 4,5               |
| 90         | S     | 80M1...Y2,Y3,Y     | 3,0                | 3,7                | 4,5               |
|            | L     | 80M2...Y2,Y3,Y     | 3,5                | 4,4                | 5,8               |
| 100        | L     |                    | 4,9                | 8,4                |                   |
|            | L1    | 90S...Y2,Y3,Y      | 4,9                | 5,8                | 6,9               |
|            | L2    | 90L...Y2,Y3,Y      | 5,6                | 6,8                | 8,4               |
| 112        | M     | 100L...Y2,Y3,Y     | 6,5                | 9,9                | 12,1              |
|            | S     | 112M...Y2,Y3,Y     |                    | 15,2               | 19,0              |
| 132        | S1    | 112M...Y2,Y3,Y     | 10,7               |                    |                   |
|            | S2    |                    | 12,4               |                    |                   |
|            |       | 132S2...Y2,Y3,Y    | 15,7               |                    |                   |
|            | M     | 132S...Y2,Y3,Y     |                    | 16,7               | 17,3              |
|            |       | 132M...Y2,Y3,Y     |                    | 23,7               | 19,2              |
|            | M1    | 132M...Y2,Y3,Y     |                    | 19,4               |                   |
|            | M2    | 132M2...Y2,Y3,Y    |                    | 22,2               |                   |
|            |       | 132M2...Y2,Y3,Y    | 24,5               |                    |                   |
|            | M     |                    | 31,9               | 38,1               |                   |
|            |       | ...Y2,Y3,Y         | 33,0               | 40,9               |                   |
| 160        | M1    | ...Y2,Y3,Y         | 20,8               |                    | 28,7              |
|            | M2    | ...Y2,Y3,Y         | 24,7               |                    | 34,3              |
|            | L     |                    | 27,5               | 33,0               | 40,9              |
|            |       | ...Y2              | 27,5               | 34,1               | 40,9              |
|            |       | ...Y3, Y           | 27,5               | 37,3               | 46,2              |
|            |       |                    |                    |                    | 42,7              |
| 180        | M     |                    | 38,5               | 48,5               |                   |
|            |       | ...Y2,Y3,Y         | 38,5               | 51,6               |                   |
|            | L     |                    | 51,6               | 61,4               | 67,6              |
|            |       | ...Y2              | 51,6               | 61,4               | 67,6              |
| 200        |       | ...Y3, Y           | 55,9               | 61,4               | 67,6              |
|            |       |                    |                    |                    | 95,9              |
|            | L     | ...Y2,Y3,Y         | 74,0               |                    |                   |
|            | L1    | ...Y2,Y3,Y         | 50,4               | 51,1               |                   |
| 225        | L2    | ...Y2,Y3,Y         | 61,4               | 84,4               |                   |
|            | S     | ...Y2,Y3,Y         | 93,7               | 104,3              |                   |
| 250        | M     | ...Y2,Y3,Y         | 76,0               | 108,0              | 122,0             |
|            |       | ...Y2,Y3,Y         | 99,0               | 136,0              | 156,0             |
| 280        | S     | ...Y2,Y3,Y         | 109,0              | 144,0              | 179,0             |
|            | M     | ...Y2,Y3,Y         | 122,0              | 163,0              | 207,0             |
| 315        | S     | ...Y2,Y3,Y         | 155,0              | 215,0              | 250,0             |
|            | M     | ...Y2,Y3,Y         | 181,0              | 261,0              | 290,0             |
|            | L1    | ...Y2,Y3,Y         | 208,0              | 293,0              | 338,0             |
|            | L2    | ...Y2,Y3,Y         | 260,0              | 465,0              | 452,0             |
|            | L3    | ...Y2,Y3,Y         | 340,0              | 465,0              | 576,0             |
| 355        | M     |                    |                    | 576,0              | 576,0             |
|            | L1    |                    | 450,0              | 582,5              | 629,0             |
|            | L2    |                    | 486,0              | 727,0              | 727,0             |
|            | L3    |                    | 548,0              | 879,0              | 880,0             |
| 400        | M     |                    | 856,0              | 1006,0             | 1147,0            |
|            | L     |                    | 688,0              | 936,0              | 1107,0            |
| 450        | M     |                    | 1066,0             | 1237,0             | 1399,0            |
|            | L     |                    | 1148,0             | 1340,0             | 1541,0            |

### Maintenance-free service life with lifetime lubrication and coupling operation for horizontal mounting

| Motors with standard output |                 |          | Motors with increased output [...X, ...W] |                 |          |
|-----------------------------|-----------------|----------|-------------------------------------------|-----------------|----------|
| Frame size                  | Number of poles | RT 40 °C | Frame size                                | Number of poles | RT 40 °C |
| 63-71                       | 2               | 20000 h  | 63-71                                     | 2               | 20000 h  |
|                             | 4, 6, 8         | 40000 h  |                                           | 4, 6, 8         | 40000 h  |
| 80-90                       | 2               | 20000 h  | 80-90                                     | 2               | 15000 h  |
|                             | 4, 6, 8         | 40000 h  |                                           | 4, 6, 8         | 30000 h  |
| 100-132                     | 2               | 20000 h  | 100-132                                   | 2               | 10000 h  |
|                             | 4, 6, 8         | 40000 h  |                                           | 4, 6, 8         | 20000 h  |
| 160-280                     | 2               | 20000 h  | 160-280                                   | 2               | 7500 h   |
|                             | 4, 6, 8         | 40000 h  |                                           | 4, 6, 8         | 15000 h  |

### Relubrication intervals for horizontal construction type

| Room temperature | Motors with standard output |                | Motors with increased output [...X, ...W] |                |
|------------------|-----------------------------|----------------|-------------------------------------------|----------------|
|                  | Relubrication interval      |                | Relubrication interval                    |                |
|                  | rpm up to 1800 rpm          | up to 3600 rpm | rpm up to 1800 rpm                        | up to 3600 rpm |
| 40 °C            | 5000 h                      | 2500 h         | 5000 h                                    | 2500 h         |
| 50 °C            | 2500 h                      | 1000 h         | 2500 h                                    | 1000 h         |
| 60 °C            | 2000 h                      | 500 h          | -                                         | -              |



Vibration recorder and box

### Bearing monitoring

For bearing status monitoring, the motors can be equipped with temperature sensors as well as shock pulse and vibration sensors.

PT100 temperature sensors are mounted within the flameproof enclosure at the bearing points. Standard implementation uses 2 wire circuits, 3 or 4 wire circuits on request. The connection is implemented either in the main terminal box or in separate additional terminal boxes, which are attached to the main terminal box or to the motor housing, depending on the version. Wiring and boxes can be implemented based on explosion protection ratings Ex d, Ex e or Ex i.

Shock pulse nipples can be mounted externally at the end shields for the wear status monitoring above frame size 132. In this way, monitoring with mobile recording units is possible. For remote monitoring, use shock pulse or vibration sensors with hard wiring. The individual sensors are combined in a separate terminal box. The connection is implemented using explosion protection rating Ex ia IIC T4.

# Bearing

## Bearing eddy currents, insulated bearings, mechanical limit speeds

### Bearing eddy currents, insulated bearings

Through magnetic asymmetries on mains-powered motors, a voltage can occur along the shaft. This shaft voltage leads to transients between rotor and stator which flow through the roller bearings. If the voltage exceeds a peak value of 500 mV, the bearings may be damaged. This danger exists only for greater shaft heights.

This effect can be amplified through operation with frequency inverter. The implementation of the inverter has a decisive influence in this case. Pulse-controlled AC inverters generate particularly high-frequency voltages and currents, depending on the clock frequency and pulse modulation. Output filters in the inverters minimize these effects.

To avoid damaged bearings, an insulated bearing is therefore always installed on the non-drive end for inverter operation with motors from frame size 315. The operator must also provide for a large-area grounding of the motor

housing to allow the currents circulating between inverter and stator to be diverted.

High-voltage motors are provided with an insulated bearing on the non-drive end as standard.

### Mechanical speed limits

If the motors operate above the rated speed, the limit values of the roller bearings, the strength of the rotating parts, critical rotor speeds and the tip speed of the fans need to be considered. The speeds limits indicated in the opposite table can make necessary measures such as special fans, special bearings or special balancing.

The rotation speeds indicated for inverter operation in the operating data from page 58 are achieved with the standard motor.

### Mechanical speed limits

| Number of poles | size  | 63/71 | 80   | 90   | 100  | 112  | 132  | 160  | 180  | 200  | 225  | 250  | 280  | 315  | 355  | 400  | 450  |
|-----------------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2               | [rpm] | 6000  | 6000 | 6000 | 6000 | 6000 | 6000 | 6000 | 5220 | 5220 | 5220 | 4000 | 3600 | 3600 | 3600 | 3600 | 3600 |
|                 | [Hz]  | 100   | 100  | 100  | 100  | 100  | 100  | 100  | 87   | 87   | 87   | 67   | 60   | 60   | 60   | 60   | 60   |
| 4               | [rpm] | 4500  | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4000 | 4000 | 4000 | 4000 | 3000 | 3000 | 3000 | 1500 | 1500 |
|                 | [Hz]  | 150   | 150  | 150  | 150  | 150  | 150  | 150  | 133  | 133  | 133  | 133  | 100  | 100  | 100  | 100  | 100  |
| 6               | [rpm] | 4000  | 4000 | 4000 | 4000 | 4000 | 4000 | 4000 | 3600 | 3600 | 3000 | 3000 | 2500 | 2500 | 2500 | 2000 | 2000 |
|                 | [Hz]  | 200   | 200  | 200  | 200  | 200  | 200  | 200  | 180  | 180  | 150  | 150  | 125  | 125  | 125  | 100  | 100  |
| 8               | [rpm] | 4000  | 4000 | 4000 | 4000 | 4000 | 4000 | 4000 | 3600 | 3600 | 3000 | 3000 | 2500 | 2500 | 2500 | 1500 | 1500 |
|                 | [Hz]  | 267   | 267  | 267  | 267  | 267  | 267  | 267  | 240  | 240  | 200  | 200  | 167  | 167  | 167  | 100  | 100  |

**Shaft ends**

The motors normally have a free shaft end with dimensions conforming to EN 50347.

From frame size 63, the shaft ends have an internal thread to DIN 332 type "D". The feather-keys are designed to DIN 6885 Sheet 1.

Motors with special shafts and/or a second shaft end are available on request at extra cost (does not apply to motors with axial fan and motors with attachments at the non-drive end, e.g. tachometer).

**Running smoothness of the shaft ends**

The running smoothness of the shaft ends corresponds to EN 50347. On request, the values can be reduced by 50% (extra-cost option).

**Balancing**

The motors are dynamically balanced with half feather-key. The balance quality corresponds according to DIN ISO 1940 minimum Q2.5. Special variants, balanced with a full feather-key, are an extra-cost option.

In conformance with DIN ISO 8821, the shaft end faces of the motors are marked as follows:

H = Half-feather key balancing

F = Full-feather key balancing

N = Balancing without feather key

**Vibration amplitude**

The mechanical vibrations according to EN 60034-14 correspond to Stage A in the standard version. In case of special requirements on the mechanical quiet running, low-vibration version can be supplied (reduced) to level B (extra cost option).

**Vibration level with free suspension**

| $v_{\text{eff}}$ [mm/s] | Frame size |         |         |
|-------------------------|------------|---------|---------|
|                         | 63–132     | 160–280 | 315–450 |
| Level A                 | 1,6        | 2,2     | 2,8     |
| Level B                 | 0,7        | 1,1     | 1,8     |

**Foundations**

Foundations must meet the requirements and ratings of DIN ISO 10816-3. They must be designed to be rigid or elastic according to the standard.

# Bearing

34

## Operating noise levels, cooling air quantity

### Operating noise levels

Noise levels are well below those specified in EN 60034-9. Noise measurements are performed according to EN ISO 3744 and EN 21680 according to class 2 in an anechoic room.

The sound pressure level "L<sub>p</sub>" and the sound power level "L<sub>w</sub>" in dB(A) are indicated for the individual frame sizes in the operating datasheets. They apply for rated loads at 50 Hz, plus a tolerance of +3 dB(A).

For available variants of low-noise motors, see page 35.

### Cooling air quantity and permissible back pressure

If the motors are to be operated above piping systems or under sound insulation cowls, the minimum cooling air quantities listed in the table below must be adhered to. The maximum back-pressures must not be exceeded to allow the self-ventilation to work properly.

### Cooling air quantity and permissible back pressure

| Frame size | 3000 rpm                              |                              | 1500 rpm                     |                              | 1000 rpm                     |                              | 750 rpm                      |                              |
|------------|---------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|            | Air volume pressure m <sup>3</sup> /s | Permissible back pressure Pa | Air volume m <sup>3</sup> /s | Permissible back pressure Pa | Air volume m <sup>3</sup> /s | Permissible back pressure Pa | Air volume m <sup>3</sup> /s | Permissible back pressure Pa |
| 71         | 0,01                                  | 20                           | 0,01                         | 10                           | 0,01                         | 5                            | 0,01                         | 3                            |
| 80         | 0,03                                  | 30                           | 0,03                         | 10                           | 0,02                         | 5                            | 0,01                         | 3                            |
| 90         | 0,05                                  | 40                           | 0,03                         | 10                           | 0,02                         | 6                            | 0,01                         | 4                            |
| 100        | 0,07                                  | 50                           | 0,07                         | 12                           | 0,03                         | 8                            | 0,02                         | 4                            |
| 112        | 0,08                                  | 50                           | 0,06                         | 12                           | 0,03                         | 8                            | 0,02                         | 5                            |
| 132        | 0,10                                  | 70                           | 0,10                         | 18                           | 0,07                         | 10                           | 0,05                         | 5                            |
| 160        | 0,20                                  | 90                           | 0,20                         | 30                           | 0,10                         | 15                           | 0,08                         | 8                            |
| 180        | 0,40                                  | 100                          | 0,30                         | 40                           | 0,15                         | 20                           | 0,10                         | 10                           |
| 200        | 0,50                                  | 120                          | 0,30                         | 50                           | 0,20                         | 25                           | 0,15                         | 12                           |
| 225        | 0,60                                  | 120                          | 0,60                         | 50                           | 0,30                         | 30                           | 0,23                         | 15                           |
| 250        | 0,70                                  | 140                          | 0,50                         | 60                           | 0,33                         | 35                           | 0,28                         | 20                           |
| 280        | 0,70                                  | 160                          | 0,70                         | 80                           | 0,45                         | 45                           | 0,33                         | 25                           |
| 315        | 1,00                                  | 160                          | 1,00                         | 80                           | 0,60                         | 45                           | 0,45                         | 25                           |
| 355        | 1,50                                  | 160                          | 1,20                         | 80                           | 1,00                         | 45                           | 0,80                         | 25                           |
| 400        | 2,20                                  | 180                          | 1,90                         | 100                          | 1,70                         | 55                           | 1,50                         | 35                           |
| 450        | 2,90                                  | 200                          | 2,50                         | 120                          | 2,20                         | 65                           | 2,00                         | 45                           |

### Noise class 1 Standard version

Radial-flow fans that are suited for rotation in both directions are employed for the standard type. The fans used are capable of conveying large volumes of air efficiently and at low noise levels.

### Noise class 2 axial-flow fans, series ...A - low-noise

For more exacting requirements, we recommend the low-noise variant with bi-directional axial-flow fan. These fans are available for 2-pole motors from frame size 112 and 4-pole motors from frame size 132. Through the aerodynamic design and the optimum angle of attack of the fan blades, a noise reduction for 2-pole motors of up to 10 dB(A) is achieved compared with the standard version.

### Noise class 3 axial-flow fans in special-purpose design, series ...AR - very low-noise

For applications requiring extremely low noise levels, ATB has developed a range of exceptionally quiet, surface-cooled three-phase motors. Featuring a 2-pole design, these motors are approx. 12 dB(A) quieter than their standard, radial-flow fan counterparts, and are quieter even than the low-noise axial-flow fan motors.

For tables with the operating data for classes 1 to 3, see pages 58 and 60.

### Noise class 4 Water-cooled, series ...W - lowest-noise version

The water-cooled ATB motors offer the following advantages:

- Reduced noise level due to omission of fan
- Prevention of air turbulence in dusty atmospheres (risk of dust explosion)
- Increased output compared to EN 50347 by a rating stage
- Mounting dimensions of IEC frame sizes are maintained
- Good heat removal without dissipation into surrounding air
- Potential for use of dissipated heat in heat exchangers

The motor housing is a welded steel construction and is double-walled for water-cooling. To prevent corrosion, the water jacket is coated internally with several layers of synthetic material.

The specified output values apply at a maximum water inlet temperature of 30 °C. The maximum permissible suspended matter content is 30 mg/l.

All motors are equipped with PTC thermistor temperature sensors for overload protection. Cooling water flow monitoring devices are therefore not required.

For tables with operating data, see page 94.

### Frequency inverter operation

All systems are suitable for inverter operation without any restrictions.



Radial-flow fan, bi-directional (noise class 1)



Axial-flow fan, fan cowl with inlet opening, uni-directional (noise class 2 and 3)



Water-cooled motors, (noise class 4)

# Special-Purpose Motors

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## Low noise motors

### Sound pressure level

| Noise class           | 1                                    | 2                                                                          |                                                        | 3                                                                                         |                                                        | 4                                                                                                   |                                                        | Series ...W                                                            |                                                          |                                                        |
|-----------------------|--------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|
|                       |                                      | Standard version<br>(radial-flow fan)<br>Temperature<br>class T4,<br>50 Hz |                                                        | Series ...A<br>low-noise<br>version<br>(axial-flow fan)<br>Temperature class<br>T4, 50 Hz |                                                        | Series...AR<br>extremely low-noise<br>version<br>(axial-flow fan)<br>Temperature class<br>T4, 50 Hz |                                                        | low-noise version<br>water-cooled<br>Temperature class<br>T4,<br>50 Hz |                                                          |                                                        |
| Frame<br>size         | output<br><br>P <sub>2</sub><br>[kW] | Sound<br>pressure<br>level<br>L <sub>p</sub><br>[dB (A)]                   | Sound<br>output<br>level<br>L <sub>w</sub><br>[dB (A)] | Sound<br>pressure<br>level<br>L <sub>p</sub><br>[dB (A)]                                  | Sound<br>output<br>level<br>L <sub>w</sub><br>[dB (A)] | Sound<br>pressure<br>level<br>L <sub>p</sub><br>[dB (A)]                                            | Sound<br>output<br>level<br>L <sub>w</sub><br>[dB (A)] | Leistung<br><br>P <sub>2</sub><br>[kW]                                 | Sound<br>pressure<br>level<br>L <sub>p</sub><br>[dB (A)] | Sound<br>output<br>level<br>L <sub>w</sub><br>[dB (A)] |
| ns = 3000 rpm, 2p = 2 |                                      |                                                                            |                                                        |                                                                                           |                                                        |                                                                                                     |                                                        |                                                                        |                                                          |                                                        |
| 112 M-2               | 4                                    | 63                                                                         | 75                                                     | 55                                                                                        | 67                                                     | -                                                                                                   | -                                                      | -                                                                      | -                                                        | -                                                      |
| 112 M-2Y              | 4                                    | 63                                                                         | 76                                                     | 55                                                                                        | 68                                                     | -                                                                                                   | -                                                      | -                                                                      | -                                                        | -                                                      |
| 132 S1-2 (Y)          | 5,5                                  | 63                                                                         | 76                                                     | 55                                                                                        | 68                                                     | 54                                                                                                  | 67                                                     | -                                                                      | -                                                        | -                                                      |
| 132 S2-2 (Y)          | 7,5                                  | 63                                                                         | 76                                                     | 55                                                                                        | 68                                                     | 54                                                                                                  | 67                                                     | -                                                                      | -                                                        | -                                                      |
| 160 M1-2 (Y)          | 11                                   | 66                                                                         | 79                                                     | 56                                                                                        | 69                                                     | 54                                                                                                  | 67                                                     | 15                                                                     | 50                                                       | 63                                                     |
| 160 M2-2 (Y)          | 15                                   | 66                                                                         | 79                                                     | 56                                                                                        | 69                                                     | 54                                                                                                  | 67                                                     | 18,5                                                                   | 50                                                       | 63                                                     |
| 160 L-2 (Y)           | 18,5                                 | 66                                                                         | 79                                                     | 56                                                                                        | 69                                                     | 54                                                                                                  | 67                                                     | 22                                                                     | 50                                                       | 63                                                     |
| 180 M-2 (Y)           | 22                                   | 69                                                                         | 82                                                     | 58                                                                                        | 71                                                     | 57                                                                                                  | 70                                                     | 30                                                                     | 51                                                       | 64                                                     |
| 200 L1-2 (Y)          | 30                                   | 71                                                                         | 85                                                     | 60                                                                                        | 74                                                     | 58                                                                                                  | 72                                                     | 37                                                                     | 52                                                       | 66                                                     |
| 200 L2-2 (Y)          | 37                                   | 71                                                                         | 85                                                     | 60                                                                                        | 74                                                     | 58                                                                                                  | 72                                                     | 45                                                                     | 52                                                       | 66                                                     |
| 225 M-2 (Y)           | 45                                   | 72                                                                         | 86                                                     | 60                                                                                        | 74                                                     | 59                                                                                                  | 73                                                     | 55                                                                     | 54                                                       | 68                                                     |
| 250 M-2 (Y)           | 55                                   | 75                                                                         | 89                                                     | 64                                                                                        | 78                                                     | 62                                                                                                  | 76                                                     | 75                                                                     | 57                                                       | 71                                                     |
| 280 S-2 (Y)           | 75                                   | 76                                                                         | 90                                                     | 66                                                                                        | 80                                                     | 64                                                                                                  | 78                                                     | 90                                                                     | 59                                                       | 73                                                     |
| 280 M-2 (Y)           | 90                                   | 76                                                                         | 90                                                     | 66                                                                                        | 80                                                     | 64                                                                                                  | 78                                                     | 110                                                                    | 59                                                       | 73                                                     |
| 315 S-2 (Y)           | 110                                  | 76                                                                         | 91                                                     | 66                                                                                        | 81                                                     | 64                                                                                                  | 79                                                     | 132                                                                    | 60                                                       | 75                                                     |
| 315 M-2 (Y)           | 132                                  | 76                                                                         | 91                                                     | 66                                                                                        | 81                                                     | 64                                                                                                  | 79                                                     | 160                                                                    | 60                                                       | 75                                                     |
| 315 L1-2 (Y)          | 160                                  | 76                                                                         | 91                                                     | 66                                                                                        | 81                                                     | 64                                                                                                  | 79                                                     | 200                                                                    | 60                                                       | 75                                                     |
| 315 L2-2 (Y)          | 200                                  | 76                                                                         | 91                                                     | 66                                                                                        | 81                                                     | 64                                                                                                  | 79                                                     | 250                                                                    | 60                                                       | 75                                                     |
| 315 L3-2 (Y)          | 250                                  | 76                                                                         | 91                                                     | 66                                                                                        | 81                                                     | 64                                                                                                  | 79                                                     | 315                                                                    | 60                                                       | 75                                                     |
| 355 L1-2 (Y)          | 315                                  | 81                                                                         | 96                                                     | 68                                                                                        | 84                                                     | 66                                                                                                  | 82                                                     | 355                                                                    | 60                                                       | 76                                                     |
| 355 L2-2 (Y)          | 355                                  | 81                                                                         | 96                                                     | 68                                                                                        | 84                                                     | 66                                                                                                  | 82                                                     | 400                                                                    | 60                                                       | 76                                                     |
| 355 L3-2 (Y)          | 400                                  | 81                                                                         | 96                                                     | 68                                                                                        | 84                                                     | 66                                                                                                  | 82                                                     | -                                                                      | -                                                        | -                                                      |
| ns = 1500 rpm, 2p = 4 |                                      |                                                                            |                                                        |                                                                                           |                                                        |                                                                                                     |                                                        |                                                                        |                                                          |                                                        |
| 132 S-4 (Y)           | 5,5                                  | 57                                                                         | 70                                                     | 55                                                                                        | 68                                                     | -                                                                                                   | -                                                      | -                                                                      | -                                                        | -                                                      |
| 132 M-4 (Y)           | 7,5                                  | 57                                                                         | 70                                                     | 55                                                                                        | 68                                                     | -                                                                                                   | -                                                      | -                                                                      | -                                                        | -                                                      |
| 160 M-4 (Y)           | 11                                   | 62                                                                         | 75                                                     | 56                                                                                        | 69                                                     | -                                                                                                   | -                                                      | -                                                                      | -                                                        | -                                                      |
| 160 L-4 (Y)           | 15                                   | 62                                                                         | 75                                                     | 56                                                                                        | 69                                                     | -                                                                                                   | -                                                      | -                                                                      | -                                                        | -                                                      |
| 180 M-4 (Y)           | 18,5                                 | 60                                                                         | 73                                                     | 57                                                                                        | 70                                                     | 56                                                                                                  | 69                                                     | 22                                                                     | 51                                                       | 64                                                     |
| 180 L-4 (Y)           | 22                                   | 60                                                                         | 73                                                     | 57                                                                                        | 70                                                     | 56                                                                                                  | 69                                                     | 27                                                                     | 51                                                       | 64                                                     |
| 200 L-4 (Y)           | 30                                   | 61                                                                         | 75                                                     | 58                                                                                        | 72                                                     | 57                                                                                                  | 71                                                     | 37                                                                     | 51                                                       | 65                                                     |
| 225 S-4 (Y)           | 37                                   | 63                                                                         | 77                                                     | 59                                                                                        | 73                                                     | 58                                                                                                  | 72                                                     | 45                                                                     | 52                                                       | 66                                                     |
| 225 M-4 (Y)           | 45                                   | 63                                                                         | 77                                                     | 59                                                                                        | 73                                                     | 58                                                                                                  | 72                                                     | 55                                                                     | 52                                                       | 66                                                     |
| 250 M-4 (Y)           | 55                                   | 65                                                                         | 79                                                     | 64                                                                                        | 78                                                     | 63                                                                                                  | 77                                                     | 70                                                                     | 56                                                       | 70                                                     |
| 280 S-4 (Y)           | 75                                   | 68                                                                         | 82                                                     | 66                                                                                        | 80                                                     | 65                                                                                                  | 79                                                     | 90                                                                     | 58                                                       | 72                                                     |
| 280 M-4 (Y)           | 90                                   | 68                                                                         | 82                                                     | 66                                                                                        | 80                                                     | 65                                                                                                  | 79                                                     | 110                                                                    | 58                                                       | 72                                                     |
| 315 S-4 (Y)           | 110                                  | 69                                                                         | 84                                                     | 66                                                                                        | 81                                                     | 65                                                                                                  | 80                                                     | 132                                                                    | 57                                                       | 72                                                     |
| 315 M-4 (Y)           | 132                                  | 69                                                                         | 84                                                     | 66                                                                                        | 81                                                     | 65                                                                                                  | 80                                                     | 160                                                                    | 57                                                       | 72                                                     |
| 315 L1-4 (Y)          | 160                                  | 69                                                                         | 84                                                     | 66                                                                                        | 81                                                     | 65                                                                                                  | 80                                                     | 200                                                                    | 57                                                       | 72                                                     |
| 315 L2-4 (Y)          | 200                                  | 69                                                                         | 84                                                     | 66                                                                                        | 81                                                     | 65                                                                                                  | 80                                                     | 250                                                                    | 57                                                       | 72                                                     |
| 315 L3-4 (Y)          | 250                                  | 69                                                                         | 84                                                     | 66                                                                                        | 81                                                     | 65                                                                                                  | 80                                                     | 315                                                                    | 57                                                       | 72                                                     |
| 355 L1-4 (Y)          | 315                                  | 72                                                                         | 88                                                     | 68                                                                                        | 84                                                     | 67                                                                                                  | 83                                                     | 355                                                                    | 58                                                       | 74                                                     |
| 355 L2-4 (Y)          | 355                                  | 72                                                                         | 88                                                     | 68                                                                                        | 84                                                     | 67                                                                                                  | 83                                                     | 400                                                                    | 58                                                       | 74                                                     |
| 355 L3-4 (Y)          | 400                                  | 72                                                                         | 88                                                     | 68                                                                                        | 84                                                     | 67                                                                                                  | 83                                                     | 400                                                                    | 58                                                       | 74                                                     |

## On-deck installation with shipping classification

Electrical machines installed on ships - especially on the top deck -, on oil rigs, in port facilities and in sewage treatment plants, must be able to withstand a high level of corrosive attack from the humid, saline atmosphere and occasional flooding. The same applies to fan motors in cooling systems and cooling towers.

For these areas of application, motors have been developed by ATB in special corrosion-resistant implementation. In addition to the many features of the industrial motor series, such as

- long life;
- long maintenance intervals;
- high efficiency and performance
- low sound pollution of the environment,

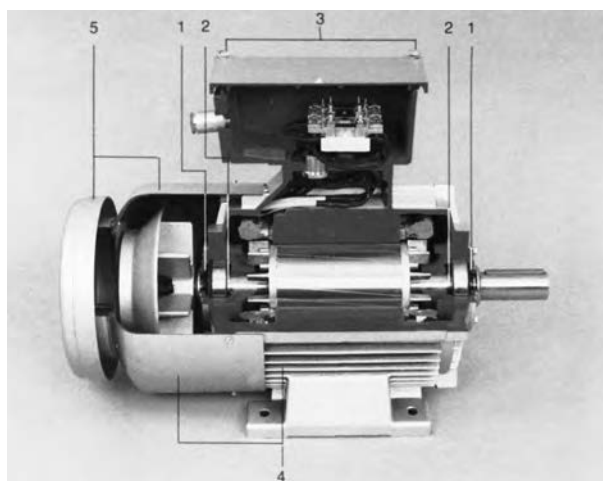
These motors incorporate a series of measures designed to protect the surface, the seals and the ventilation system from the effects of water and chemical.

These special-purpose motors are certified for use in maritime applications by Germanischer Lloyd, Nippon Kaiji Kyobai, and Lloyd's Register.

An anti-condensation heater can be fitted to the motors in order to prevent excessive condensation on the stator winding due to high temperature fluctuations and load changes (e.g. during intermittent use).

This heater takes the form of heating strips attached to the winding heads. Anti-condensation heating is also possible through feeding of the stator coil with a reduced voltage.

In addition, the windings can be protected by encapsulating them. This method can be used instead of an anti-condensation heater.



1. Saltwater-resistant double seals
2. Corrosion-resistant shafts
3. Stainless-steel fastening screws
4. Saltwater-resistant multilayer special paintwork, also with zinc primer
5. Reinforced fan cowl with canopy and baffle plate to protect fan in high seas

### Special-purpose variants for on-deck installation

| Components                                | Measures                                                                                                                                                                                         |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protection type of motor and terminal box | IP56 tested to DIN EN 60034, Part 5                                                                                                                                                              |
| Shafts                                    | The motor shafts are made from stainless steel.                                                                                                                                                  |
| Shaft area seals<br>D and N ends          | For frame sizes up to 160, radial shaft seals to DIN 3760 are used<br>From frame size 180, motors are fitted with a combined sealing system consisting of a radial and an axial seal             |
| Fan cowl, canopy                          | Frame sizes 71 to 160 have reinforced fan cowls, Material thickness 2 mm<br>From frame size 180 fan cowls for all construction types with canopy and baffle plate material thickness $\geq 3$ mm |
| Fan                                       | Fan in saltwater-resistant aluminum alloy or steel                                                                                                                                               |
| Fastening screws                          | Stainless steel screws (A 2-70) used throughout                                                                                                                                                  |
| Cable gland                               | If supplied with cable gland, metal cable glands certified to DIN EN 60079 are used                                                                                                              |
| Paintwork                                 | Special paintwork with zinc primer                                                                                                                                                               |

# Special-Purpose Motors

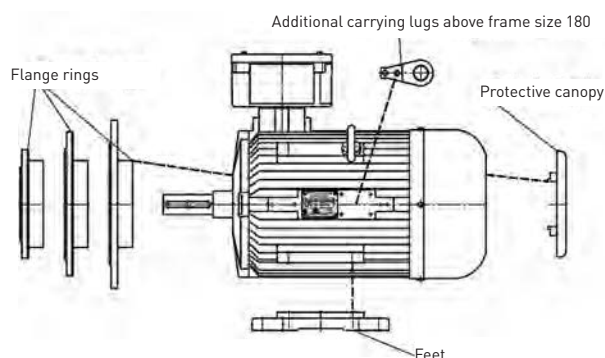
38

## Flexi mount motor

The Flexi Mount Motor was designed to simplify warehouse stock keeping through the universal employment of one type of motor.

The illustration shows how the flanges, the feet, the lugs and the protective cowl can be replaced. Thus all possible versions according to EN 60034-7 can be achieved from a basic motor.

All these work operations are feasible without opening the flameproof chamber. No authorization from any authority is necessary for restarting operation. The conversion is reversible, so that one motor after another can be employed at different locations.



### Available flanges

| Frame size | FF flange dia. in mm <sup>1)</sup> |     |     |     |     |     |     |     |     |     |     |     | FT flange dia. in mm <sup>1)</sup> |    |     |     |     |     |     |     |
|------------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------|----|-----|-----|-----|-----|-----|-----|
|            | 100                                | 115 | 130 | 165 | 215 | 265 | 300 | 350 | 400 | 500 | 600 | 740 | 65                                 | 75 | 85  | 100 | 115 | 130 | 165 | 215 |
|            | FF flange dia. in mm <sup>2)</sup> |     |     |     |     |     |     |     |     |     |     |     | FT flange dia. in mm <sup>2)</sup> |    |     |     |     |     |     |     |
|            | 120                                | 140 | 160 | 200 | 250 | 300 | 350 | 400 | 450 | 550 | 660 | 800 | 80                                 | 90 | 105 | 120 | 140 | 160 | 200 | 250 |
| 63         | 0                                  | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0                                  | X  | 0   | 0   | 0   | 0   | 0   | 0   |
| 71         | 0                                  | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0                                  | 0  | X   | 0   | 0   | 0   | 0   | 0   |
| 80         | 0                                  | 0   | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0                                  | 0  | 0   | X   | 0   | 0   | 0   | 0   |
| 80 (Y)     |                                    | 0   | 0   | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0                                  | 0  | X   | 0   | 0   | 0   | 0   | 0   |
| 90 (Y)     |                                    | 0   | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |                                    |    | 0   | 0   | X   | 0   | 0   | 0   |
| 100 (Y)    |                                    |     | 0   | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |                                    |    |     |     | 0   | X   | 0   | 0   |
| 112 (Y)    |                                    |     | 0   | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |                                    |    |     |     |     | X   | 0   | 0   |
| 132 (Y)    |                                    |     |     |     | 0   | X   | 0   | 0   | 0   | 0   | 0   | 0   |                                    |    |     |     |     | 0   | X   | 0   |
| 160 (Y)    |                                    |     |     |     |     | 0   | 0   | X   | 0   | 0   | 0   | 0   |                                    |    |     |     |     |     |     | X   |
| 180 (Y)    |                                    |     |     |     |     |     | 0   | X   | 0   | 0   | 0   | 0   |                                    |    |     |     |     |     |     |     |
| 200 (Y)    |                                    |     |     |     |     |     |     | 0   | X   | 0   | 0   | 0   |                                    |    |     |     |     |     |     |     |
| 225 (Y)    |                                    |     |     |     |     |     |     |     | 0   | X   | 0   | 0   |                                    |    |     |     |     |     |     |     |
| 250 (Y)    |                                    |     |     |     |     |     |     |     |     | X   | 0   | 0   |                                    |    |     |     |     |     |     |     |
| 280 (Y)    |                                    |     |     |     |     |     |     |     |     | X   | 0   | 0   |                                    |    |     |     |     |     |     |     |
| 315 (Y)    |                                    |     |     |     |     |     |     |     |     | 0   | X   | 0   |                                    |    |     |     |     |     |     |     |
| 355 (Y)    |                                    |     |     |     |     |     |     |     |     |     |     | X   |                                    |    |     |     |     |     |     |     |

X = Standard

0 = Special flange (extra cost option)

All other versions require an intermediate ring (extra cost option).

#### Note

1) new designation to EN 50347

2) old designation to DIN 42948

## Built-on and built-in components, tachogenerator, reverse-running lock

ATB motors are designed to cover a wide range of applications. To meet the special requirements associated with each of these uses, a series of attachments has been developed. The standard attachment and use of brakes, tachogenerators and pulse generators, as well as reverse running locks, enables you to save costs. With the installation of one component, different combinations of special-purpose versions can be achieved.

Attachments are available for frame sizes of 80 and higher. Explosion-proof equipment is connected to a reinforced fan cowl and either coupled to the motor shaft directly or by means of a backlash-free coupling.

For IE2 or IE3 motor versions, the shaft length may be exceeded by the attachment for design reasons.

For IE1 frame sizes 80 to 132 brakes and rotary encoders can be incorporated directly into the explosion-proof motor housing.

### Tachogenerator

Actual-value sensors are employed for the electrical remote measurement, as well as regulation of the motor speed. These devices convert the input variable "rotation speed" into an analog or digital electric signal.

Attached devices are connected using a separate terminal box.

In case of motors with integrated sensor (...R series), the connection is implemented in the main terminal box.



Motor with integrated incremental sensor

### Reverse-running lock

In the operation of conveying systems or pumps, the reverse-running lock prevents reverse-running after the shutdown of the motor.

For the frame sizes 80 to 100, locking ball bearing can be used. This is especially recommended if this version should be combined with another attachment. Although the locking bodies are integrated into the bearings, the load-bearing capacity of the bearings is reduced only slightly compared to normal bearings. Since the locking bodies rub against the raceways, however, the maximum rotation speed is limited to 1500 rpm and a reduced bearing service life is to be expected.

From frame size 90, the reverse-running lock can also be mounted onto a reinforced fan cowl directly on the extended motor shaft. This reverse-running lock is designed so that the clamping pieces lift off the stationary outer ring due to the centrifugal force if the minimum speed is maintained. No additional frictional forces or noise are therefore generated with this version.

### Reverse-running lock specifications

| Frame size | Locking-bearing DS type | Rated torque [Nm] | Useful life at 1500 rpm [h] |
|------------|-------------------------|-------------------|-----------------------------|
| 80         | ZZ 6204 L               | 32                | 3800                        |
| 80 Y / 90  | FC 6205                 | 40                | 5600                        |
| 90 Y / 100 | ZZ 6206 M               | 110               | 1900                        |

| Frame size | Reverse-running lock Type | Rated torque [Nm] | Lift-off speed [U/min] |
|------------|---------------------------|-------------------|------------------------|
| 90         | FXM 31-17 DX              | 100               | 890                    |
| 100        | FXM 38-17 DX              | 150               | 860                    |
| 112        | FXM 38-17 DX              | 150               | 860                    |
| 132        | FXM 38-17 DX              | 150               | 860                    |
| 160        | FXM 66-25 DX              | 800               | 700                    |
| 180        | FXM 66-25 DX              | 800               | 700                    |
| 200        | FXM 86-25 DX              | 1350              | 630                    |
| 225        | FXM 86-25 DX              | 1350              | 630                    |
| 250        | on request                |                   |                        |
| 280        | on request                |                   |                        |

# Special-Purpose Motors

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## Brake motors with attached brake

Our motors can be supplied with flameproof spring-loaded brakes in two variants. Attached as a flange version on the drive side (...SV type) or attached to a reinforced fan cowl on the non-drive side of the motor (...SVN or ...S types).

The electrical connection is made in a separate terminal compartment cast on to the brake.

### Type...SV and ...SVN series

With flange motors of frame sizes 63 to 280 (e.g. B5 or B14 types), we recommend attaching this brake directly to the drive-side shaft end and the motor flange.

The brake then provides the IEC connection dimensions for shaft and flange for attaching it to the machine (...SV type).

For foot-mounted motors, the brake can be attached to a reinforced fan cowl on the non-drive side of the motor (...SVN type).

This brake is available in the following versions:

- Frame size 63 - 160 all pole configurations  
Frame size 180 - 225 only 4, 6 or 8 poles  
or 2-poles S3 40%  
Frame size 250 - 280 only 4, 6, 8 poles
- Terminal box Ex d
- 5 to 1200 Nm depending on frame size (for standard assignments, see page 87)
- 24 to 690 VAC 1~, 50/60 Hz,  
(for brake sizes 80 to 160 also 3~) 24 to 300 VDC
- Category 2 G / 2D / 2GD
- Protection type Ex d / Ex tD A21  
Protection group IIB / IIC
- Temperature class T3 / T4 / T5
- maximum surface temperature T200°C / T135°C / T100°C
- Protection type IP66
- Ambient temperature -20 to +40 °C / -50 to +55 °C
- thermal protection by means of thermo switch (in addition, PTC thermistor as an option)
- Manual ventilation (optional; not for 250/280)
- Micro switch (optional)
- Anti-condensation heater (optional)
- Special flanges or shafts on request



Type CD...SV series

**Type... S series**

This brake is always attached to a reinforced fan cowl on the non-drive side of the motor. Properties:

- Frame sizes 80 to 200
- Terminal compartment Ex e
- 10 to 270 Nm depending on frame size (for standard assignment, see page 90)
- 110 to 400 VAC 1~, 50/60 Hz 12 up to 356VDC
- Category 2 G / 2D / 2GD
- Protection type Ex de / Ex tD A21
- Protection group IIC
- Temperature class T5
- Maximum surface temperature T100°C
- Protection type IP67
- Ambient temperature -20 °C to +40 °C
- Thermal protection by means of thermo switch
- Manual ventilation (optional)
- Micro switch (optional)



Motor with attached type... S brake

**Direct transmission mounting**

Motors with oil proof flanges can be fitted directly to transmission units. The shafts of these motors are sealed with radial seal rings to DIN 3760. The available flanges are listed in the table on page 38.

The seal rings must be spray or mist lubricated.

Motors up to frame size 450 have the fixed bearing on the drive side, in order to limit the thermal expansion of the rotor to the transmission.



Motor with attached transmission

# Special-Purpose Motors

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## Brake motors with integral brake

### BD...B type series

#### Construction

For frame sizes 80 to 132 motors, the brake is enclosed in a flameproof adapter housing mounted on the non-drive end of the motor to form a single unit. The ignition protection type is II 2G Ex d(e) IIB + H2 T4 or II 2D Ex tD A21 IP65 T120°C.

The system is completely maintenance-free for the lifespan of the brake linings.

#### Connection

The brake coil is energized by a silicon rectifier fitted inside the flameproof enclosure. The brake can be controlled from the AC or DC side.

For operation from the DC side, a brake coil connection is fed into the terminal compartment. In addition, the motor is equipped with a protective resistor. If this layout is to be used for AC brake operation, a connection is not required in the terminal box. Instead, the connection shown in the circuit diagram must be established. On pole-changing and rectifier-supplied motors, the brake coil must be supplied from an external power source.

#### Motor voltages

Frame sizes 80 to 112: 230 V to 690 V  
Frame size 132: 400 V to 690 V

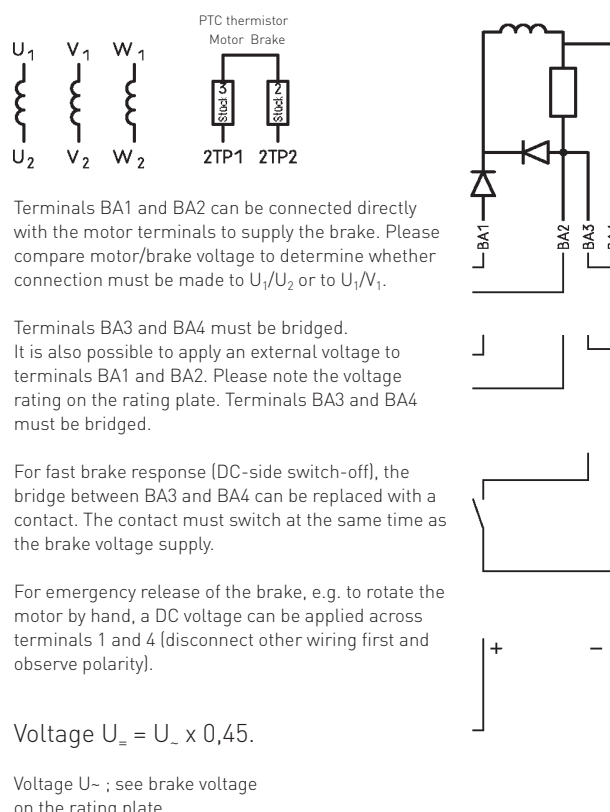
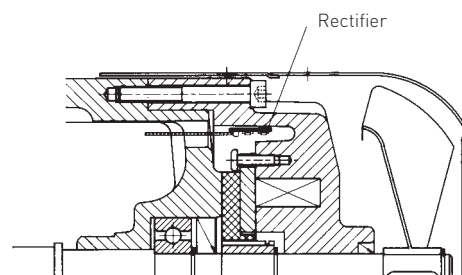
#### Brake voltages

For brake coil data, see page 92.  
Non-standard voltages are available at extra cost.

#### Protective devices

To protect the motor from excessive temperatures to DIN EN 60079-14 VDE 0165, three series-connected PTC thermistor temperature sensors are installed in the winding head (warmest point) of the three stator winding phases.

In addition, each motor is equipped with a PTC thermistor temperature sensor in the brake coil and on the non-drive-end shield. The temperature sensor are connected in series and protect the motor and brake from overloading or overheating.



#### Operating data

For electrical motor ratings not specified in the operating data on page 88 (e.g. torque data), see the specifications for three-phase motors starting on page 58.

#### Switching times, overtravel

The table on the next page shows nominal brake response and recovery times and revolutions following power-off. The values were obtained in series testing.

### Switching times, overtravel

| Frame size | Response time AC switch-off | DC switch-off          | Recovery time       | Overtravel <sup>(1)</sup> AC switch-off | DC switch-off |
|------------|-----------------------------|------------------------|---------------------|-----------------------------------------|---------------|
| BD ... B   | t <sub>11</sub> ~ [ms]      | t <sub>11</sub> = [ms] | t <sub>2</sub> [ms] | revolutions                             | revolutions   |
| 80M1-2     | 150                         | 30                     | 90                  | 10                                      | 2             |
| 80M2-2     | 150                         | 30                     | 90                  | 11                                      | 2             |
| 90S-2      | 250                         | 45                     | 110                 | 15                                      | 2             |
| 90L-2      | 250                         | 45                     | 110                 | 16                                      | 3             |
| 100L-2     | 300                         | 50                     | 150                 | 19                                      | 3             |
| 112M-2     | 300                         | 50                     | 150                 | 24                                      | 3             |
| 132S1-2    | 350                         | 50                     | 230                 | 25                                      | 4             |
| 132S2-2    | 350                         | 90                     | 230                 | 27                                      | 4             |
| 80M1-4     | 150                         | 30                     | 90                  | 4                                       | 1             |
| 80M2-4     | 150                         | 30                     | 90                  | 4                                       | 1             |
| 90S-4      | 250                         | 45                     | 110                 | 5                                       | 1             |
| 90L-4      | 250                         | 45                     | 110                 | 5                                       | 1             |
| 100L1-4    | 300                         | 50                     | 150                 | 6                                       | 1             |
| 100L2-4    | 300                         | 50                     | 150                 | 7                                       | 1             |
| 112M-4     | 300                         | 50                     | 170                 | 11                                      | 1             |
| 132S-4     | 350                         | 90                     | 230                 | 12                                      | 2             |
| 132M-4     | 350                         | 90                     | 230                 | 13                                      | 2             |
| 80M1-6     | 150                         | 30                     | 90                  | 3                                       | 1             |
| 80M2-6     | 150                         | 30                     | 90                  | 3                                       | 1             |
| 90S-6      | 250                         | 45                     | 110                 | 4                                       | 1             |
| 90L-6      | 250                         | 45                     | 110                 | 4                                       | 1             |
| 100L-6     | 300                         | 50                     | 150                 | 6                                       | 1             |
| 112M-6     | 300                         | 50                     | 150                 | 7                                       | 1             |
| 132S-6     | 350                         | 90                     | 230                 | 7                                       | 1             |
| 132M1-6    | 350                         | 90                     | 230                 | 8                                       | 2             |
| 132M2-6    | 350                         | 90                     | 230                 | 8                                       | 2             |
| 80M1-8     | 150                         | 30                     | 90                  | 2                                       | 1             |
| 80M2-8     | 150                         | 30                     | 90                  | 2                                       | 1             |
| 90S-8      | 250                         | 45                     | 110                 | 3                                       | 1             |
| 90L-8      | 250                         | 45                     | 110                 | 3                                       | 1             |
| 100L1-8    | 300                         | 50                     | 150                 | 3                                       | 1             |
| 100L2-8    | 300                         | 50                     | 150                 | 4                                       | 1             |
| 112M-8     | 300                         | 50                     | 150                 | 6                                       | 1             |
| 132S-8     | 350                         | 90                     | 230                 | 7                                       | 2             |
| 132M-8     | 350                         | 90                     | 230                 | 7                                       | 2             |

#### Note:

1) The overtravel of the motors was measured without additional centrifugal masses.

### Brake torque, wear values

Through a combination of different coupling springs and brake disks, the brake torques can be adjusted (see table).

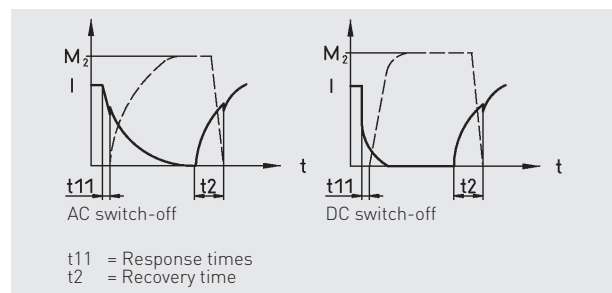
### Brake torque<sup>1)</sup>, wear values

| Frame size | Rated torque M <sub>2</sub> [Nm] | Wear Q <sub>r</sub> 0,1 [J] | Q <sub>r</sub> ges. [J] | Brake disk new thickness [mm] |
|------------|----------------------------------|-----------------------------|-------------------------|-------------------------------|
| BD...B     |                                  |                             |                         |                               |
| 80         | 8                                | 65x10 <sup>6</sup>          | 162x10 <sup>6</sup>     | 6,9                           |
|            | 10 <sup>2)</sup>                 | 65x10 <sup>6</sup>          | 162x10 <sup>6</sup>     | 6,9                           |
|            | 11,5                             | 13x10 <sup>6</sup>          | 13x10 <sup>6</sup>      | 6,9                           |
|            | 16                               | 13x10 <sup>6</sup>          | 13x10 <sup>6</sup>      | 6,9                           |
| 90         | 16                               | 100x10 <sup>6</sup>         | 500x10 <sup>6</sup>     | 8                             |
|            | 20 <sup>2)</sup>                 | 100x10 <sup>6</sup>         | 500x10 <sup>6</sup>     | 8                             |
|            | 23                               | 20x10 <sup>6</sup>          | 20x10 <sup>6</sup>      | 8                             |
|            | 32                               | 20x10 <sup>6</sup>          | 20x10 <sup>6</sup>      | 8                             |
| 100        | 32                               | 130x10 <sup>6</sup>         | 600x10 <sup>6</sup>     | 10,4                          |
|            | 40                               | 130x10 <sup>6</sup>         | 600x10 <sup>6</sup>     | 10,4                          |
|            | 46 <sup>2)</sup>                 | 30x10 <sup>6</sup>          | 45x10 <sup>6</sup>      | 10,4                          |
|            | 64                               | 30x10 <sup>6</sup>          | 45x10 <sup>6</sup>      | 10,4                          |
| 112        | 32                               | 130x10 <sup>6</sup>         | 600x10 <sup>6</sup>     | 10,4                          |
|            | 40                               | 130x10 <sup>6</sup>         | 600x10 <sup>6</sup>     | 10,4                          |
|            | 46 <sup>2)</sup>                 | 30x10 <sup>6</sup>          | 45x10 <sup>6</sup>      | 10,4                          |
|            | 64                               | 30x10 <sup>6</sup>          | 45x10 <sup>6</sup>      | 10,4                          |
| 132        | 60                               | 130x10 <sup>6</sup>         | 700x10 <sup>6</sup>     | 11,15                         |
|            | 75                               | 130x10 <sup>6</sup>         | 700x10 <sup>6</sup>     | 11,15                         |
|            | 86 <sup>2)</sup>                 | 65x10 <sup>6</sup>          | 130x10 <sup>6</sup>     | 11,15                         |
|            | 100                              | 65x10 <sup>6</sup>          | 130x10 <sup>6</sup>     | 11,15                         |

#### Note:

1) Tolerance -20%/+40% at 1m/s friction speed

2) Standard torque



The possible friction work Q<sub>r</sub> can be calculated according to the following formulae. Please take the wear limits from the table.

$$Q_r = \frac{J \times n^2}{182,4} \times \frac{M_2}{M_v} \quad [J]$$

$$M_v = M_2 + (-) * M_L \quad [Nm]$$

Q<sub>r</sub> [J] = Existing friction work per braking operation

Q<sub>r</sub> 0,1 [J] = friction work per 0.1 mm of wear

Q<sub>r</sub> ges. [J] = Friction work up to brake disk change

J [kgm<sup>2</sup>] = Moment of inertia

N [rpm] = Rotation speed

M<sub>2</sub> [Nm] = Rated torque

M<sub>v</sub> [Nm] = Retardation torque

M<sub>L</sub> [Nm] = Load torque

\* Sign in brackets [-] applies in case of load braking downwards

# Three-phase AC Asynchronous Motors with Integrated Frequency Inverter

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## Compact drives

### CD...I type series

Compact drives with the explosion protection types II 2G Ex de IIC T4 or II 2D Ex tD A21 IP65 T120 °C consist of a flameproof ATB type CD motor with a type CEIGL flameproof frequency inverter attached. It is suitable for rotation-speed-controlled applications in explosion-hazard areas of zones 1 and 21.

### Frequency range

The certification covers a frequency range from 2 to 100 Hz. Compact drives are therefore suitable for use in drive solutions up to 6000 rpm. Above 50 Hz, the drive is designed for operation in the field-weakening range, i.e. with constant power.

### Monitoring

The thermal monitoring of motor and inverter is implemented through PTC thermistor temperature sensors. Optionally a certified thermistor tripping device, as well as an input contactor, can be installed in the inverter casing. A compact drive with galvanic separation can therefore provide the necessary switching functionality in case of a fault in an explosion-hazard area, without additional switching devices.

### Frequency inverter

A full-featured LENZE 8200 vector frequency inverter is used to drive the motor with field-oriented vector control and a switching frequency of 4 kHz., providing excellent running and control characteristics across the entire speed and torque range. The adaptation of the inverter to the motor with the recording of the motor parameters, as well as the base parameterization of the frequency inverter, is carried out during final inspection and testing.

### Control

The compact drive is controlled using various exchangeable frequency inverter modules according to user requirements. These modules are available for bus systems such as PROFIBUS-DP, interbus or CAN-Bus or as I/O modules for conventional control over analog set point value and ON/OFF contacts.



Compact Drive Type CD 132 M-4

### Specifications

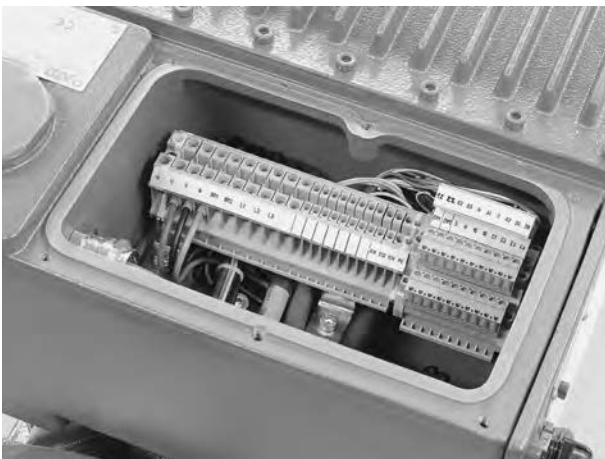
|                                              |                                                                                            |
|----------------------------------------------|--------------------------------------------------------------------------------------------|
| Ignition protection type                     | flameproof enclosure/dust protection<br>II 2G Ex de IIC T4<br>II 2D Ex tD A21 IP65 T120 °C |
| Inverter casing certification                | PTB 08 ATEX 1111X                                                                          |
| Frame sizes                                  | 80 to 160                                                                                  |
| Supply voltage                               | 380 to 500 V $\pm 10\%$ , 50/60 Hz                                                         |
| Range of power                               | 0,55 bis 11 kW                                                                             |
| Maximum current                              | 150 % $I_n$ for 60 s in 10 min                                                             |
| Leakage current to PE<br>(to EN 50178)       | > 3,5 mA<br>Fixed installations required                                                   |
| Fixed installations required                 | double PE                                                                                  |
| Output frequency                             | 2 to 50/100 Hz                                                                             |
| Frequency resolution absolute                | 0,02 Hz                                                                                    |
| Protective insulation of<br>control circuits | Safe isolation of PELV<br>to EN 50178                                                      |
| EMC                                          | Compliance with requirements<br>of EN 61800-3/A11                                          |

### EMC

To limit power line interference, the inverter is equipped with a line reactor integrated into the flameproof casing as well as an EMC filter for grounded mains networks. The compact drive therefore meets the prerequisites of the specifications of the EMC Directive 2004/108/EC as well as the low-voltage Directive 2006/42/EC, i.e. conformity with DIN EN 61800-3/A11 and compliance with the limit value class A according to DIN EN 55011.

## Connections

The connections of the supply voltage and control are implemented in an explosion-protected Ex e terminal compartment of the inverter casing. A manual terminal with keyboard and LC display is available for display of operating data, parameters and diagnostics. This "key pad" is connected to the frequency inverter via a plug to the explosion-protection Ex e terminal compartment. However, it is not explosion-proof and thus designed for short-term operation only.



Compact motor terminal compartment

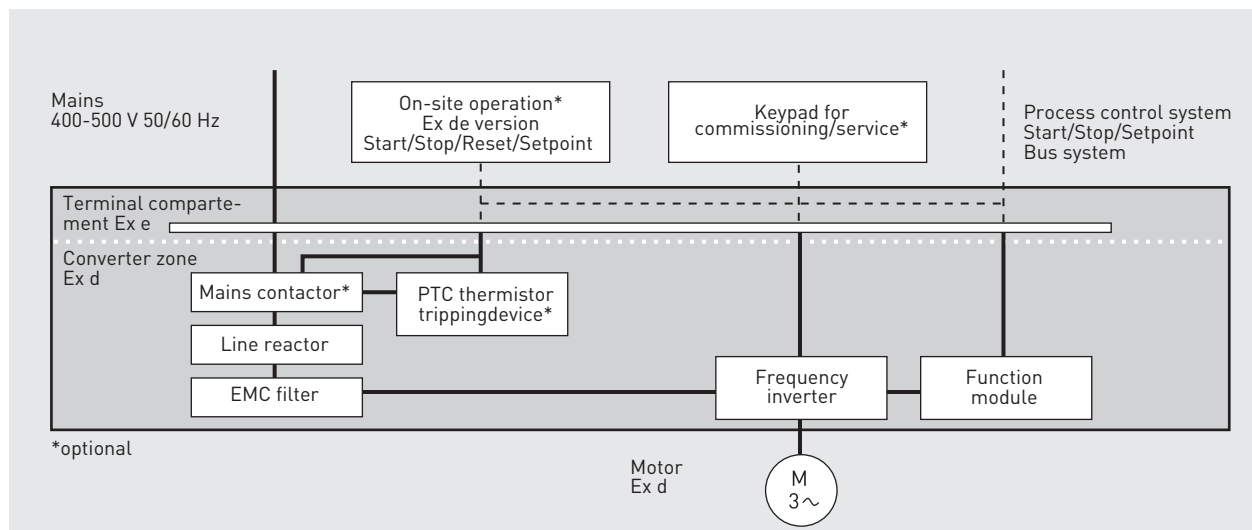
## Entries for mains supply cables

| Frame size              | 80                       | 90 | 100 | 112 | 132                                    | 160 |
|-------------------------|--------------------------|----|-----|-----|----------------------------------------|-----|
| Thread type             | 2x M25x1,5<br>1x M16x1,5 |    |     |     | 1x M32x1,5<br>1x M25x1,5<br>1x M16x1,5 |     |
| for cable outer dia. mm | 8-17<br>6-11             |    |     |     | 12-21<br>8-17<br>6-11                  |     |

Through the compact connection of a motor with frequency inverter, for employment in almost all explosion-hazard areas, with the following advantages for the user:

- With certification according to ATEX 95, the motor can be used in zones 1 and 21 throughout Europe - with no additional national acceptance.
- Simplified planning process
- No additional control cabinet or switching system
- Cost reduction through short feed to the motor. No shielded cables necessary.
- Feed to the compact drive without EMC problems through the use of network and EMC filters on the motor.
- Lower number of different part types and thus cost reduction through utilization of an inverter wide-voltage device for 400 V to 500 V mains voltage.
- No version limitation since a standard ATB flameproof motor Ex d is used.
- The version is available as a universal chemical industry motor (flexi mount motor).

For tables with operating data, see page 93.



Functional diagram

# High-Voltage Motors

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## CD...H type series

The high-voltage three-phase motors are explosion-proof with a flameproof enclosure, in accordance with DIN EN 60079-1 for Group IIC and temperature classes T3 to T6.

### Winding

According to design, round-wire random-wound windings or conventional form-wound coils are employed. The thermal application meets insulation class B. Only in special cases, the class F limit is slightly exceeded.

### Design

- Series CD 355...H to CD 450...H
- Acceptance for category II 2G for use in zones 1 and 2
- Acceptance for category II 2G for use in zones 21 and 22
- Temperature classes T3 to T6
- Power range from 160 to approx. 700 kW (for 1500 rpm)
- Rated voltage from 3 kV to 6.6 kV
- 50Hz for 2 to 8 poles, 60 Hz for 4 to 8 poles
- Self-cooling (IC411) with fans which are independent of the direction of rotation
- Low-noise design with axial fans which are dependent of the direction of rotation
- Anti-condensation heater
- Low temperature up to -55 °C without heater
- Ambient temperatures of up to 60 °C
- Altitude of installation above 1000 m m.s.l.
- Installation of temperature sensors such as PT 100, PTC thermistors or KTY in winding and bearing for additional protection
- Customer-specific special-purpose versions

For tables with operating data, see page 95.



High voltage motor Ex d IIC

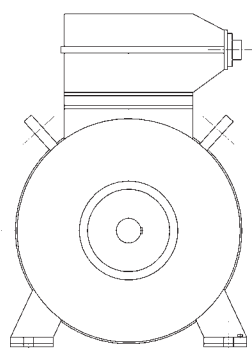
### Connection

For rated voltage of up to 6.6 kV, the motors can be connected using terminal boxes with the "increased safety" or "flameproof enclosure" protection type. The box is mounted on top as standard arrangement. Side versions are possible. The boxes can be rotated by  $4 \times 90^\circ$  in each case in order to enable connection from all directions. This is possible without rotating the connecting terminals.

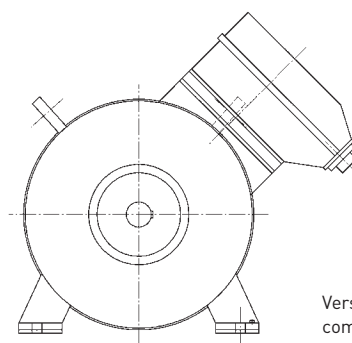
On request, the star point can be located in a second terminal compartment. In this case, main- and star-point boxes are installed on a flameproof adapter piece mounted on the motor support. By replacing the terminals between the two boxes, it is also possible to switch voltages.

### Bearings

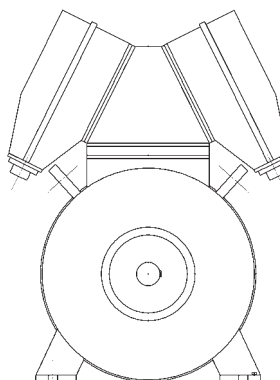
All high-voltage motors are already equipped with an insulated bearing on the non-drive end in the standard version.



Standard version



Version with main terminal compartment under  $45^\circ$



Motor with main and star point terminal compartment

## Protective device

According to DIN EN 60079-14 and VDE 0165-1, all motor poles must be protected against overheating by motor protection switches or equivalent protective equipment. For example, a winding temperature monitoring system using PTC thermistor temperature sensors according to DIN 44081 in combination with an approved tripping device is an equivalent protective device. Motors up to 200 kW (2 or 4 poles), motors up to 160 kW (6 poles) and 132 kW (8 poles) can be equipped with this protective facility as the sole motor protection.

All motors can be protected by PTC thermistor temperature sensors in addition to the motor circuit breaker.

This protection method is specified in operating modes other than S1, such as inverter operation, short-time operation, switching operation, long starting times, etc. It also provides protection in case of reduced cooling airflow and excessive ambient temperature.

Motors certified for operating modes S1 to S7, as well as S9 and S10, with temperature sensors as the sole protection, are therefore approved for use with all frequency inverters (operating data see pages 59, 61, 65).

Motors with temperature sensors as the sole protection are generally also approved for use with frequency inverters. The temperature sensor provides the overload protection. Short-circuit protection must be provided by the frequency inverter and/or a motor protection switch.

Temperature sensor protection consists of three series-connected PTC thermistors fitted to the winding head (warmest point) of the three phases of the stator winding. For motors with up to 3 separate windings, 3 temperature sensors are employed in each case; all sensors are connected in series.

The designations of the temperature sensor terminals in the terminal compartment are TP1 and TP2.

The PTCs have to be connected to an certified PTC-tripping device marked II(2) G.

Versions with additional temperature sensors, e.g. for warning or reserve, are available on request.

## Heater

Heating elements will be used to avoid condensation or to protect the motor against low-temperatures below  $-20^{\circ}\text{C}$ . The anti-condensation heating can be implemented using the motor winding or separate heating strips. Heating for protection against motor temperatures below  $-20^{\circ}\text{C}$  can only be implemented with the motor winding.

## Motor winding

The anti-condensation heating via the motor winding is achieved by an reduced AC voltage via terminals U1 and V1. The heating voltage in table (page 47) relate to 50 and 60 Hz in star or delta circuit layout and to all frame sizes of the respective frame sizes for 2-pole to 8-pole designs ( $2p = 2$  to  $2p = 8$ ). The stated apparent output is a minimum value, i.e. the next higher output type must be used as the transformer rating. For precise matching, the transformer must have voltage taps of  $\pm 10\%$ . Provisions must be made to ensure that motor voltage and heating voltage cannot be applied at the same time.

The heating power is shown in the table.

When using the heater to protect the motor from temperatures below  $-20^{\circ}\text{C}$ , note that the heater itself is not explosion-proof. It may not be used to heat up the motor from temperatures of less than  $-20^{\circ}\text{C}$  to at least  $-20^{\circ}\text{C}$ , because at motor housing temperatures below  $-20^{\circ}\text{C}$  the flameproof enclosure will lose the approval and the motor must not be used at these low temperatures. The heating is only suitable for preventing a drop of the motor temperature to below  $-20^{\circ}\text{C}$  when the motor is not in use.

For applications where motor temperatures below  $-20^{\circ}\text{C}$  (down to  $-55^{\circ}\text{C}$ ) are required, we offer a special version without heaters (see page 19).

## Heating strips

The heater version providing protection against condensation with heating strips, self-limiting explosion-proof heating strips are used. These provide optimum protection of the winding against damage and the heater may also be used when the motor temperature is below  $-20^{\circ}\text{C}$ .

Two voltage ranges are available: 110 - 120 V or 208 - 254 V.

The heating power is shown in the table.

## Heater data

| Frame size | for prevention of condensation with heating strip over the motor winding |        |                                         |           |           |           |           | for protection of temperatures below –20 °C to –40 °C <sup>1)</sup> over motor winding |                                         |           |           |           |           |
|------------|--------------------------------------------------------------------------|--------|-----------------------------------------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------|-----------------------------------------|-----------|-----------|-----------|-----------|
|            | Output                                                                   | Output | Heating voltage for motor rated voltage |           |           |           |           | Output                                                                                 | Heating voltage for motor rated voltage |           |           |           |           |
|            | [W]                                                                      | [VA]   | 230 V [V]                               | 400 V [V] | 460 V [V] | 500 V [V] | 690 V [V] | [VA]                                                                                   | 230 V [V]                               | 400 V [V] | 460 V [V] | 500 V [V] | 690 V [V] |
| 63         | 23                                                                       | 25     | 45                                      | 75        | 90        | 100       | 130       | 65                                                                                     | 70                                      | 120       | 140       | 160       | 210       |
| 71         | 23                                                                       | 40     | 35                                      | 65        | 75        | 85        | 110       | 100                                                                                    | 60                                      | 100       | 120       | 135       | 175       |
| 80         | 23                                                                       | 50     | 30                                      | 55        | 65        | 75        | 100       | 125                                                                                    | 50                                      | 90        | 100       | 115       | 155       |
| 90         | 23                                                                       | 70     | 25                                      | 45        | 50        | 60        | 80        | 175                                                                                    | 40                                      | 70        | 80        | 95        | 125       |
| 100        | 23                                                                       | 100    | 25                                      | 40        | 50        | 55        | 70        | 250                                                                                    | 40                                      | 65        | 75        | 85        | 115       |
| 112        | 23                                                                       | 150    | 20                                      | 40        | 45        | 50        | 65        | 375                                                                                    | 35                                      | 60        | 70        | 80        | 105       |
| 132        | 46                                                                       | 200    | 20                                      | 35        | 40        | 45        | 60        | 500                                                                                    | 30                                      | 55        | 65        | 70        | 90        |
| 160        | 46                                                                       | 300    | 17                                      | 30        | 35        | 40        | 50        | 750                                                                                    | 25                                      | 45        | 55        | 60        | 80        |
| 180        | 80                                                                       | 400    | 15                                      | 25        | 30        | 35        | 45        | 1000                                                                                   | 25                                      | 40        | 50        | 55        | 70        |
| 200        | 80                                                                       | 500    | 13                                      | 20        | 25        | 30        | 40        | 1250                                                                                   | 20                                      | 35        | 40        | 45        | 60        |
| 225        | 120                                                                      | 650    | 13                                      | 20        | 25        | 30        | 40        | 1650                                                                                   | 20                                      | 35        | 40        | 45        | 60        |
| 250        | 120                                                                      | 800    |                                         | 20        | 25        | 30        | 35        | 2000                                                                                   |                                         | 35        | 40        | 45        | 60        |
| 280        | 240                                                                      | 1200   |                                         | 20        | 20        | 25        | 30        | 3000                                                                                   |                                         | 30        | 35        | 40        | 50        |
| 315        | 240                                                                      | 1600   |                                         | 17        | 20        | 25        | 30        | 4000                                                                                   |                                         | 30        | 35        | 40        | 50        |
| 355        | 360                                                                      | 2300   |                                         | 15        | 18        | 20        | 25        | 5700                                                                                   |                                         | 25        | 28        | 30        | 40        |
| 400        | 600                                                                      | 3000   |                                         | 12        | 14        | 16        | 20        | 7500                                                                                   |                                         | 20        | 22        | 25        | 30        |
| 450        | 1000                                                                     | 4000   |                                         | 10        | 12        | 13        | 17        | 10000                                                                                  |                                         | 15        | 18        | 20        | 20        |

### Note:

1) Outputs for temperatures up to 55 °C on request

# Electrical Design for Motors up to 690 V

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## Rated voltage

The explosion-proof, flameproof three-phase asynchronous motors are generally available for the following rated voltages:

### Rated voltage

|       |           |                          |
|-------|-----------|--------------------------|
| 50 Hz | 230/400 V | Delta/Star <sup>1)</sup> |
|       | 400/690 V | Delta/Star <sup>2)</sup> |
|       | 500 V     | Star <sup>3)</sup>       |
|       | 500 V     | Delta                    |
| 60 Hz | 266/460 V | Delta/Star <sup>1)</sup> |
|       | 460 V     | Delta <sup>2)</sup>      |

#### Notes:

1) Standard up to frame size 112

2) Standard up from frame size 132

3) Standard

Tolerances to IEC/EN 60034-1. Special voltages on request.

## Insulation

All materials used for insulation of the winding and the winding end leads comply with insulation class F. Utilization of the over temperature limit in S1 continuous operation corresponds to insulation class B for constant-speed motors.

Motors of the series ...X with increased performance and pole-switching motors are utilized in accordance with insulation class F.

The limit overtemperature for the winding insulated to thermal class F, according to IEC/EN 60034-1, is 105 K at an ambient temperature of RT 40 °C. In case of utilization to insulation class B, the permissible winding temperature increase is 80 K at an ambient temperature of RT 40 °C according to IEC/EN 60034-1. The high-grade materials used for the insulation system provide optimum protection against the influence of aggressive gases, vapors, dust oil and air humidity.

## Winding end leads

The motors have six winding end leads: U1, V1, W1, U2, V2 and W2. In case of motors with high output and delta circuit connection with a rated current of 400 A or higher, two parallel mains supply lines are required in each case, because the connection terminals have a current limit. For delta connection from 690 A and star connection from 400 A rated current, duplicate winding ends are provided. The three motor connections to the six terminals are U, U; V, V; and W, W. Here also, two parallel mains connections are needed in each case.

## Pole-changing motors

Pole-changing motors have the same design and dimensions as the constant-speed three-phase asynchronous motors. The special features of the pole-changing motors are listed below.

## Frame sizes

|        |           |
|--------|-----------|
| 80–355 | 4/2 poles |
| 90–355 | 8/4 poles |
| 90–355 | 6/4 poles |

Other pole combinations and frame sizes are available on request.

In the standard version, the pole-changing motors are designed for about the same torque (see pp. 84). For motors with a Dahlander pole-changing circuit, this corresponds to the circuit  $\Delta/YY$ .

For special applications of e.g. fan, centrifugal pumps, etc., the pole-changing motors are designed for approximately quadratic torque (see pp. 87). For motors with a Dahlander pole-changing circuit, this corresponds to the circuit  $Y/YY$ .

These motors are supplied for the standard rated voltages 400, 500 and 690 V for a rated frequency of 50 Hz. With special windings, these motors can also be used for any voltage within the voltage range from 400 to 690 V. Other voltages and frequencies are available on request. The thermal utilization of the motors corresponds to insulation class "F".

## Insulation system

| Insulation class according to IEC/EN 60034 | Insulation system<br>Wire/Surface insulation                                                                           | Impregnation                                                                                                                         |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| F                                          | Enamelled wires to DIN 46416-5 Part 5 Grade 2, Temperature index 200 on the basis of polyester and aromatic polyamides | Impregnating resins to insulation class F to DIN EN 60464-2 applied in continuous operation, from frame size 225 hardened by rolling |

# Operating Characteristics for Motors up to 690 V

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## Efficiency, power factor

The efficiency values and power factors listed in the tables apply to operation at rated output, rated voltage and rated frequency. Efficiencies have been determined according to IEC/EN 60034-2-1; tolerances to IEC/EN 60034-1.

The efficiency and power factor values at partial load are listed on page 76. These values apply to the rated output at 50 Hz.

## Output, operating mode

The output values in the tables apply at rated voltage and rated speed in continuous operation S1, a coolant temperature up to 40 °C and an altitude of up to 1000 m above m.s.l.

For higher ambient temperatures and altitudes above 1000 meters, output reductions become necessary. The tables below apply to standard motors (temperature class T4).

| Coolant temperature [°C] | Reduction of the rated output to approx. |                      |
|--------------------------|------------------------------------------|----------------------|
| 40                       | 100 %                                    | see "Operating data" |
| 45                       | 94 %                                     |                      |
| 50                       | 91 %                                     |                      |
| 55                       | 88 %                                     |                      |
| 60                       | 84 %                                     |                      |

| Height above m.s.l. [m] | Reduction of the rated output to approx. |                      |
|-------------------------|------------------------------------------|----------------------|
| 1000                    | 100 %                                    | see "Operating data" |
| 1500                    | 97 %                                     |                      |
| 2000                    | 94 %                                     |                      |

If, for installation above 1000 m above m.s.l., the coolant temperature is reduced according to the table below, no power reduction is necessary. See also IEC/EN 60034-1.

| Altitude of installation above m.s.l. [m] |         | Maximum Coolant temperature [°C] |
|-------------------------------------------|---------|----------------------------------|
| 0                                         | to 1000 | 40                               |
| 1000                                      | 1500    | 35                               |
| 1500                                      | 2000    | 30                               |

These are listed in the tables below: Additional testing may be required for motors with a coolant temperature deviating from 40°C, at an installation altitude other than 1000 m above sea level and whose outputs differ from the standard version.

Special acceptance tests are also required for non-S1 operating modes according to IEC/EN 60034-1. When making an inquiry, please provide the relevant information as required by paragraphs 4 and 6 of these regulations.

A winding temperature monitoring system ensures optimum utilization of the motor, as well as overload protection (see page 48).

## Overload, starting current

The motors can be overloaded in accordance with the requirements of IEC/EN 60034-1. At operating temperature, they can run for two minutes at 1.5 times their rated current without incurring damage and can take 1.6 times their rated torque for 15 seconds.

The over-current relays which must be fitted according to the installation regulations for electrical equipment in hazardous areas only allow limited startup times. This results in limited moments of inertia to be accelerated. This means that up to 2x consecutive startups are possible up to frame size 315 and 1x startup from frame size 355.

# Operating Characteristics for Motors up to 690 V

Permissible start up times for standard motors  
Temperature class T4  
Protection by PTC thermistor sensors

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## Starting current, apparent starting output

The values of the starting current as a multiple of the rated current indicated under operating data are measured variables from a type test sample. From the values of the starting current relationship, the ratio of the starting apparent power to the rated motor output results from the following relationship:

$$\frac{S_A}{P_2} = I_A/I_N \frac{1}{\eta \times \cos \varphi}$$

## Torque

The motors have squirrel-cage rotors whose cages are die-cast aluminum constructions, with 2 to 8 poles, on frame sizes 63 to 315L2 and, in larger sizes, they are implemented as hard-soldered coppered bar constructions for direct actuation. The starting and stalling torques, expressed as multiples of the rated torques, are listed in the specifications tables. The specifications are type sample measured values.

If the voltage deviates from the rated value, torques (starting torque, acceleration torque and stalling torque) change approximately as a function of the square of the voltage.

## Direction of rotation

In general, the motors can rotate in both directions. Motors with self-driven axial-flow fans are an exception (series ...A, ...AR). These fans are dependent on the direction of rotation. The direction of rotation is displayed by an arrow on the fan cowl. Certified circuit diagrams are supplied with the motors.

## Permissible startup times

| Rated<br>output<br><br>$P_2$<br>[kW] | 2p = 2<br>permissible<br>startup time <sup>1)</sup> |                  | 2p = 4<br>permissible<br>startup time <sup>1)</sup> |                  | 2p = 6<br>permissible<br>startup time <sup>1)</sup> |                  | 2p = 8<br>permissible<br>startup time <sup>1)</sup> |                  |
|--------------------------------------|-----------------------------------------------------|------------------|-----------------------------------------------------|------------------|-----------------------------------------------------|------------------|-----------------------------------------------------|------------------|
|                                      | cold<br>t<br>[s]                                    | warm<br>t<br>[s] | cold<br>t<br>[s]                                    | warm<br>t<br>[s] | cold<br>t<br>[s]                                    | warm<br>t<br>[s] | cold<br>t<br>[s]                                    | warm<br>t<br>[s] |
| 0,12                                 | -                                                   | -                | 90                                                  | 62               | -                                                   | -                | 100                                                 | 59               |
| 0,18                                 | 60                                                  | 40               | 90                                                  | 62               | -                                                   | -                | 100                                                 | 59               |
| 0,25                                 | 60                                                  | 40               | 90                                                  | 62               | 80                                                  | 63               | 100                                                 | 59               |
| 0,37                                 | 60                                                  | 40               | 90                                                  | 62               | 79                                                  | 62               | 100                                                 | 59               |
| 0,55                                 | 60                                                  | 40               | 90                                                  | 62               | 55                                                  | 40               | 100                                                 | 59               |
| 0,75                                 | 50                                                  | 36               | 75                                                  | 50               | 85                                                  | 55               | 95                                                  | 56               |
| 1,1                                  | 47                                                  | 31               | 60                                                  | 38               | 80                                                  | 50               | 108                                                 | 69               |
| 1,5                                  | 45                                                  | 27               | 46                                                  | 26               | 73                                                  | 42               | 108                                                 | 81               |
| 2,2                                  | 45                                                  | 20               | 46                                                  | 25               | 65                                                  | 46               | 104                                                 | 72               |
| 3                                    | 42                                                  | 20               | 46                                                  | 22               | 51                                                  | 39               | 80                                                  | 50               |
| 4                                    | 35                                                  | 19               | 39                                                  | 23               | 46                                                  | 34               | 85                                                  | 55               |
| 5,5                                  | 30                                                  | 19               | 43                                                  | 25               | 45                                                  | 29               | 84                                                  | 54               |
| 7,5                                  | 35                                                  | 19               | 42                                                  | 22               | 35                                                  | 22               | 87                                                  | 58               |
| 11                                   | 35                                                  | 19               | 39                                                  | 23               | 38                                                  | 19               | 81                                                  | 45               |
| 15                                   | 41                                                  | 21               | 46                                                  | 24               | 43                                                  | 22               | 59                                                  | 41               |
| 18,5                                 | 39                                                  | 20               | 46                                                  | 23               | 46                                                  | 27               | 46                                                  | 29               |
| 22                                   | 39                                                  | 20               | 52                                                  | 24               | 43                                                  | 21               | 59                                                  | 40               |
| 30                                   | 39                                                  | 20               | 52                                                  | 25               | 60                                                  | 31               | 57                                                  | 33               |
| 37                                   | 53                                                  | 21               | 56                                                  | 28               | 57                                                  | 28               | 66                                                  | 45               |
| 45                                   | 69                                                  | 32               | 62                                                  | 26               | 75                                                  | 45               | 74                                                  | 44               |
| 55                                   | 74                                                  | 29               | 45                                                  | 25               | 80                                                  | 56               | 77                                                  | 48               |
| 75                                   | 85                                                  | 39               | 56                                                  | 23               | 64                                                  | 36               | 61                                                  | 40               |
| 90                                   | 84                                                  | 42               | 59                                                  | 25               | 49                                                  | 22               | 60                                                  | 30               |
| 110                                  | 97                                                  | 45               | 62                                                  | 23               | 60                                                  | 30               | 60                                                  | 30               |
| 132                                  | 103                                                 | 48               | 63                                                  | 26               | 60                                                  | 30               | 60                                                  | 30               |
| 160                                  | 100                                                 | 50               | 60                                                  | 30               | 60                                                  | 30               | 60                                                  | 30               |
| 200                                  | 100                                                 | 50               | 60                                                  | 30               | 60                                                  | 30               | 60                                                  | 30               |
| 250                                  | 100                                                 | 50               | 60                                                  | 30               | 60                                                  | 30               | 60                                                  | 30               |
| 315                                  | 100                                                 | 50               | 60                                                  | 30               | 60                                                  | 30               | 60                                                  | 30               |
| 355                                  | 100                                                 | 50               | 60                                                  | 30               | 60                                                  | 30               | 60                                                  | 30               |
| 400                                  | 100                                                 | 50               | 60                                                  | 30               | 60                                                  | 30               | 60                                                  | 30               |
| 450                                  | -                                                   | -                | 60                                                  | 30               | 60                                                  | 30               | -                                                   | -                |

### Note

1) These times can be achieved only with winding temperature monitoring with PTC thermistor temperature sensors.

Permissible switching frequencies for standard  
motors Temperature class T4  
Protection by PTC thermistor sensors

### Switching frequency

For standard version motors (temperature class T4) the start-up times indicated in the table are allowed with temperature rise "F" and winding temperature monitoring using PTC thermistors.

The following cases are distinguished:

1. Number of starts with constant load torque
2. Number of starts with load torque rising to rated torque as a square of the speed (quadratic load torque).

The values given apply for an inertia factor  $FI = 1$ , i.e. they do not take the external moment of inertia into account. External moments of inertia can be included using the  $FI$  factor according to the equation

$$S = \frac{S_{\text{Catalogue}}}{FI} \quad [S/h]$$

$$\text{mit } FI = \frac{J_{Zus.} + J_{Mot.}}{J_{Mot.}}$$

The operating frequencies listed for motors under load involve accelerations only, in contrast to the no-load operating frequencies. If the motors are decelerated with reverse current, these values must be divided by the  $K$  factor.

This  $K$  factor is:

$K = 2.5$  for constant load torque

$K = 3.2$  for quadratic load torque

The resulting relationship is:

$$S = \frac{S_{\text{Catalogue}}[S/h]}{FI \times K}$$

[S/h] switching operations per hour

### Startups per hour

| Rated Output<br>$P_2$<br>[kW] | <b>2p = 2</b><br>Startups per hour<br>$FI = 1$<br>Load torque<br>const. quadr.<br>[S/h] [S/h] |       | <b>2p = 4</b><br>Startups per hour<br>$FI = 1$<br>Load torque<br>const. quadr.<br>[S/h] [S/h] |       | <b>2p = 6</b><br>Startups per hour<br>$FI = 1$<br>Load torque<br>const. quadr.<br>[S/h] [S/h] |       | <b>2p = 8</b><br>Startups per hour<br>$FI = 1$<br>Load torque<br>const. quadr.<br>[S/h] [S/h] |       |
|-------------------------------|-----------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------|-------|
| <b>0,12</b>                   |                                                                                               |       | 11000                                                                                         | 12000 |                                                                                               |       | 6000                                                                                          | 10200 |
| <b>0,18</b>                   | 8000                                                                                          | 11000 | 11000                                                                                         | 12000 |                                                                                               |       | 6000                                                                                          | 10200 |
| <b>0,25</b>                   | 8000                                                                                          | 11000 | 11000                                                                                         | 12000 | 10800                                                                                         | 11450 | 6000                                                                                          | 10200 |
| <b>0,37</b>                   | 8000                                                                                          | 11000 | 11000                                                                                         | 12000 | 10800                                                                                         | 11450 | 5000                                                                                          | 8500  |
| <b>0,55</b>                   | 8000                                                                                          | 11000 | 10800                                                                                         | 11550 | 10800                                                                                         | 11450 | 5000                                                                                          | 8500  |
| <b>0,75</b>                   | 7850                                                                                          | 10500 | 10800                                                                                         | 11550 | 6300                                                                                          | 10590 | 4000                                                                                          | 6800  |
| <b>1,1</b>                    | 5700                                                                                          | 7560  | 6200                                                                                          | 9550  | 5900                                                                                          | 8880  | 6100                                                                                          | 9900  |
| <b>1,5</b>                    | 3260                                                                                          | 4410  | 3420                                                                                          | 6480  | 2950                                                                                          | 4580  | 9200                                                                                          | 10500 |
| <b>2,2</b>                    | 1410                                                                                          | 1960  | 2960                                                                                          | 4400  | 2800                                                                                          | 4100  | 4500                                                                                          | 6930  |
| <b>3</b>                      | 980                                                                                           | 1260  | 1930                                                                                          | 2690  | 2600                                                                                          | 3780  | 3900                                                                                          | 5500  |
| <b>4</b>                      | 820                                                                                           | 1200  | 2600                                                                                          | 3490  | 2400                                                                                          | 3460  | 2750                                                                                          | 4530  |
| <b>5,5</b>                    | 610                                                                                           | 880   | 1520                                                                                          | 2050  | 2300                                                                                          | 3150  | 2420                                                                                          | 3480  |
| <b>7,5</b>                    | 780                                                                                           | 1040  | 1000                                                                                          | 1360  | 1340                                                                                          | 1800  | 2190                                                                                          | 3180  |
| <b>11</b>                     | 300                                                                                           | 400   | 990                                                                                           | 1360  | 720                                                                                           | 1000  | 1100                                                                                          | 1640  |
| <b>15</b>                     | 240                                                                                           | 320   | 510                                                                                           | 750   | 630                                                                                           | 860   | 1330                                                                                          | 1850  |
| <b>18,5</b>                   | 180                                                                                           | 240   | 460                                                                                           | 620   | 540                                                                                           | 820   | 770                                                                                           | 1040  |
| <b>22</b>                     | 130                                                                                           | 170   | 130                                                                                           | 180   | 400                                                                                           | 540   | 1080                                                                                          | 1430  |
| <b>30</b>                     | 65                                                                                            | 100   | 300                                                                                           | 400   | 290                                                                                           | 380   | 410                                                                                           | 560   |
| <b>37</b>                     | 55                                                                                            | 75    | 230                                                                                           | 310   | 170                                                                                           | 240   | 370                                                                                           | 560   |
| <b>45</b>                     | 50                                                                                            | 65    | 110                                                                                           | 170   | 200                                                                                           | 280   | 205                                                                                           | 305   |
| <b>55</b>                     | 40                                                                                            | 55    | 95                                                                                            | 130   | 220                                                                                           | 310   | 270                                                                                           | 305   |
| <b>75</b>                     | 30                                                                                            | 45    | 70                                                                                            | 100   | 100                                                                                           | 170   | 220                                                                                           | 330   |
| <b>90</b>                     | 25                                                                                            | 35    | 40                                                                                            | 65    | 90                                                                                            | 150   | 120                                                                                           | 180   |
| <b>110</b>                    | 18                                                                                            | 27    | 23                                                                                            | 30    | 80                                                                                            | 125   | 170                                                                                           | 230   |
| <b>132</b>                    | 16                                                                                            | 25    | 30                                                                                            | 55    | 70                                                                                            | 100   | 150                                                                                           | 190   |
| <b>160</b>                    | 12                                                                                            | 22    | 30                                                                                            | 45    | 55                                                                                            | 85    | 150                                                                                           | 190   |
| <b>200</b>                    | 8                                                                                             | 20    | 22                                                                                            | 35    | 50                                                                                            | 75    | 150                                                                                           | 190   |
| <b>250</b>                    | 8                                                                                             | 18    | 18                                                                                            | 30    | 40                                                                                            | 60    |                                                                                               |       |
| <b>315</b>                    | 8                                                                                             | 18    | 18                                                                                            | 30    |                                                                                               |       |                                                                                               |       |

### Notes

Frame size 355 to 450 on request.

Switching operation can be implemented only with winding temperature monitoring using PTC thermistor temperature sensors.

# Frequency Inverter Operation

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## Frequencies above the rated frequency of 50 Hz

If the frequency continues to increase beyond the drive's rated value, the speed increases accordingly.

The speeds corresponding to the maximum frequencies must not exceed the motor's speed limit. If a motor is operated above its rated frequency, it will generate more noise.

To prevent excessive noise generation, the use of a motor with a separately driven external fan is recommended. For operation above the rated frequency (50 Hz), there are two basic operating modes:

### Three phase motors operated with a frequency inverter at constant flux up to 87 Hz

If the motor is operated above its rated frequency, at a voltage that increases in linear proportion with frequency, the magnetic flux remains constant. Because the core losses increase out of proportion to the frequency, the maximum torque is lower than it is at 50 Hz (see illustrations of torque characteristic pages 56 and 57). The specifications tables list the output at 87 Hz or at the maximum frequency for 2-pole motors. If voltage increase with frequency is linear, make sure that the voltage limits are not exceeded (see maximum permissible voltage load).

### Three phase motors operated with a frequency inverter at constant voltage above 50 Hz

If the motor runs above the mains frequency, at a constant voltage, field weakening occurs. The flux of the motor drops inversely proportion to the frequency. In the range above the rated frequency (50 Hz to 87 Hz), the motor's output remains approximately constant i.e. the torque drops inversely proportion to the frequency (see torque characteristic pages 56 and 57).

The maximum frequency for two-pole motors is listed in the specifications tables.

## Power and torque values

The output values for inverter operation listed in the tables apply for continuous S1 operation at an ambient temperature up to 40 °C and an altitude up to 1000 meters. Values for higher room temperatures and altitudes available on request.

The output figures apply for an inverter with

- a direct-current intermediate circuit (I-type inverter)
- a direct-voltage intermediate circuit with block or pulsed voltage (U-type inverter)

The thermal utilization of the motors corresponds to thermal class F.

For torque characteristics, see pages 56 and 57.

## Noise generation of three-phase motors in frequency inverter operation

Due to the harmonic oscillations, noise levels are higher in frequency inverter operation than they are at mains frequency. Without the use of a sinusoidal phase filter, the increase on the U-type inverter is about 7-15 dB(A); on the I-type inverter, it is about 3 dB(A).

If a filter is used with the U-type inverter, the noise levels at frequencies < 50 Hz do not exceed the values with mains operation.

The noise increase from self-ventilated motors at frequencies > 50 Hz can be taken from the following table.

### Guideline values for the increase of the sound pressure level through increase of the fan noise

| F [Hz] | Δ LP [dB(A)] |
|--------|--------------|
| 50     | 0            |
| 60     | ≤ 5          |
| 70     | ≤ 9          |
| 80     | ≤ 12         |
| 87     | ≤ 15         |

For low-noise drives with inverters, we offer special motors as listed on page 35.

### Motors with separately driven external fans

Motors with separately driven external fans are recommended for drives with larger control ranges and constant load torque, as well as for operation above 50 Hz in order to avoid noise increase.

The fan motor meets the explosion protection rating "flameproof enclosure".

The motor's electrical control system must ensure that the main motor can only operate while the external fan is running.

### Installation note

If the current-limited inverter power output is not insulated from the mains, one of the following measures must be implemented to protect the ground conductor from overload as specified in DIN EN 50178, VDE 0160 (Installation of electronic equipment in low voltage installations).

When dimensioning the protective device in the main poles, one must take into account that, in the event of a fault, the PE conductor current can be greater than the main pole current. In this case, the protective conductor must be designed for the fault current.

All the specifications of the inverter manufacturer with regard to this fault must be observed.

### Permissible voltage load

With frequency-inverter operation, voltage peaks are created by the switching operations which place additional stress on the terminals and winding insulation. This is the case to an extreme degree if, in the case of pulse-controlled AC inverters with very steep rises, vibrations are created on the line which can even overlay under unfavorable conditions.

The following values of the permissible voltage loading capacity through voltage peaks (limit values of the terminals and winding insulation) are safe.

1. The air and creep sections of the **terminals** are designed for an effective rated voltage of 750 V on the basis of DIN EN 50019 - explosion protection type "Increased safety e". The permissible transient over voltage surge in frequency inverter operation of the motors is 2.15 kV phase-to-phase and phase-to-ground.
2. **Standard windings** for effective rated voltages of 230/400 V and 500 V have a peak-voltage resistance of 1.6kV phase-to-phase and phase-to-ground at continuous heating according to the heat class F. These motors can be used with frequency inverters with NO additional filter.
3. **Standard windings** for effective rated voltages of 400 V/690 V have a peak-voltage resistance of 1.6 kV phase-to-phase and phase-to-ground at continuous heating according to heat class F. These motors can be used with frequency inverters WITH an additional filter.
4. **Special windings** for an effective rated voltage of 690 V have a peak-voltage resistance of 2.15 kV phase-to-phase and phase-to-ground at continuous heating according to heat class F. These motors can be used with a frequency inverter WITHOUT additional filters. They are identified with the letter "U" at the end of the type designation of the motor. This special winding can be implemented in motors of frame size 315 or higher and requires a reduction of output.

# Frequency Inverter Operation

Torque characteristic on the frequency inverter, 50 Hz mains,  
Temperature class T4  
2p = 2

56

Diagram 1: Frame size 63-160

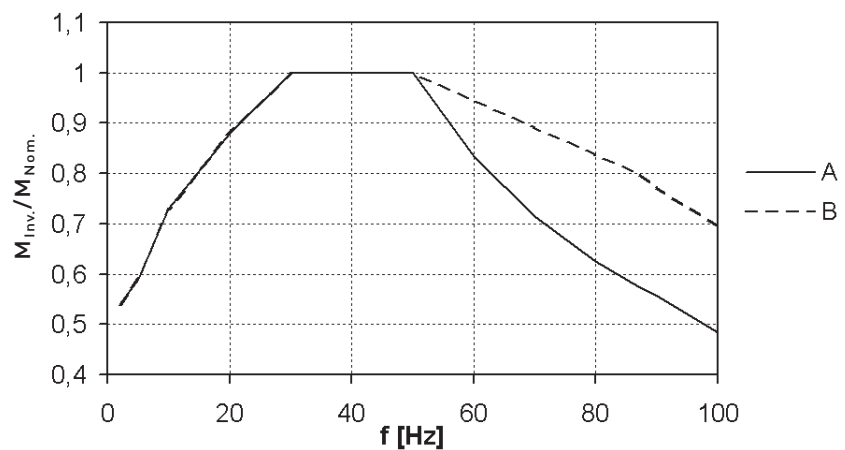


Diagramm 2: Frame size 180-225

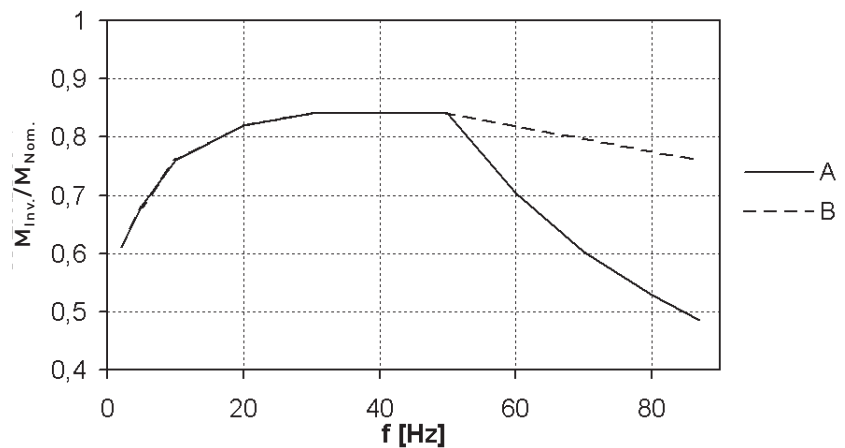
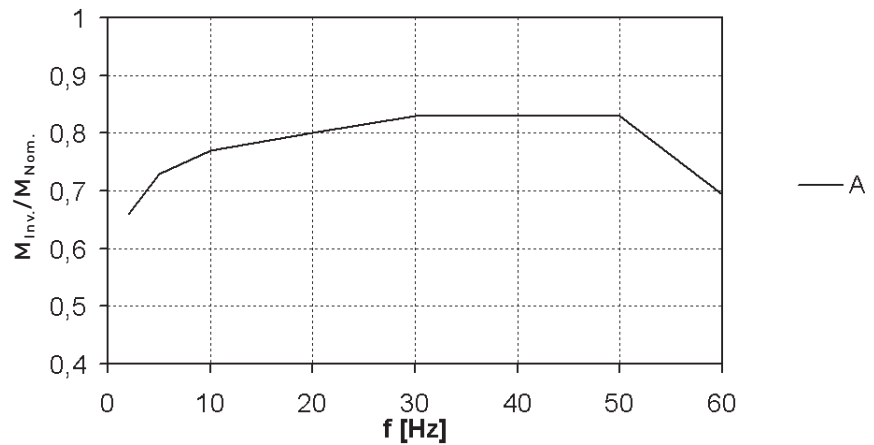


Diagramm 3: Frame size 250-400



Curve A: Field weakening range above 50Hz  
Curve B: Field weakening range above 87Hz

Torque characteristic on the frequency inverter, 50 Hz mains,  
Temperature class T4  
 $2p = 4$  to  $8$

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IV

Diagram 4: Frame sizes 63 to 160

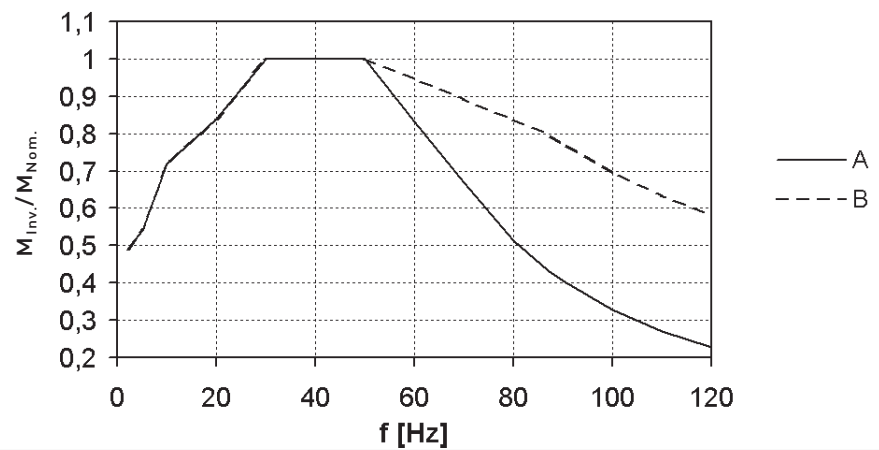


Diagram 5: Frame sizes 180 to 200

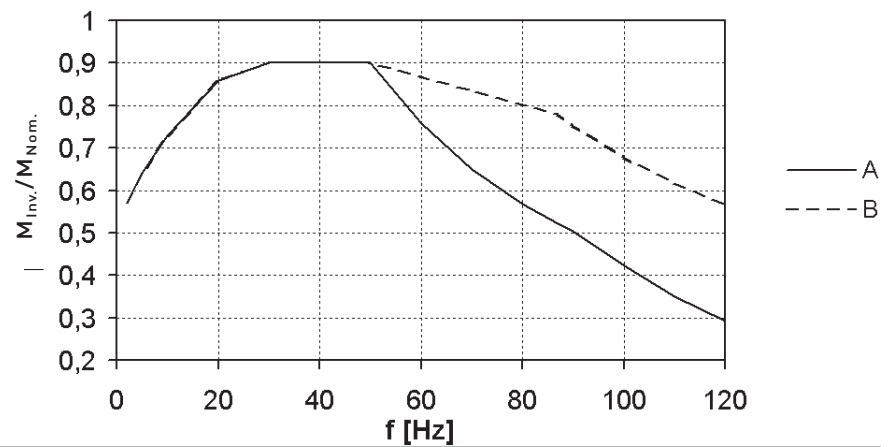
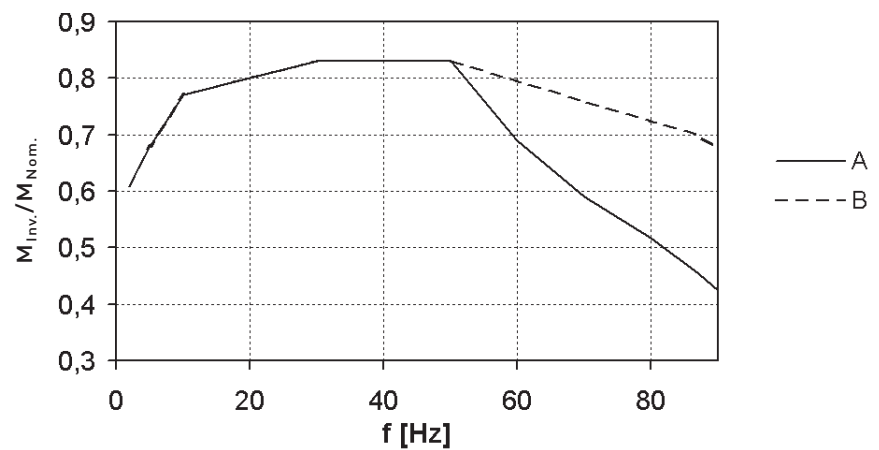


Diagram 6: Frame sizes 225 to 450



Curve A: Field weakening range above 50 Hz  
Curve B: Field weakening range above 87Hz

# IE1

## Mains Operation 50 Hz

Temperature class T4

ns = 3000 rpm, 2p = 2

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| Frame size | Output                                        | Rated current at  |                   | rpm        | Efficiency | Power factor | Torque    | Starting torque                | Starting current               | Stalling torque                | Moment of inertia        | Weight <sup>2)</sup> | Noise levels with radial-flow fan |                           | Noise levels with axial-flow fan Type ...A |                           |
|------------|-----------------------------------------------|-------------------|-------------------|------------|------------|--------------|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------|----------------------|-----------------------------------|---------------------------|--------------------------------------------|---------------------------|
|            | P <sub>2</sub><br>[kW]                        | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]   | cos φ        | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | L <sub>p</sub><br>[dB(A)]         | L <sub>w</sub><br>[dB(A)] | L <sub>p</sub><br>[dB(A)]                  | L <sub>w</sub><br>[dB(A)] |
| CD...      | Efficiency according to manufacturer standard |                   |                   |            |            |              |           |                                |                                |                                |                          |                      |                                   |                           |                                            |                           |
| 63M1-2     | 0,18                                          | 0,59              | 0,47              | 2905       | 66         | 0,67         | 0,59      | 4,6                            | 6,8                            | 6,5                            | 0,00028                  | 16                   | 49                                | 61                        | -                                          | -                         |
| 63M2-2     | 0,25                                          | 0,69              | 0,55              | 2860       | 70         | 0,75         | 0,83      | 3,4                            | 5,8                            | 4,7                            | 0,00028                  | 16                   | 49                                | 61                        | -                                          | -                         |
| 71M1-2     | 0,37                                          | 0,89              | 0,71              | 2800       | 71,5       | 0,84         | 1,26      | 2,7                            | 5,2                            | 3,5                            | 0,00028                  | 16                   | 51                                | 63                        | -                                          | -                         |
| 71M2-2     | 0,55                                          | 1,34              | 1,08              | 2810       | 72         | 0,82         | 1,87      | 2,8                            | 5,5                            | 3,6                            | 0,00039                  | 17                   | 51                                | 63                        | -                                          | -                         |
| CD...      | IE1 Efficiency according to IEC 60034-30      |                   |                   |            |            |              |           |                                |                                |                                |                          |                      |                                   |                           |                                            |                           |
| 80M1-2     | 0,75                                          | 1,73              | 1,38              | 2790       | 74,5       | 0,84         | 2,57      | 2,7                            | 4,8                            | 3,3                            | 0,00058                  | 24                   | 55                                | 67                        | -                                          | -                         |
| 80M2-2     | 1,1                                           | 2,5               | 1,99              | 2820       | 78         | 0,82         | 3,73      | 2,8                            | 5,5                            | 3,5                            | 0,0008                   | 25                   | 55                                | 67                        | -                                          | -                         |
| 90S-2      | 1,5                                           | 3,25              | 2,6               | 2840       | 77,8       | 0,86         | 5         | 2,9                            | 5,9                            | 3,2                            | 0,0013                   | 31                   | 60                                | 72                        | -                                          | -                         |
| 90L-2      | 2,2                                           | 4,55              | 3,65              | 2850       | 82         | 0,85         | 7,4       | 3                              | 6,3                            | 3,5                            | 0,0018                   | 35                   | 60                                | 72                        | -                                          | -                         |
| 100L-2     | 3                                             | 6,1               | 4,85              | 2850       | 82         | 0,87         | 10,1      | 2,7                            | 6,8                            | 3,3                            | 0,0029                   | 45                   | 63                                | 75                        | -                                          | -                         |
| 112M-2     | 4                                             | 7,7               | 6,2               | 2880       | 85         | 0,88         | 13,3      | 2,3                            | 6,5                            | 3,1                            | 0,0051                   | 53                   | 63                                | 75                        | 55                                         | 67                        |
| 132S1-2    | 5,5                                           | 10,7              | 8,5               | 2880       | 85,5       | 0,87         | 18,2      | 2,5                            | 6,4                            | 3,3                            | 0,0089                   | 95                   | 63                                | 76                        | 55                                         | 68                        |
| 132S2-2    | 7,5                                           | 14,4              | 11,5              | 2910       | 86,5       | 0,87         | 24,6      | 2,7                            | 6,8                            | 3,5                            | 0,0125                   | 100                  | 63                                | 76                        | 55                                         | 68                        |
| 160M1-2    | 11                                            | 20                | 16                | 2925       | 89         | 0,89         | 36        | 2,8                            | 6,6                            | 3,2                            | 0,032                    | 163                  | 66                                | 79                        | 56                                         | 69                        |
| 160M2-2    | 15                                            | 26,5              | 21,5              | 2920       | 89         | 0,91         | 49        | 2,8                            | 6,8                            | 3,2                            | 0,043                    | 173                  | 66                                | 79                        | 56                                         | 69                        |
| 160L-2     | 18,5                                          | 32                | 25,5              | 2925       | 90,5       | 0,92         | 60        | 2,6                            | 6,8                            | 3,1                            | 0,052                    | 188                  | 66                                | 79                        | 56                                         | 69                        |
| 180M-2     | 22                                            | 38                | 30,5              | 2925       | 91,2       | 0,92         | 72        | 2,5                            | 6,9                            | 3                              | 0,075                    | 196                  | 69                                | 82                        | 58                                         | 71                        |
| 200L1-2    | 30                                            | 52                | 42                | 2955       | 92         | 0,90         | 97        | 2,6                            | 7,2                            | 2,9                            | 0,13                     | 254                  | 71                                | 85                        | 60                                         | 74                        |
| 200L2-2    | 37                                            | 63                | 51                | 2955       | 92,5       | 0,91         | 120       | 2,7                            | 7,2                            | 3                              | 0,16                     | 278                  | 71                                | 85                        | 60                                         | 74                        |
| 225M-2     | 45                                            | 79                | 63                | 2960       | 92,8       | 0,89         | 145       | 2,5                            | 7,1                            | 3                              | 0,24                     | 400                  | 72                                | 86                        | 60                                         | 74                        |
| 250M-2     | 55                                            | 96                | 77                | 2970       | 93,2       | 0,89         | 177       | 2,4                            | 7,1                            | 2,8                            | 0,4                      | 545                  | 75                                | 89                        | 64                                         | 78                        |
| 280S-2     | 75                                            | 130               | 104               | 2970       | 93,6       | 0,89         | 241       | 2,2                            | 6,8                            | 2,7                            | 0,65                     | 700                  | 76                                | 90                        | 66                                         | 80                        |
| 280M-2     | 90                                            | 154               | 123               | 2970       | 93,8       | 0,90         | 289       | 2,4                            | 6,8                            | 2,8                            | 0,78                     | 762                  | 76                                | 90                        | 66                                         | 80                        |
| 315S-2     | 110                                           | 190               | 152               | 2975       | 94         | 0,89         | 353       | 2                              | 6,5                            | 2,4                            | 1,4                      | 960                  | 76                                | 91                        | 66                                         | 81                        |
| 315M-2     | 132                                           | 225               | 182               | 2975       | 94,3       | 0,89         | 424       | 2,1                            | 6,8                            | 2,5                            | 1,6                      | 1025                 | 76                                | 91                        | 66                                         | 81                        |
| 315L1-2    | 160                                           | 270               | 215               | 2975       | 94,5       | 0,90         | 514       | 2,4                            | 6,9                            | 2,7                            | 1,9                      | 1065                 | 76                                | 91                        | 66                                         | 81                        |
| 315L2-2    | 200                                           | 240               | 270               | 2980       | 94,7       | 0,90         | 641       | 2,3                            | 6,9                            | 2,6                            | 2,2                      | 1270                 | 76                                | 91                        | 66                                         | 81                        |
| 315L3-2    | 250                                           | 410 <sup>1)</sup> | 325               | 2980       | 96         | 0,92         | 801       | 1,7                            | 7,2                            | 2,7                            | 2,8                      | 1420                 | 76                                | 91                        | 66                                         | 81                        |
| 355L1-2    | 315                                           | 510 <sup>1)</sup> | 410 <sup>1)</sup> | 2980       | 96,6       | 0,92         | 1009      | 1,5                            | 6,7                            | 2,8                            | 4,5                      | 1900                 | 81                                | 97                        | 68                                         | 84                        |
| 355L2-2    | 355                                           | 570 <sup>1)</sup> | 455 <sup>1)</sup> | 2985       | 96,8       | 0,93         | 1136      | 1,4                            | 6,9                            | 2,7                            | 5                        | 2050                 | 81                                | 97                        | 68                                         | 84                        |
| CD...      | Efficiency according to manufacturer standard |                   |                   |            |            |              |           |                                |                                |                                |                          |                      |                                   |                           |                                            |                           |
| 355L3-2    | 400                                           | 640 <sup>1)</sup> | 515 <sup>1)</sup> | 2985       | 96,8       | 0,93         | 1280      | 1,3                            | 7                              | 2,8                            | 5,5                      | 2350                 | 81                                | 97                        | 68                                         | 84                        |
| 400L-2     | 450                                           | 710 <sup>1)</sup> | 570 <sup>1)</sup> | 2990       | 97         | 0,94         | 1437      | 1,1                            | 7,2                            | 2,8                            | 8,5                      | 2910                 | 81                                | 97                        | -                                          | -                         |

### Notes:

1) Two parallel cables are required in each case

2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns = 3000 rpm, 2p = 2

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Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with        | Mains               | Inverter                      |                     |                              |                     |                              |                     |                              |                     |                              |                        | Inverter                     |                              |  |
|-----------------------|---------------------|-------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|------------------------|------------------------------|------------------------------|--|
| Ventilation           |                     | Self ventilation              |                     |                              |                     |                              |                     |                              |                     |                              |                        | Forced ventilation           |                              |  |
| Torque characteristic | -                   | decreasing quadratic constant |                     |                              |                     | constant                     |                     | constant                     |                     | constant                     |                        | constant                     |                              |  |
| Frequency             | 50 Hz               | 5-50 Hz                       |                     | 20-50 Hz                     |                     | 10-50 Hz                     |                     | 5-50 Hz                      |                     | 50-87 Hz <sup>1)</sup>       |                        | 5-87 Hz <sup>1)</sup>        |                              |  |
| Control range         | -                   | 1:10                          |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     |                              |                        |                              |                              |  |
| Speed range           | -                   | 300-3000 rpm                  |                     | 1200-3000 rpm                |                     | 600-3000 rpm                 |                     | 300-3000 rpm                 |                     | 3000-5220 rpm                |                        | 300-5220 rpm                 |                              |  |
| Output/torque         | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]<br>50 Hz  | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>87 Hz | M <sub>U</sub> [Nm]    | P <sub>U</sub> [kW]<br>50 Hz | P <sub>U</sub> [kW]<br>87 Hz |  |
| 63M1-2                | 0,18                | 0,18                          | 0,59                | 0,16                         | 0,52                | 0,14                         | 0,46                | 0,12                         | 0,39                | 0,25                         | 0,47                   | -                            | -                            |  |
| 63M2-2                | 0,25                | 0,25                          | 0,83                | 0,22                         | 0,73                | 0,19                         | 0,63                | 0,15                         | 0,49                | 0,37                         | 0,7                    | -                            | -                            |  |
| 71M1-2                | 0,37                | 0,37                          | 1,25                | 0,35                         | 1,2                 | 0,3                          | 1                   | 0,22                         | 0,74                | 0,55                         | 1                      | -                            | -                            |  |
| 71M2-2                | 0,55                | 0,55                          | 1,9                 | 0,52                         | 1,8                 | 0,45                         | 1,5                 | 0,33                         | 1,1                 | 0,8                          | 1,5                    | -                            | -                            |  |
| 80M1-2                | 0,75                | 0,75                          | 2,57                | 0,7                          | 2,4                 | 0,6                          | 2                   | 0,5                          | 1,7                 | 1,1                          | 2                      | -                            | -                            |  |
| 80M2-2                | 1,1                 | 1,1                           | 3,73                | 1                            | 3,4                 | 0,9                          | 3                   | 0,75                         | 2,5                 | 1,6                          | 2,9                    | -                            | -                            |  |
| 90S-2                 | 1,5                 | 1,5                           | 5                   | 1,4                          | 4,7                 | 1,2                          | 4                   | 1                            | 3,3                 | 2,2                          | 4                      | -                            | -                            |  |
| 90L-2                 | 2,2                 | 2,2                           | 7,4                 | 2                            | 6,7                 | 1,7                          | 5,7                 | 1,4                          | 4,7                 | 3,3                          | 6                      | -                            | -                            |  |
| 100L-2                | 3                   | 3                             | 10,1                | 2,7                          | 8,9                 | 2,2                          | 7,2                 | 1,8                          | 5,9                 | 4,5                          | 8,2                    | -                            | -                            |  |
| 112M-2                | 4                   | 4                             | 13,3                | 3,7                          | 12                  | 3,2                          | 11                  | 2,5                          | 8,2                 | 6                            | 11                     | -                            | -                            |  |
| 132S1-2               | 5,5                 | 5,5                           | 18,2                | 5                            | 16                  | 4,5                          | 15                  | 3,7                          | 12                  | 8                            | 15                     | 5,5                          | 8                            |  |
| 132S2-2               | 7,5                 | 7,5                           | 24,6                | 7                            | 23                  | 6                            | 20                  | 5                            | 16                  | 11                           | 20                     | 7,5                          | 10,5                         |  |
| 160M1-2               | 11                  | 11                            | 36                  | 10                           | 32                  | 9                            | 29                  | 7,5                          | 24                  | 16                           | 29                     | 11                           | 15                           |  |
| 160M2-2               | 15                  | 14,5 <sup>2)</sup>            | 47                  | 13                           | 42                  | 12                           | 39                  | 10                           | 32                  | 21                           | 38                     | 14,5                         | 20                           |  |
| 160L-2                | 18,5                | 17,5 <sup>2)</sup>            | 57                  | 16                           | 52                  | 15                           | 49                  | 12,5                         | 41                  | 26                           | 48                     | 17,5                         | 25                           |  |
| 180M-2                | 22                  | 21 <sup>2)</sup>              | 68                  | 20                           | 65                  | 18                           | 58                  | 15                           | 49                  | 30                           | 55                     | 21                           | 29                           |  |
| 200L1-2               | 30                  | 28 <sup>2)</sup>              | 103                 | 31                           | 100                 | 28                           | 90                  | 27                           | 87                  | 49                           | 90                     | 32                           | 45                           |  |
| 200L2-2               | 37                  | 32 <sup>2)</sup>              | 103                 | 31                           | 100                 | 28                           | 90                  | 27                           | 87                  | 49                           | 90                     | 32                           | 45                           |  |
| 225M-2                | 45                  | 38 <sup>2)</sup>              | 123                 | 37                           | 119                 | 34                           | 110                 | 32                           | 103                 | 60                           | 110                    | 38                           | 55                           |  |
|                       |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                        |                              |                              |  |
| Frequency             |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              | 50-60 Hz <sup>1)</sup> |                              | 5-60 Hz <sup>1)</sup>        |  |
| Speed range           |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              | 3000-3600 rpm          |                              | 300-3600 rpm                 |  |
| 250M-2                | 55                  | 47 <sup>2)</sup>              | 151                 | 45                           | 145                 | 43                           | 138                 | 41                           | 132                 | 47                           | 126                    | 47                           | 47                           |  |
| 280S-2                | 75                  | 62 <sup>2)</sup>              | 199                 | 60                           | 193                 | 58                           | 186                 | 55                           | 177                 | 62                           | 166                    | 62                           | 62                           |  |
| 280M-2                | 90                  | 75 <sup>2)</sup>              | 241                 | 73                           | 234                 | 70                           | 225                 | 67                           | 215                 | 75                           | 201                    | 75                           | 75                           |  |
| 315S-2                | 110                 | 95 <sup>2)</sup>              | 304                 | 90                           | 288                 | 88                           | 282                 | 85                           | 272                 | 95                           | 258                    | 95                           | 95                           |  |
| 315M-2                | 132                 | 115                           | 369                 | 110                          | 353                 | 105                          | 336                 | 100                          | 320                 | 115                          | 307                    | 115                          | 115                          |  |
| 315L1-2               | 160                 | 140                           | 449                 | 135                          | 433                 | 128                          | 410                 | 120                          | 385                 | 140                          | 374                    | 140                          | 140                          |  |
| 315L2-2               | 200                 | 175                           | 560                 | 165                          | 528                 | 160                          | 512                 | 150                          | 480                 | 175                          | 467                    | 175                          | 175                          |  |
| 315L3-2               | 250                 | 215                           | 688                 | 205                          | 656                 | 200                          | 640                 | 185                          | 592                 | 215                          | 720                    | 215                          | 215                          |  |
| 355L1-2               | 315                 | 270                           | 865                 | 260                          | 832                 | 250                          | 800                 | 235                          | 752                 | 270                          | 813                    | 270                          | 270                          |  |
| 355L2-2               | 355                 | 305                           | 976                 | 295                          | 944                 | 285                          | 912                 | 265                          | 848                 | 305                          | 918                    | 305                          | 305                          |  |
| 355L3-2               | 400                 | 345                           | 1104                | 335                          | 1072                | 320                          | 1024                | 300                          | 960                 | 345                          | 1038                   | 345                          | 345                          |  |
| 400L-2                | 450                 | 390                           | 1245                | 375                          | 1197                | 360                          | 1149                | 340                          | 1085                | 390                          | 201                    | 390                          | 390                          |  |

## Notes:

1) Higher frequencies on request

2) With inverter operation with output filter and practically sinusoidal output voltage, output power as P<sub>2</sub>

Output for inverter operation (indicative values), torque characteristic on page 56,  
overload protection through temperature sensor

# IE1

## Mains Operation 50Hz

Temperature class T4,  
ns = 1500 rpm, 2p = 4

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| Frame size                                          | Output<br><br>P <sub>2</sub><br>[kW] | Rated current at   |                   | rpm        | Efficiency<br><br>η<br>[%] | Power factor<br><br>cos φ | Torque<br><br>M<br>[Nm] | Starting torque<br><br>M <sub>A</sub> /M <sub>N</sub> | Starting current<br><br>I <sub>A</sub> /I <sub>N</sub> | Stalling torque<br><br>M <sub>K</sub> /M <sub>N</sub> | Moment of inertia<br><br>J<br>[kgm <sup>2</sup> ] | Weight <sup>2)</sup><br><br>m<br>[kg] | Noise levels with radial-flow fan |                           | Noise levels with axial-flow fan Type ...A |                           |
|-----------------------------------------------------|--------------------------------------|--------------------|-------------------|------------|----------------------------|---------------------------|-------------------------|-------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|---------------------------------------|-----------------------------------|---------------------------|--------------------------------------------|---------------------------|
|                                                     |                                      | 400 V<br>I<br>[A]  | 500 V<br>I<br>[A] | n<br>[rpm] |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       | L <sub>p</sub><br>[dB(A)]         | L <sub>w</sub><br>[dB(A)] | L <sub>p</sub><br>[dB(A)]                  | L <sub>w</sub><br>[dB(A)] |
| CD... Efficiency according to manufacturer standard |                                      |                    |                   |            |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       |                                   |                           |                                            |                           |
| 63M1-4                                              | 0,12                                 | 0,43               | 0,34              | 1445       | 67                         | 0,60                      | 0,79                    | 3,9                                                   | 5,6                                                    | 3,9                                                   | 0,00046                                           | 16                                    | 44                                | 56                        | -                                          | -                         |
| 63M2-4                                              | 0,18                                 | 0,53               | 0,42              | 1415       | 70                         | 0,70                      | 1,21                    | 2,7                                                   | 4,7                                                    | 2,7                                                   | 0,00046                                           | 16                                    | 44                                | 56                        | -                                          | -                         |
| 71M1-4                                              | 0,25                                 | 0,66               | 0,53              | 1370       | 68,5                       | 0,80                      | 1,74                    | 2                                                     | 3,9                                                    | 2,3                                                   | 0,00046                                           | 16                                    | 45                                | 57                        | -                                          | -                         |
| 71M2-4                                              | 0,37                                 | 0,94               | 0,75              | 1380       | 71                         | 0,80                      | 2,56                    | 2,2                                                   | 3,9                                                    | 2,3                                                   | 0,00063                                           | 17                                    | 45                                | 57                        | -                                          | -                         |
| 80M1-4                                              | 0,55                                 | 1,38               | 1,10              | 1380       | 72                         | 0,80                      | 3,8                     | 2                                                     | 3,8                                                    | 2,3                                                   | 0,00092                                           | 24                                    | 46                                | 58                        | -                                          | -                         |
| CD... IE1 Efficiency according to IEC 60034-30      |                                      |                    |                   |            |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       |                                   |                           |                                            |                           |
| 80M2-4                                              | 0,75                                 | 1,81               | 1,45              | 1400       | 75,5                       | 0,79                      | 5,1                     | 2,1                                                   | 4,5                                                    | 2,5                                                   | 0,0013                                            | 25                                    | 46                                | 58                        | -                                          | -                         |
| 90S-4                                               | 1,1                                  | 2,55               | 2,05              | 1400       | 76                         | 0,83                      | 7,5                     | 2,1                                                   | 4,8                                                    | 2,5                                                   | 0,0021                                            | 31                                    | 49                                | 61                        | -                                          | -                         |
| 90L-4                                               | 1,5                                  | 3,35               | 2,65              | 1505       | 79                         | 0,82                      | 10,2                    | 2,3                                                   | 5                                                      | 2,7                                                   | 0,0029                                            | 35                                    | 49                                | 61                        | -                                          | -                         |
| 100L1-4                                             | 2,2                                  | 4,95               | 3,95              | 1420       | 80                         | 0,80                      | 14,8                    | 2,4                                                   | 5,4                                                    | 2,8                                                   | 0,0046                                            | 44                                    | 52                                | 64                        | -                                          | -                         |
| 100L2-4                                             | 3                                    | 6,5                | 5,2               | 1415       | 81,7                       | 0,82                      | 20,2                    | 2,3                                                   | 5,5                                                    | 2,7                                                   | 0,0056                                            | 46                                    | 52                                | 64                        | -                                          | -                         |
| 112M-4                                              | 4                                    | 8,1                | 6,5               | 1435       | 85                         | 0,84                      | 26,6                    | 2,7                                                   | 6,8                                                    | 3,2                                                   | 0,0110                                            | 59                                    | 54                                | 66                        | -                                          | -                         |
| 132S-4                                              | 5,5                                  | 10,8               | 8,6               | 1440       | 86,5                       | 0,85                      | 36,5                    | 2,5                                                   | 6,4                                                    | 2,7                                                   | 0,0220                                            | 100                                   | 57                                | 70                        | 55                                         | 68                        |
| 132M-4                                              | 7,5                                  | 14,3               | 11,4              | 1440       | 88                         | 0,86                      | 50                      | 2,7                                                   | 6,5                                                    | 2,8                                                   | 0,030                                             | 110                                   | 57                                | 70                        | 55                                         | 68                        |
| 160M-4                                              | 11                                   | 21                 | 16,7              | 1460       | 89,5                       | 0,85                      | 72                      | 2,5                                                   | 6,6                                                    | 2,8                                                   | 0,057                                             | 168                                   | 62                                | 75                        | 59                                         | 69                        |
| 160L-4                                              | 15                                   | 28                 | 22,5              | 1455       | 90                         | 0,86                      | 98                      | 2,8                                                   | 6,7                                                    | 3,1                                                   | 0,079                                             | 184                                   | 62                                | 75                        | 59                                         | 69                        |
| 180M-4                                              | 18,5                                 | 35                 | 28                | 1460       | 91                         | 0,84                      | 121                     | 2,9                                                   | 6,7                                                    | 3                                                     | 0,13                                              | 198                                   | 60                                | 73                        | 57                                         | 70                        |
| 180L-4                                              | 22                                   | 41,5               | 33                | 1460       | 91,5                       | 0,84                      | 144                     | 3                                                     | 6,9                                                    | 3                                                     | 0,155                                             | 217                                   | 60                                | 73                        | 57                                         | 70                        |
| 200L-4                                              | 30                                   | 53                 | 42,5              | 1460       | 92,2                       | 0,88                      | 196                     | 2,6                                                   | 6,8                                                    | 2,9                                                   | 0,25                                              | 274                                   | 61                                | 75                        | 58                                         | 72                        |
| 225S-4                                              | 37                                   | 66                 | 52                | 1465       | 92,6                       | 0,88                      | 241                     | 2,7                                                   | 6,7                                                    | 2,6                                                   | 0,4                                               | 372                                   | 63                                | 77                        | 59                                         | 73                        |
| 225M-4                                              | 45                                   | 80                 | 64                | 1470       | 92,8                       | 0,88                      | 292                     | 2,7                                                   | 6,5                                                    | 2,6                                                   | 0,48                                              | 402                                   | 63                                | 77                        | 59                                         | 73                        |
| 250M-4                                              | 55                                   | 96                 | 77                | 1470       | 93,2                       | 0,89                      | 357                     | 2,9                                                   | 7,1                                                    | 2,9                                                   | 0,75                                              | 573                                   | 65                                | 79                        | 64                                         | 78                        |
| 280S-4                                              | 75                                   | 134                | 107               | 1480       | 93,8                       | 0,86                      | 484                     | 2,6                                                   | 6,8                                                    | 2,5                                                   | 1,25                                              | 740                                   | 68                                | 82                        | 66                                         | 80                        |
| 280M-4                                              | 90                                   | 161                | 129               | 1480       | 94                         | 0,86                      | 581                     | 2,8                                                   | 6,9                                                    | 2,6                                                   | 1,48                                              | 820                                   | 68                                | 82                        | 66                                         | 80                        |
| 315S-4                                              | 110                                  | 198                | 159               | 1485       | 94,2                       | 0,85                      | 707                     | 2,5                                                   | 6,7                                                    | 2,5                                                   | 2,2                                               | 1040                                  | 69                                | 84                        | 66                                         | 81                        |
| 315M-4                                              | 132                                  | 235                | 190               | 1485       | 94,4                       | 0,85                      | 849                     | 2,6                                                   | 6,8                                                    | 2,6                                                   | 2,7                                               | 1120                                  | 69                                | 84                        | 66                                         | 81                        |
| 315L1-4                                             | 160                                  | 285                | 225               | 1485       | 94,7                       | 0,86                      | 1029                    | 2,7                                                   | 6,9                                                    | 2,6                                                   | 3,1                                               | 1210                                  | 69                                | 84                        | 66                                         | 81                        |
| 315L2-4                                             | 200                                  | 355                | 285               | 1485       | 94,9                       | 0,86                      | 1286                    | 2,7                                                   | 6,9                                                    | 2,6                                                   | 3,9                                               | 1430                                  | 69                                | 84                        | 66                                         | 81                        |
| 315L3-4                                             | 250                                  | 430 <sup>1)</sup>  | 345               | 1490       | 96,2                       | 0,87                      | 1602                    | 1,7                                                   | 7,3                                                    | 2,7                                                   | 4,6                                               | 1565                                  | 69                                | 84                        | 66                                         | 81                        |
| 355L1-4                                             | 315                                  | 525 <sup>1)</sup>  | 420 <sup>1)</sup> | 1490       | 96,3                       | 0,90                      | 2019                    | 1,5                                                   | 6,9                                                    | 2,7                                                   | 6,1                                               | 2050                                  | 72                                | 88                        | 68                                         | 84                        |
| 355L2-4                                             | 355                                  | 590 <sup>1)</sup>  | 470 <sup>1)</sup> | 1490       | 96,6                       | 0,90                      | 2275                    | 1,6                                                   | 6,9                                                    | 2,8                                                   | 6,7                                               | 2200                                  | 72                                | 88                        | 68                                         | 84                        |
| CD... Efficiency according to manufacturer standard |                                      |                    |                   |            |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       |                                   |                           |                                            |                           |
| 355L3-4                                             | 400                                  | 665 <sup>1)</sup>  | 530 <sup>1)</sup> | 1490       | 97                         | 0,90                      | 2564                    | 1,5                                                   | 7                                                      | 2,8                                                   | 7,4                                               | 2430                                  | 72                                | 88                        | 68                                         | 84                        |
| 400M-4                                              | 450                                  | 735 <sup>1)</sup>  | 590 <sup>1)</sup> | 1495       | 97                         | 0,91                      | 2875                    | 1,1                                                   | 7,3                                                    | 2,7                                                   | 18                                                | 2850                                  | 78                                | 94                        | -                                          | -                         |
| 400L-4                                              | 500                                  | 815 <sup>1)</sup>  | 655 <sup>1)</sup> | 1495       | 97,1                       | 0,91                      | 3194                    | 1,1                                                   | 7,3                                                    | 2,7                                                   | 20                                                | 3230                                  | 78                                | 94                        | -                                          | -                         |
| 450M-4                                              | 560                                  | 915 <sup>1)</sup>  | 730 <sup>1)</sup> | 1495       | 97,2                       | 0,91                      | 3577                    | 1                                                     | 6,8                                                    | 2,7                                                   | 26                                                | 3500                                  | 79                                | 95                        | -                                          | -                         |
| 450L-4                                              | 630                                  | 1025 <sup>1)</sup> | 820 <sup>1)</sup> | 1495       | 97,4                       | 0,91                      | 4024                    | 1                                                     | 6,8                                                    | 2,7                                                   | 31                                                | 3800                                  | 79                                | 95                        | -                                          | -                         |
| 500...                                              | on request                           |                    |                   |            |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       |                                   |                           |                                            |                           |

### Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns = 1500 rpm, 2p = 4

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Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with        | Mains               | Inverter                      |                     |                     |                     |                     |                     |                     |                     |                        |                     | Inverter              |                     |
|-----------------------|---------------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|-----------------------|---------------------|
| Ventilation           |                     | Self ventilation              |                     |                     |                     |                     |                     |                     |                     |                        |                     | Forced ventilation    |                     |
| Torque characteristic | -                   | decreasing quadratic constant |                     |                     |                     | constant            |                     | constant            |                     | constant               |                     | constant              |                     |
| Frequency             | 50 Hz               | 5-50 Hz                       |                     | 20-50 Hz            |                     | 10-50 Hz            |                     | 5-50 Hz             |                     | 50-87 Hz <sup>1)</sup> |                     | 5-87 Hz <sup>1)</sup> |                     |
| Control range         | -                   | 1:10                          |                     | 1:2,5               |                     | 1:5                 |                     | 1:10                |                     |                        |                     |                       |                     |
| Speed range           | -                   | 150-1500 rpm                  |                     | 600-1500 rpm        |                     | 300-1500 rpm        |                     | 150-1500 rpm        |                     | 1500-2610 rpm          |                     | 150-2610 rpm          |                     |
| Output/torque         | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]           | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW] | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW] | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW] | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]    | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]   | P <sub>U</sub> [kW] |
|                       | 50 Hz               | 50 Hz                         |                     | 50 Hz               |                     | 50 Hz               |                     | 50 Hz               |                     | 87 Hz                  |                     | 50 Hz                 | 87 Hz               |
| 63M1-4                | 0,12                | 0,12                          | 0,79                | 0,11                | 0,73                | 0,09                | 0,59                | 0,08                | 0,53                | 0,18                   | 0,68                | -                     | -                   |
| 63M2-4                | 0,18                | 0,18                          | 1,2                 | 0,16                | 1,08                | 0,14                | 0,94                | 0,11                | 0,79                | 0,25                   | 0,96                | -                     | -                   |
| 70M1-4                | 0,25                | 0,25                          | 1,74                | 0,22                | 1,5                 | 0,19                | 1,25                | 0,15                | 1                   | 0,37                   | 1,4                 | -                     | -                   |
| 71M2-4                | 0,37                | 0,37                          | 2,56                | 0,33                | 2,2                 | 0,28                | 1,9                 | 0,22                | 1,5                 | 0,55                   | 2                   | -                     | -                   |
| 80M1-4                | 0,55                | 0,55                          | 3,8                 | 0,52                | 3,5                 | 0,45                | 3                   | 0,33                | 2,2                 | 0,8                    | 2,9                 | -                     | -                   |
| 80M2-4                | 0,75                | 0,75                          | 5,1                 | 0,7                 | 4,8                 | 0,6                 | 4                   | 0,5                 | 3,3                 | 1,1                    | 4                   | -                     | -                   |
| 90S-4                 | 1,1                 | 1,1                           | 7,5                 | 1                   | 6,7                 | 0,9                 | 6                   | 0,75                | 5                   | 1,6                    | 5,9                 | -                     | -                   |
| 90L-4                 | 1,5                 | 1,5                           | 10,2                | 1,4                 | 9,5                 | 1,2                 | 8                   | 1                   | 6,7                 | 2,2                    | 8                   | -                     | -                   |
| 100L1-4               | 2,2                 | 2,2                           | 14,8                | 2                   | 13                  | 1,7                 | 11                  | 1,4                 | 9,3                 | 3,3                    | 12                  | -                     | -                   |
| 100L2-4               | 3                   | 3                             | 20,2                | 2,8                 | 19                  | 2,2                 | 15                  | 1,8                 | 12                  | 4,5                    | 16                  | -                     | -                   |
| 112M-4                | 4                   | 4                             | 26,6                | 3,6                 | 24                  | 3                   | 20                  | 2,5                 | 16                  | 6                      | 22                  | -                     | -                   |
| 132S-4                | 5,5                 | 5,5                           | 36,5                | 5                   | 33                  | 4,4                 | 29                  | 3,7                 | 24                  | 8                      | 29                  | 5,5                   | 8                   |
| 132M-4                | 7,5                 | 7,5                           | 50                  | 7                   | 46                  | 6                   | 39                  | 5                   | 33                  | 11                     | 40                  | 7,5                   | 10,5                |
| 160M-4                | 11                  | 11                            | 72                  | 10                  | 65                  | 9                   | 58                  | 7,5                 | 49                  | 16                     | 59                  | 11                    | 15                  |
| 160L-4                | 15                  | 15                            | 98                  | 13,5                | 88                  | 12                  | 78                  | 10                  | 65                  | 21                     | 79                  | 15                    | 20                  |
| 180M-4                | 18,5                | 18 <sup>2)</sup>              | 118                 | 98                  | 111                 | 15                  | 97                  | 12,5                | 81                  | 26                     | 95                  | 18                    | 25                  |
| 180L-4                | 22                  | 21 <sup>2)</sup>              | 137                 | 20                  | 130                 | 18                  | 117                 | 15                  | 97                  | 30                     | 110                 | 21                    | 29                  |
| 200L-4                | 30                  | 28 <sup>2)</sup>              | 183                 | 27                  | 176                 | 24                  | 156                 | 21                  | 136                 | 40                     | 146                 | 28                    | 37                  |
| 225S-4                | 37                  | 32 <sup>2)</sup>              | 208                 | 31                  | 201                 | 29                  | 188                 | 26                  | 168                 | 49                     | 179                 | 32                    | 45                  |
| 225M-4                | 45                  | 38 <sup>2)</sup>              | 247                 | 37                  | 240                 | 35                  | 227                 | 32                  | 207                 | 60                     | 220                 | 38                    | 55                  |
| 250M-4                | 55                  | 46 <sup>2)</sup>              | 298                 | 45                  | 291                 | 43                  | 278                 | 41                  | 265                 | 70                     | 256                 | 46                    | 65                  |
| 280S-4                | 75                  | 62 <sup>2)</sup>              | 400                 | 60                  | 386                 | 58                  | 373                 | 55                  | 354                 | 95                     | 348                 | 62                    | 88                  |
| 280M-4                | 90                  | 75 <sup>2)</sup>              | 482                 | 73                  | 470                 | 70                  | 450                 | 66                  | 424                 | 110                    | 402                 | 75                    | 105                 |
| 315S-4                | 110                 | 95 <sup>2)</sup>              | 610                 | 90                  | 577                 | 88                  | 564                 | 83                  | 532                 | 140                    | 512                 | 95                    | 130                 |
| 315M-4                | 132                 | 115                           | 737                 | 110                 | 705                 | 105                 | 673                 | 100                 | 641                 | 165                    | 604                 | 115                   | 157                 |
| 315L1-4               | 160                 | 140                           | 897                 | 135                 | 865                 | 128                 | 820                 | 120                 | 769                 | 200                    | 732                 | 140                   | 190                 |
| 315L2-4               | 200                 | 175                           | 1122                | 165                 | 1058                | 160                 | 1026                | 150                 | 961                 | 250                    | 915                 | 175                   | 240                 |
| 315L3-4               | 250                 | 215                           | 1378                | 205                 | 1314                | 200                 | 1282                | 185                 | 1186                | 310                    | 1134                | 215                   | 305                 |
| 355L1-4               | 315                 | 270                           | 1731                | 260                 | 1666                | 250                 | 1602                | 235                 | 1506                | 395                    | 1445                | 270                   | 385                 |
| 355L2-4               | 355                 | 305                           | 1955                | 295                 | 1891                | 285                 | 1827                | 265                 | 1698                | 440                    | 1610                | 305                   | 425                 |
| 355L3-4               | 400                 | 345                           | 2209                | 335                 | 2145                | 320                 | 2048                | 300                 | 1920                | 495                    | 1820                | 345                   | 480                 |
| 400M-4                | 450                 | 390                           | 2500                | 375                 | 2405                | 360                 | 2307                | 340                 | 2179                | 560                    | 2050                | 390                   | 540                 |
| 400L-4                | 500                 | 435                           | 2778                | 415                 | 2650                | 400                 | 2553                | 380                 | 2425                | 620                    | 2274                | 435                   | 600                 |
| 450M-4                | 560                 | 485                           | 3097                | 465                 | 2969                | 450                 | 2873                | 425                 | 2713                | 695                    | 2549                | 485                   | 670                 |
| 450L-4                | 630                 | 545                           | 3480                | 525                 | 3352                | 505                 | 3224                | 475                 | 3032                | 785                    | 2879                | 545                   | 755                 |

## Notes:

1) Higher frequencies on request

2) For inverter operation with output filter and practically sinusoidal output voltage, output power same as P<sub>2</sub>

Output for inverter operation (indicative values), torque characteristic on page 57, overload protection through temperature sensor.

V

# IE 1

## Mains operation 50 Hz

Temperature class T4,  
ns = 1000 rpm, 2p = 6

| Frame size                                    | Out-put    | Rated current at  |                   | Speed | Effi-<br>cien-<br>cy | Power factor | Torque | Start-<br>ing torque | Starting current | Stall-<br>ing torque | Moment of inertia | Weight <sup>2)</sup> | Noise levels with radial-flow fan Type ...A |          |
|-----------------------------------------------|------------|-------------------|-------------------|-------|----------------------|--------------|--------|----------------------|------------------|----------------------|-------------------|----------------------|---------------------------------------------|----------|
|                                               |            | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] |       |                      |              |        |                      |                  |                      |                   |                      | n<br>[rpm]                                  | η<br>[%] |
| CD...                                         |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |
| Efficiency according to manufacturer standard |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |
| 71M2-6                                        | 0,25       | 0,82              | 0,66              | 920   | 62                   | 0,71         | 2,6    | 2,2                  | 3,5              | 2,6                  | 0,0012            | 17                   | 44                                          | 56       |
| 80M1-6                                        | 0,37       | 1,12              | 0,90              | 925   | 67                   | 0,71         | 3,8    | 2,5                  | 4,1              | 2,8                  | 0,0019            | 24                   | 44                                          | 56       |
| 80M2-6                                        | 0,55       | 1,6               | 1,28              | 925   | 69                   | 0,72         | 5,7    | 2,4                  | 4                | 2,7                  | 0,0025            | 25                   | 44                                          | 56       |
| CD...                                         |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |
| IE1 Efficiency according to IEC 60034-30      |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |
| 90S-6                                         | 0,75       | 2,15              | 1,72              | 910   | 70,2                 | 0,75         | 7,9    | 1,8                  | 3,4              | 2,1                  | 0,0033            | 31                   | 47                                          | 59       |
| 90L-6                                         | 1,1        | 3,05              | 2,45              | 920   | 73                   | 0,73         | 11,4   | 2                    | 3,7              | 2,2                  | 0,0046            | 35                   | 47                                          | 59       |
| 100L-6                                        | 1,5        | 3,75              | 3                 | 945   | 77                   | 0,75         | 15,2   | 2,5                  | 4,9              | 3                    | 0,0095            | 46                   | 50                                          | 62       |
| 112M-6                                        | 2,2        | 5,2               | 4,2               | 950   | 81                   | 0,75         | 22,1   | 2,7                  | 5,6              | 3,1                  | 0,017             | 59                   | 53                                          | 65       |
| 132S-6                                        | 3          | 6,7               | 5,4               | 965   | 82,6                 | 0,78         | 29,7   | 2,7                  | 6,3              | 3,1                  | 0,031             | 100                  | 56                                          | 69       |
| 132M1-6                                       | 4          | 8,7               | 7                 | 965   | 83,6                 | 0,79         | 39,6   | 2,6                  | 6                | 3                    | 0,037             | 104                  | 56                                          | 69       |
| 132M2-6                                       | 5,5        | 11,6              | 9,3               | 960   | 84,6                 | 0,81         | 55     | 2,6                  | 6,4              | 3                    | 0,043             | 112                  | 56                                          | 69       |
| 160M-6                                        | 7,5        | 14,8              | 11,8              | 960   | 86,1                 | 0,85         | 75     | 2,5                  | 6,8              | 3,3                  | 0,087             | 170                  | 58                                          | 71       |
| 160L-6                                        | 11         | 21                | 16,9              | 965   | 87,5                 | 0,86         | 109    | 2,5                  | 6,7              | 3,2                  | 0,12              | 190                  | 58                                          | 71       |
| 180L-6                                        | 15         | 29                | 23                | 965   | 89,1                 | 0,84         | 148    | 2,4                  | 6,9              | 3,2                  | 0,19              | 215                  | 58                                          | 71       |
| 200L1-6                                       | 18,5       | 35,5              | 28,5              | 975   | 89,7                 | 0,84         | 181    | 1,9                  | 6,3              | 2,7                  | 0,28              | 270                  | 58                                          | 71       |
| 200L2-6                                       | 22         | 41,5              | 33                | 970   | 90,4                 | 0,85         | 217    | 2,2                  | 6,8              | 3                    | 0,31              | 280                  | 58                                          | 72       |
| 225M-6                                        | 30         | 57                | 45,5              | 975   | 90,9                 | 0,84         | 294    | 2,8                  | 6,6              | 2,5                  | 0,69              | 404                  | 58                                          | 72       |
| 250M-6                                        | 37         | 70                | 56                | 980   | 91,4                 | 0,84         | 361    | 2,8                  | 6,6              | 2,6                  | 1,03              | 570                  | 58                                          | 76       |
| 280S-6                                        | 45         | 85                | 68                | 985   | 92,4                 | 0,83         | 436    | 2,8                  | 5,8              | 2,4                  | 1,35              | 720                  | 62                                          | 77       |
| 280M-6                                        | 55         | 105               | 84                | 985   | 92,5                 | 0,82         | 533    | 2,7                  | 5,8              | 2,3                  | 1,7               | 770                  | 62                                          | 77       |
| 315S-6                                        | 75         | 134               | 107               | 990   | 93                   | 0,87         | 723    | 2,6                  | 6,4              | 2,4                  | 4,3               | 995                  | 65                                          | 79       |
| 315M-6                                        | 90         | 158               | 127               | 990   | 93,3                 | 0,88         | 868    | 2,6                  | 6,5              | 2,4                  | 5                 | 1050                 | 65                                          | 79       |
| 315L1-6                                       | 110        | 193               | 154               | 990   | 93,6                 | 0,88         | 1061   | 2,7                  | 6,5              | 2,5                  | 6                 | 1145                 | 69                                          | 84       |
| 315L2-6                                       | 132        | 230               | 185               | 990   | 93,8                 | 0,88         | 1273   | 2,7                  | 6,7              | 2,5                  | 7,3               | 1265                 | 69                                          | 84       |
| 315L3-6                                       | 160        | 2280              | 225               | 990   | 94,3                 | 0,88         | 1543   | 2,6                  | 6,8              | 2,5                  | 8,3               | 1440                 | 69                                          | 84       |
| 355M-6                                        | 200        | 345               | 275               | 990   | 94,8                 | 0,88         | 1929   | 1,8                  | 6,7              | 2,7                  | 11,3              | 1750                 | 74                                          | 90       |
| 355L1-6                                       | 250        | 430 <sup>1)</sup> | 345               | 990   | 95,9                 | 0,88         | 2411   | 1,8                  | 6,7              | 2,7                  | 13,8              | 1950                 | 74                                          | 90       |
| 355L2-6                                       | 315        | 540 <sup>1)</sup> | 430 <sup>1)</sup> | 990   | 96                   | 0,88         | 3039   | 1,7                  | 6,9              | 2,6                  | 17,6              | 2300                 | 74                                          | 90       |
| 400M-6                                        | 355        | 595 <sup>1)</sup> | 475 <sup>1)</sup> | 994   | 96,6                 | 0,89         | 3411   | 1,1                  | 6,6              | 2,7                  | 27                | 2850                 | 78                                          | 94       |
| CD...                                         |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |
| Efficiency according to manufacturer standard |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |
| 400L-6                                        | 400        | 670 <sup>1)</sup> | 535 <sup>1)</sup> | 994   | 96,6                 | 0,89         | 3843   | 1,1                  | 6,8              | 2,6                  | 31                | 3230                 | 78                                          | 94       |
| 450M-6                                        | 450        | 755 <sup>1)</sup> | 605 <sup>1)</sup> | 995   | 96,6                 | 0,89         | 4319   | 1,2                  | 6,8              | 2,8                  | 46                | 3500                 | 78                                          | 94       |
| 450L-6                                        | 500        | 835 <sup>1)</sup> | 670 <sup>1)</sup> | 995   | 97                   | 0,89         | 4799   | 1,1                  | 6,8              | 2,7                  | 51                | 3800                 | 78                                          | 94       |
| 500...                                        | on request |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                             |          |

### Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns = 1000 rpm, 2p = 6

63

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with<br>Ventilation | Mains               | Inverter<br>Self ventilation  |                     |                              |                     |                              |                     |                              |                     |                              |                     | Inverter<br>Forced ventilation |                              |
|-------------------------------|---------------------|-------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|--------------------------------|------------------------------|
| Torque characteristic         | -                   | decreasing quadratic constant |                     |                              |                     | constant                     |                     | constant                     |                     | constant                     |                     | constant                       |                              |
| Frequency                     | 50 Hz               | 5–50 Hz                       |                     | 20–50 Hz                     |                     | 10–50 Hz                     |                     | 5–50 Hz                      |                     | 50–87 Hz <sup>1)</sup>       |                     | 5–87 Hz <sup>1)</sup>          |                              |
| Control range                 | -                   | 1:10                          |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     |                              |                     |                                |                              |
| Speed range                   | -                   | 100–1000 rpm                  |                     | 400–1000 rpm                 |                     | 200–1000 rpm                 |                     | 100–1000 rpm                 |                     | 1000–1740 rpm                |                     | 100–1740 rpm                   |                              |
| Output/torque                 | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]<br>50 Hz  | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>87 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz   | P <sub>U</sub> [kW]<br>87 Hz |
| 71M2-6                        | 0,25                | 0,25                          | 2,6                 | 0,22                         | 2,2                 | 0,18                         | 1,8                 | 0,16                         | 1,6                 | 0,37                         | 2                   | -                              | -                            |
| 80M1-6                        | 0,37                | 0,37                          | 3,8                 | 0,33                         | 3,4                 | 0,27                         | 2,7                 | 0,22                         | 2,2                 | 0,55                         | 3                   | -                              | -                            |
| 80M2-6                        | 0,55                | 0,55                          | 5,7                 | 0,5                          | 5,1                 | 0,4                          | 4                   | 0,33                         | 3,3                 | 0,8                          | 4,4                 | -                              | -                            |
| 90S-6                         | 0,75                | 0,75                          | 7,9                 | 0,65                         | 6,7                 | 0,55                         | 5,5                 | 0,42                         | 4,2                 | 1,1                          | 6                   | -                              | -                            |
| 90L-6                         | 1,1                 | 1,1                           | 11,4                | 0,9                          | 9,2                 | 0,8                          | 8                   | 0,6                          | 6                   | 1,6                          | 8,8                 | -                              | -                            |
| 100L-6                        | 1,5                 | 1,5                           | 15,2                | 1,4                          | 14                  | 1,1                          | 11                  | 0,9                          | 9                   | 2,2                          | 12                  | -                              | -                            |
| 112M-6                        | 2,2                 | 2,2                           | 22,1                | 2                            | 20                  | 1,7                          | 17                  | 1,3                          | 13                  | 3,3                          | 18                  | -                              | -                            |
| 132S1-6                       | 3                   | 3                             | 29,7                | 2,7                          | 27                  | 2,2                          | 22                  | 1,8                          | 18                  | 4,5                          | 25                  | 3                              | 4,2                          |
| 132M1-6                       | 4                   | 4                             | 40                  | 3,5                          | 35                  | 3                            | 30                  | 2,5                          | 25                  | 6                            | 33                  | 4                              | 5,5                          |
| 132M2-6                       | 5,5                 | 5,5                           | 55                  | 4,8                          | 48                  | 4                            | 40                  | 3,3                          | 33                  | 8                            | 44                  | 5,5                            | 7,6                          |
| 160M-6                        | 7,5                 | 7,5                           | 75                  | 7                            | 69                  | 6                            | 59                  | 5                            | 49                  | 11                           | 60                  | 7,5                            | 10,5                         |
| 160L-6                        | 11                  | 11                            | 109                 | 10                           | 98                  | 9                            | 88                  | 7,5                          | 73                  | 16                           | 88                  | 11                             | 15                           |
| 180L-6                        | 15                  | 15                            | 148                 | 13                           | 128                 | 12                           | 118                 | 10                           | 98                  | 21                           | 115                 | 15                             | 20                           |
| 200L1-6                       | 18,5                | 17,5 <sup>2)</sup>            | 171                 | 16                           | 157                 | 14                           | 137                 | 12                           | 118                 | 26                           | 143                 | 17,5                           | 24                           |
| 200L2-6                       | 22                  | 20 <sup>2)</sup>              | 196                 | 19                           | 186                 | 17                           | 167                 | 15                           | 147                 | 30                           | 165                 | 20                             | 28                           |
| 225M-6                        | 30                  | 27 <sup>2)</sup>              | 262                 | 25                           | 242                 | 23                           | 223                 | 21                           | 204                 | 40                           | 220                 | 27                             | 37                           |
| 250M-6                        | 37                  | 33 <sup>2)</sup>              | 320                 | 31                           | 301                 | 29                           | 281                 | 26                           | 252                 | 49                           | 269                 | 33                             | 45                           |
| 280S-6                        | 45                  | 40 <sup>2)</sup>              | 386                 | 37                           | 357                 | 35                           | 338                 | 32                           | 309                 | 60                           | 329                 | 40                             | 55                           |
| 280M-6                        | 55                  | 47 <sup>2)</sup>              | 453                 | 45                           | 434                 | 43                           | 415                 | 41                           | 396                 | 70                           | 384                 | 47                             | 65                           |
| 315S-6                        | 75                  | 65 <sup>2)</sup>              | 627                 | 62                           | 598                 | 58                           | 559                 | 56                           | 540                 | 95                           | 521                 | 65                             | 88                           |
| 315M-6                        | 90                  | 78 <sup>2)</sup>              | 752                 | 73                           | 704                 | 70                           | 675                 | 68                           | 656                 | 110                          | 604                 | 78                             | 105                          |
| 315L1-6                       | 110                 | 95 <sup>2)</sup>              | 916                 | 90                           | 868                 | 88                           | 849                 | 85                           | 820                 | 140                          | 768                 | 95                             | 130                          |
| 315L2-6                       | 132                 | 115                           | 1109                | 110                          | 1061                | 105                          | 1013                | 100                          | 965                 | 165                          | 906                 | 115                            | 157                          |
| 315L3-6                       | 160                 | 140                           | 1351                | 135                          | 1302                | 128                          | 1235                | 120                          | 1158                | 200                          | 1098                | 140                            | 190                          |
| 355M-6                        | 200                 | 170                           | 1640                | 165                          | 1592                | 160                          | 1543                | 150                          | 1447                | 250                          | 1372                | 170                            | 240                          |
| 355L1-6                       | 250                 | 215                           | 2074                | 205                          | 1978                | 200                          | 1929                | 190                          | 1833                | 310                          | 1701                | 215                            | 305                          |
| 355L2-6                       | 315                 | 270                           | 2605                | 260                          | 2508                | 250                          | 2412                | 235                          | 2267                | 395                          | 2168                | 270                            | 385                          |
| 400M-6                        | 355                 | 305                           | 2942                | 295                          | 2846                | 285                          | 2749                | 265                          | 2556                | 440                          | 2115                | 305                            | 425                          |
| 400L-6                        | 400                 | 345                           | 3328                | 335                          | 3232                | 320                          | 3087                | 300                          | 2894                | 495                          | 2717                | 345                            | 480                          |
| 450M-6                        | 450                 | 390                           | 2762                | 375                          | 3617                | 360                          | 3473                | 340                          | 3280                | 560                          | 3074                | 390                            | 540                          |
| 450L-6                        | 500                 | 435                           | 4196                | 415                          | 4003                | 400                          | 3859                | 375                          | 3618                | 620                          | 3404                | 435                            | 600                          |

## Notes:

1) Higher frequencies on request

2) For inverter operation with output filter and practically sinusoidal output voltage, output power same as P<sub>2</sub>

Output for inverter operation (indicative values), torque characteristic on page 57, overload protection through temperature sensor

V

# Mains Operation 50 Hz

Temperature class T4,  
ns = 750 rpm, 2p = 8

| Frame size | Output<br><br>P <sub>2</sub><br>[kW]          | Rated current at  |                   | Speed<br><br>n<br>[rpm] | Efficiency<br><br>η<br>[%] | Power factor<br><br>cos φ | Torque<br><br>M<br>[Nm] | Starting torque<br><br>M <sub>A</sub> /M <sub>N</sub> | Starting current<br><br>I <sub>A</sub> /I <sub>N</sub> | Stalling torque<br><br>M <sub>K</sub> /M <sub>N</sub> | Moment of inertia<br><br>J<br>[kgm <sup>2</sup> ] | Weight <sup>2)</sup><br><br>m<br>[kg] | Noise levels with radial-flow fan |                           |
|------------|-----------------------------------------------|-------------------|-------------------|-------------------------|----------------------------|---------------------------|-------------------------|-------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|---------------------------------------|-----------------------------------|---------------------------|
|            |                                               | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] |                         |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       | L <sub>P</sub><br>[dB(A)]         | L <sub>W</sub><br>[dB(A)] |
| CD...      | Efficiency according to manufacturer standard |                   |                   |                         |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       |                                   |                           |
| 71M2-8     | 0,12                                          | 0,52              | 0,42              | 680                     | 51                         | 0,65                      | 1,7                     | 1,9                                                   | 2,6                                                    | 2,4                                                   | 0,0012                                            | 17                                    | 41                                | 53                        |
| 80M1-8     | 0,18                                          | 0,66              | 0,52              | 690                     | 61                         | 0,65                      | 2,5                     | 2,2                                                   | 3,2                                                    | 2,6                                                   | 0,0019                                            | 24                                    | 42                                | 54                        |
| 80M2-8     | 0,25                                          | 0,91              | 0,73              | 690                     | 62                         | 0,64                      | 3,5                     | 2,2                                                   | 3,2                                                    | 2,5                                                   | 0,0025                                            | 25                                    | 42                                | 54                        |
| 90S-8      | 0,37                                          | 1,30              | 1,04              | 690                     | 63                         | 0,65                      | 5,1                     | 1,8                                                   | 3                                                      | 2,2                                                   | 0,0033                                            | 31                                    | 46                                | 58                        |
| 90L-8      | 0,55                                          | 1,85              | 1,48              | 690                     | 67                         | 0,65                      | 7,6                     | 1,8                                                   | 3,1                                                    | 2,2                                                   | 0,0046                                            | 35                                    | 46                                | 58                        |
| 100L1-8    | 0,75                                          | 2,3               | 1,85              | 710                     | 71                         | 0,66                      | 10,1                    | 2,4                                                   | 4                                                      | 2,6                                                   | 0,008                                             | 44                                    | 49                                | 61                        |
| 100L2-8    | 1,1                                           | 3,15              | 2,5               | 695                     | 69                         | 0,73                      | 15,1                    | 2                                                     | 3,8                                                    | 2,4                                                   | 0,0095                                            | 46                                    | 49                                | 61                        |
| 112M-8     | 1,5                                           | 4,15              | 3,3               | 710                     | 78                         | 0,67                      | 20,2                    | 2,2                                                   | 4,6                                                    | 2,8                                                   | 0,017                                             | 59                                    | 52                                | 64                        |
| 132S-8     | 2,2                                           | 5,0               | 4,0               | 695                     | 80                         | 0,79                      | 30                      | 2                                                     | 4,1                                                    | 2,3                                                   | 0,029                                             | 97                                    | 53                                | 66                        |
| 132M-8     | 3                                             | 6,9               | 5,6               | 705                     | 81                         | 0,77                      | 41                      | 2,4                                                   | 4,6                                                    | 2,7                                                   | 0,036                                             | 113                                   | 53                                | 66                        |
| 160M1-8    | 4                                             | 8,7               | 7                 | 715                     | 85                         | 0,78                      | 53                      | 1,8                                                   | 4,6                                                    | 2,3                                                   | 0,071                                             | 157                                   | 54                                | 67                        |
| 160M2-8    | 5,5                                           | 12                | 9,6               | 720                     | 86                         | 0,77                      | 73                      | 2,1                                                   | 5,4                                                    | 2,8                                                   | 0,105                                             | 170                                   | 54                                | 67                        |
| 160L-8     | 7,5                                           | 16,3              | 13                | 720                     | 86,5                       | 0,77                      | 99                      | 2,2                                                   | 5,6                                                    | 2,9                                                   | 0,136                                             | 190                                   | 54                                | 67                        |
| 180L-8     | 11                                            | 22,5              | 18,1              | 725                     | 89                         | 0,79                      | 145                     | 2,4                                                   | 6,4                                                    | 3                                                     | 0,22                                              | 215                                   | 56                                | 69                        |
| 200L-8     | 15                                            | 30                | 24                | 730                     | 89,5                       | 0,80                      | 196                     | 2,4                                                   | 6,9                                                    | 3,2                                                   | 0,4                                               | 280                                   | 56                                | 70                        |
| 225S-8     | 18,5                                          | 37,5              | 30                | 730                     | 90                         | 0,79                      | 242                     | 2,2                                                   | 6,3                                                    | 3                                                     | 0,56                                              | 372                                   | 57                                | 71                        |
| 225M-8     | 22                                            | 44                | 35,5              | 730                     | 91                         | 0,79                      | 288                     | 2,2                                                   | 6,6                                                    | 3                                                     | 0,69                                              | 404                                   | 57                                | 71                        |
| 250M-8     | 30                                            | 57                | 45,5              | 735                     | 92,5                       | 0,82                      | 390                     | 2                                                     | 6,8                                                    | 3                                                     | 1,2                                               | 550                                   | 58                                | 72                        |
| 280S-8     | 37                                            | 70                | 56                | 735                     | 92,8                       | 0,82                      | 481                     | 2,1                                                   | 6,2                                                    | 2,8                                                   | 1,9                                               | 740                                   | 61                                | 75                        |
| 280M-8     | 45                                            | 85                | 67                | 735                     | 92,8                       | 0,82                      | 585                     | 2                                                     | 6,3                                                    | 2,6                                                   | 2,3                                               | 800                                   | 61                                | 75                        |
| 315S-8     | 55                                            | 103               | 83                | 740                     | 92,5                       | 0,83                      | 710                     | 2,5                                                   | 6                                                      | 2,6                                                   | 4,3                                               | 995                                   | 68                                | 83                        |
| 315M-8     | 75                                            | 140               | 112               | 740                     | 93                         | 0,83                      | 968                     | 2,5                                                   | 6,3                                                    | 2,5                                                   | 5                                                 | 1050                                  | 68                                | 83                        |
| 315L1-8    | 90                                            | 168               | 134               | 740                     | 93,2                       | 0,83                      | 1161                    | 2,6                                                   | 6,6                                                    | 2,6                                                   | 6                                                 | 1145                                  | 68                                | 83                        |
| 315L2-8    | 110                                           | 210               | 166               | 740                     | 93,2                       | 0,82                      | 1420                    | 2,7                                                   | 6,8                                                    | 2,7                                                   | 7,3                                               | 1265                                  | 68                                | 83                        |
| 315L3-8    | 132                                           | 250               | 199               | 735                     | 93,4                       | 0,82                      | 1715                    | 2,5                                                   | 6,3                                                    | 2,5                                                   | 8,3                                               | 1440                                  | 68                                | 83                        |
| 355M-8     | 160                                           | 295               | 235               | 740                     | 95,1                       | 0,83                      | 2065                    | 1,9                                                   | 6,4                                                    | 2,4                                                   | 11,4                                              | 1750                                  | 70                                | 86                        |
| 355L1-8    | 200                                           | 370               | 295               | 745                     | 95,8                       | 0,82                      | 2564                    | 1,7                                                   | 6,6                                                    | 2,5                                                   | 13,9                                              | 1950                                  | 70                                | 86                        |
| 355L2-8    | 250                                           | 460 <sup>1)</sup> | 370               | 745                     | 95,8                       | 0,82                      | 3205                    | 1,2                                                   | 6,1                                                    | 2,4                                                   | 17,7                                              | 2300                                  | 70                                | 86                        |
| 400M-8     | 315                                           | 570 <sup>1)</sup> | 455 <sup>1)</sup> | 745                     | 96,2                       | 0,83                      | 4038                    | 1,2                                                   | 6,2                                                    | 2,4                                                   | 30                                                | 3100                                  | 73                                | 89                        |
| 400L-8     | 355                                           | 640 <sup>1)</sup> | 515 <sup>1)</sup> | 745                     | 96,3                       | 0,83                      | 4551                    | 1                                                     | 6,1                                                    | 2,36                                                  | 34                                                | 3440                                  | 73                                | 89                        |
| 450M-8     | 400                                           | 710 <sup>1)</sup> | 570 <sup>1)</sup> | 745                     | 96,6                       | 0,84                      | 5128                    | 1                                                     | 6,1                                                    | 2,2                                                   | 51                                                | 3750                                  | 74                                | 90                        |
| 450L-8     | 450                                           | 800 <sup>1)</sup> | 640 <sup>1)</sup> | 745                     | 96,7                       | 0,84                      | 5768                    | 1                                                     | 6,1                                                    | 2,2                                                   | 57                                                | 4050                                  | 74                                | 90                        |
| 500...     | on request                                    |                   |                   |                         |                            |                           |                         |                                                       |                                                        |                                                       |                                                   |                                       |                                   |                           |

## Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns = 750 rpm, 2p = 8

65

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with<br>Ventilation | Mains               | Inverter<br>Self ventilation  |                     |                              |                     |                              |                     |                              |                     |                              |                     | Inverter<br>Forced ventilation |                              |
|-------------------------------|---------------------|-------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|--------------------------------|------------------------------|
| Torque characteristic         | -                   | decreasing quadratic constant |                     |                              |                     | constant                     |                     | constant                     |                     | constant                     |                     | constant                       |                              |
| Frequency                     | 50 Hz               | 5–50 Hz                       |                     | 20–50 Hz                     |                     | 10–50 Hz                     |                     | 5–50 Hz                      |                     | 50–87 Hz <sup>1)</sup>       |                     | 5–87 Hz <sup>1)</sup>          |                              |
| Control range                 | -                   | 1:10                          |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     |                              |                     |                                |                              |
| Speed range                   | -                   | 75–750 rpm                    |                     | 300–750 rpm                  |                     | 150–750 rpm                  |                     | 75–750 rpm                   |                     | 750–1305 rpm                 |                     | 75–1305 rpm                    |                              |
| Output/torque                 | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]<br>50 Hz  | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>87 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz   | P <sub>U</sub> [kW]<br>87 Hz |
| 71M2-8                        | 0,12                | 0,12                          | 1,7                 | 0,11                         | 1,5                 | 0,1                          | 1,4                 | 0,08                         | 1,1                 | 0,18                         | 1,3                 | -                              | -                            |
| 80M1-8                        | 0,18                | 0,18                          | 2,5                 | 0,16                         | 2,2                 | 0,13                         | 1,7                 | 0,11                         | 1,5                 | 0,25                         | 1,8                 | -                              | -                            |
| 80M2-8                        | 0,25                | 0,25                          | 3,5                 | 0,22                         | 3                   | 0,18                         | 2,4                 | 0,16                         | 2,2                 | 0,37                         | 2,7                 | -                              | -                            |
| 90S-8                         | 0,37                | 0,37                          | 5,1                 | 0,33                         | 4,4                 | 0,27                         | 3,6                 | 0,22                         | 3                   | 0,55                         | 4                   | -                              | -                            |
| 90L-8                         | 0,55                | 0,55                          | 7,6                 | 0,5                          | 6,7                 | 0,4                          | 5,4                 | 0,33                         | 4,4                 | 0,8                          | 5,9                 | -                              | -                            |
| 100L1-8                       | 0,75                | 0,75                          | 10,1                | 0,65                         | 8,7                 | 0,55                         | 7,4                 | 0,42                         | 5,6                 | 1,1                          | 8                   | -                              | -                            |
| 100L2-8                       | 1,1                 | 1,1                           | 15,1                | 0,9                          | 12                  | 0,8                          | 11                  | 0,6                          | 8,1                 | 1,6                          | 12                  | -                              | -                            |
| 112M-8                        | 1,5                 | 1,5                           | 20,2                | 1,4                          | 19                  | 1,1                          | 15                  | 0,9                          | 12                  | 2,2                          | 16                  | -                              | -                            |
| 132S-8                        | 2,2                 | 2,2                           | 30                  | 2                            | 27                  | 1,7                          | 23                  | 1,3                          | 17                  | 3,3                          | 24                  | 2,2                            | 3,1                          |
| 132M-8                        | 3                   | 3                             | 41                  | 2,7                          | 36                  | 2,2                          | 29                  | 1,8                          | 24                  | 4,5                          | 33                  | 3                              | 4,2                          |
| 160M1-8                       | 4                   | 4                             | 53                  | 3,5                          | 46                  | 3                            | 40                  | 2,5                          | 33                  | 6                            | 44                  | 4                              | 5,5                          |
| 160M2-8                       | 5,5                 | 5,5                           | 73                  | 4,8                          | 64                  | 4                            | 52                  | 3,3                          | 44                  | 8                            | 59                  | 5,5                            | 7,6                          |
| 160L-8                        | 7,5                 | 7,5                           | 99                  | 7                            | 92                  | 5,5                          | 72                  | 4,5                          | 59                  | 11                           | 80                  | 7,5                            | 10,5                         |
| 180L-8                        | 11                  | 11                            | 145                 | 10                           | 131                 | 8                            | 104                 | 7                            | 91                  | 16                           | 117                 | 11                             | 15                           |
| 200L-8                        | 15                  | 15                            | 196                 | 13                           | 170                 | 11                           | 143                 | 10                           | 130                 | 21                           | 154                 | 15                             | 20                           |
| 225S-8                        | 18,5                | 18,5                          | 242                 | 16                           | 208                 | 14                           | 181                 | 12                           | 155                 | 26                           | 190                 | 18,5                           | 25                           |
| 225M-8                        | 22                  | 22                            | 288                 | 19                           | 245                 | 17                           | 219                 | 15                           | 194                 | 30                           | 220                 | 22                             | 29                           |
| 250M-8                        | 30                  | 27 <sup>2)</sup>              | 348                 | 25                           | 323                 | 23                           | 297                 | 21                           | 271                 | 40                           | 293                 | 27                             | 37                           |
| 280S-8                        | 37                  | 33 <sup>2)</sup>              | 426                 | 31                           | 400                 | 29                           | 374                 | 26                           | 336                 | 49                           | 359                 | 33                             | 45                           |
| 280M-8                        | 45                  | 40 <sup>2)</sup>              | 516                 | 37                           | 478                 | 35                           | 452                 | 32                           | 413                 | 60                           | 439                 | 40                             | 55                           |
| 315S-8                        | 55                  | 48 <sup>2)</sup>              | 619                 | 45                           | 581                 | 43                           | 555                 | 41                           | 529                 | 70                           | 512                 | 48                             | 65                           |
| 315M-8                        | 75                  | 65 <sup>2)</sup>              | 839                 | 62                           | 800                 | 58                           | 749                 | 56                           | 723                 | 95                           | 695                 | 65                             | 88                           |
| 315L1-8                       | 90                  | 78 <sup>2)</sup>              | 1007                | 73                           | 942                 | 70                           | 903                 | 68                           | 878                 | 110                          | 805                 | 78                             | 105                          |
| 315L2-8                       | 110                 | 95 <sup>2)</sup>              | 1226                | 90                           | 1161                | 88                           | 1136                | 85                           | 1097                | 140                          | 1025                | 95                             | 130                          |
| 315L3-8                       | 132                 | 115                           | 1484                | 110                          | 1420                | 105                          | 1309                | 100                          | 1247                | 165                          | 1027                | 115                            | 157                          |
| 355M-8                        | 160                 | 140                           | 1807                | 135                          | 1743                | 128                          | 1596                | 120                          | 1496                | 200                          | 1464                | 140                            | 190                          |
| 355L1-8                       | 200                 | 170                           | 2194                | 165                          | 2129                | 160                          | 1994                | 150                          | 1870                | 250                          | 1830                | 170                            | 240                          |
| 355L2-8                       | 250                 | 215                           | 2775                | 205                          | 2646                | 200                          | 2493                | 190                          | 2368                | 310                          | 2269                | 215                            | 305                          |
| 400M-8                        | 315                 | 270                           | 3484                | 260                          | 3355                | 250                          | 3116                | 235                          | 2929                | 395                          | 2891                | 270                            | 385                          |
| 400L-8                        | 355                 | 305                           | 3935                | 295                          | 3807                | 285                          | 3553                | 265                          | 3303                | 440                          | 3220                | 305                            | 425                          |
| 450M-8                        | 400                 | 345                           | 4452                | 335                          | 4323                | 320                          | 3989                | 300                          | 3740                | 495                          | 3622                | 345                            | 480                          |
| 450L-8                        | 450                 | 390                           | 5033                | 375                          | 4839                | 360                          | 4488                | 340                          | 4239                | 560                          | 4098                | 390                            | 540                          |

## Notes:

1) Higher frequencies on request

2) For inverter operation with output filter and practically sinusoidal output voltage, output power as P<sub>2</sub>

Output for inverter operation (indicative values), torque characteristic on page 57,  
overload protection through temperature sensor

V

# IE2

## Mains operation 50 Hz

Temperature class T4,  
ns = 3000 rpm, 2p = 2

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| Frame size                                          | Out-put | Rated current at  |                   | Speed | Efficiency | Power factor | Torque | Starting torque | Starting current | Stall-<br>ing torque | Moment of inertia | Weight <sup>2)</sup> | Noise levels with radial-flow fan Type ...A |          |       |           |                                |
|-----------------------------------------------------|---------|-------------------|-------------------|-------|------------|--------------|--------|-----------------|------------------|----------------------|-------------------|----------------------|---------------------------------------------|----------|-------|-----------|--------------------------------|
|                                                     |         | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] |       |            |              |        |                 |                  |                      |                   |                      | n<br>[rpm]                                  | η<br>[%] | cos φ | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> |
| CD... Efficiency according to manufacturer standard |         |                   |                   |       |            |              |        |                 |                  |                      |                   |                      |                                             |          |       |           |                                |
| 63M1-2                                              | 0,18    | 0,59              | 0,47              | 2905  | 66         | 0,67         | 0,59   | 4,6             | 6,8              | 6,5                  | 0,00028           | 16                   | 49                                          | 61       | -     | -         |                                |
| 63M2-2                                              | 0,25    | 0,69              | 0,55              | 2860  | 70         | 0,75         | 0,83   | 3,4             | 5,8              | 4,7                  | 0,00028           | 16                   | 49                                          | 61       | -     | -         |                                |
| 71M1-2                                              | 0,37    | 0,89              | 0,71              | 2800  | 71,5       | 0,84         | 1,26   | 2,7             | 5,2              | 3,5                  | 0,00028           | 16                   | 51                                          | 63       | -     | -         |                                |
| 71M2-2                                              | 0,55    | 1,34              | 1,08              | 2810  | 72         | 0,82         | 1,87   | 2,8             | 5,5              | 3,6                  | 0,00039           | 17                   | 51                                          | 63       | -     | -         |                                |
| CD...Y2 IE2Efficiency according to IEC 60034-30     |         |                   |                   |       |            |              |        |                 |                  |                      |                   |                      |                                             |          |       |           |                                |
| 80M1-2                                              | 0,75    | 1,58              | 1,26              | 2890  | 79         | 0,87         | 2,48   | 3               | 6,6              | 3,6                  | 0,0013            | 31                   | 55                                          | 67       | -     | -         |                                |
| 80M2-2                                              | 1,1     | 2,25              | 1,80              | 2885  | 81,1       | 0,87         | 3,64   | 2,9             | 6,5              | 3,5                  | 0,0018            | 35                   | 55                                          | 67       | -     | -         |                                |
| 90S-2                                               | 1,5     | 3                 | 2,4               | 2895  | 82,7       | 0,88         | 4,95   | 3               | 6,8              | 3,5                  | 0,0029            | 45                   | 60                                          | 72       | -     | -         |                                |
| 90L-2                                               | 2,2     | 4,25              | 3,4               | 2900  | 84,5       | 0,88         | 7,2    | 3               | 6,9              | 3,6                  | 0,0039            | 48                   | 60                                          | 72       | -     | -         |                                |
| 100L-2                                              | 3       | 5,7               | 4,6               | 2910  | 85,8       | 0,88         | 9,8    | 2,5             | 6,9              | 2,9                  | 0,0051            | 53                   | 63                                          | 75       | -     | -         |                                |
| 112M-2                                              | 4       | 7,6               | 6,1               | 2930  | 86,9       | 0,87         | 13     | 2,8             | 6,9              | 3,6                  | 0,0089            | 95                   | 63                                          | 76       | 55    | 67        |                                |
| 132S1-2                                             | 5,5     | 10,1              | 8,1               | 2925  | 88,1       | 0,89         | 18     | 2,5             | 7                | 3,3                  | 0,0125            | 103                  | 63                                          | 76       | 55    | 68        |                                |
| 132S2-2                                             | 7,5     | 13,7              | 10,9              | 2930  | 89,1       | 0,89         | 24,4   | 2,7             | 7,1              | 3,5                  | 0,0177            | 115                  | 63                                          | 76       | 55    | 68        |                                |
| 160M1-2                                             | 11      | 20                | 16,2              | 2940  | 90,3       | 0,87         | 35,7   | 3               | 7,3              | 3,6                  | 0,032             | 163                  | 66                                          | 79       | 56    | 69        |                                |
| 160M2-2                                             | 15      | 26,5              | 21                | 2940  | 91,1       | 0,9          | 48,7   | 2,8             | 7,2              | 3,2                  | 0,043             | 173                  | 66                                          | 79       | 56    | 69        |                                |
| 160L-2                                              | 18,5    | 32                | 25,5              | 2940  | 91,6       | 0,91         | 60     | 2,7             | 7,2              | 3,1                  | 0,052             | 188                  | 66                                          | 79       | 56    | 69        |                                |
| 180M-2                                              | 22      | 38                | 30,5              | 2945  | 92         | 0,91         | 71     | 2,6             | 7,5              | 3,2                  | 0,075             | 196                  | 69                                          | 82       | 58    | 71        |                                |
| 200L1-2                                             | 30      | 52                | 41,5              | 2955  | 92,7       | 0,9          | 97     | 2,7             | 7,5              | 3,1                  | 0,13              | 254                  | 71                                          | 85       | 60    | 74        |                                |
| 200L2-2                                             | 37      | 63                | 50                | 2955  | 93,1       | 0,91         | 120    | 2,7             | 7,2              | 3                    | 0,16              | 278                  | 71                                          | 85       | 60    | 74        |                                |
| 225M-2                                              | 45      | 77                | 62                | 2960  | 93,4       | 0,9          | 145    | 2,7             | 7,3              | 3                    | 0,24              | 400                  | 72                                          | 86       | 60    | 74        |                                |
| 250M-2                                              | 55      | 95                | 76                | 2970  | 93,8       | 0,89         | 177    | 2,4             | 7,1              | 2,8                  | 0,4               | 545                  | 75                                          | 89       | 64    | 78        |                                |
| 280S-2                                              | 75      | 129               | 103               | 2970  | 94,2       | 0,89         | 241    | 2,2             | 6,8              | 2,7                  | 0,65              | 700                  | 76                                          | 90       | 66    | 80        |                                |
| 280M-2                                              | 90      | 153               | 122               | 2970  | 94,5       | 0,90         | 289    | 2,4             | 6,8              | 2,8                  | 0,78              | 762                  | 76                                          | 90       | 66    | 80        |                                |
| 315S-2                                              | 110     | 188               | 151               | 2975  | 94,8       | 0,89         | 353    | 2               | 6,5              | 2,4                  | 1,4               | 960                  | 76                                          | 91       | 66    | 81        |                                |
| 315M-2                                              | 132     | 225               | 180               | 2975  | 95         | 0,89         | 424    | 2,1             | 6,8              | 2,5                  | 1,6               | 1025                 | 76                                          | 91       | 66    | 81        |                                |
| 315L1-2                                             | 160     | 270               | 215               | 2975  | 95,2       | 0,9          | 514    | 2,4             | 6,9              | 2,7                  | 1,7               | 1065                 | 76                                          | 91       | 66    | 81        |                                |
| 315L2-2                                             | 200     | 335               | 270               | 2980  | 95,4       | 0,9          | 614    | 2,3             | 6,9              | 2,6                  | 2,2               | 1270                 | 76                                          | 91       | 66    | 81        |                                |
| 315L3-2                                             | 250     | 410 <sup>1)</sup> | 325               | 2980  | 96         | 0,92         | 801    | 1,7             | 7,2              | 2,7                  | 2,8               | 1420                 | 76                                          | 91       | 66    | 81        |                                |
| 355L1-2                                             | 315     | 510 <sup>1)</sup> | 410 <sup>1)</sup> | 2980  | 96,6       | 0,92         | 1009   | 1,5             | 6,7              | 2,8                  | 4,5               | 1900                 | 81                                          | 97       | 68    | 84        |                                |
| 355L2-2                                             | 355     | 570 <sup>1)</sup> | 455 <sup>1)</sup> | 2985  | 96,8       | 0,93         | 1136   | 1,4             | 6,9              | 2,7                  | 5                 | 2050                 | 81                                          | 97       | 68    | 84        |                                |
| CD... Efficiency according to manufacturer standard |         |                   |                   |       |            |              |        |                 |                  |                      |                   |                      |                                             |          |       |           |                                |
| 355L3-2                                             | 400     | 640 <sup>1)</sup> | 515 <sup>1)</sup> | 2985  | 96,8       | 0,93         | 1280   | 1,3             | 7                | 2,8                  | 5,5               | 2350                 | 81                                          | 97       | -     | -         |                                |
| 400L-2                                              | 450     | 710 <sup>1)</sup> | 570 <sup>1)</sup> | 2990  | 97         | 0,94         | 1437   | 1,1             | 7,2              | 2,8                  | 8,5               | 2910                 | 81                                          | 97       | -     | -         |                                |

### Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns = 3000 rpm, 2p = 2

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Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with        | Mains               | Inverter                      |                     |                     |                     |                     |                     |                     |                     |                        |                     | Inverter              |                     |
|-----------------------|---------------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|-----------------------|---------------------|
| Ventilation           |                     | Self ventilation              |                     |                     |                     |                     |                     |                     |                     |                        |                     | Forced ventilation    |                     |
| Torque characteristic | -                   | decreasing quadratic constant |                     |                     |                     | constant            |                     | constant            |                     | constant               |                     | constant              |                     |
| Frequency             | 50 Hz               | 5-50 Hz                       |                     | 20-50 Hz            |                     | 10-50 Hz            |                     | 5-50 Hz             |                     | 50-87 Hz <sup>1)</sup> |                     | 5-87 Hz <sup>1)</sup> |                     |
| Control range         | -                   | 1:10                          |                     | 1:2,5               |                     | 1:5                 |                     | 1:10                |                     |                        |                     |                       |                     |
| Speed range           | -                   | 300-3000 rpm                  |                     | 1200-3000 rpm       |                     | 600-3000 rpm        |                     | 300-3000 rpm        |                     | 3000-5220 rpm          |                     | 300-5220 rpm          |                     |
| Output/torque         | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]           | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW] | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW] | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW] | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]    | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]   | P <sub>U</sub> [kW] |
|                       | 50 Hz               | 50 Hz                         | 50 Hz               | 50 Hz               | 50 Hz               | 50 Hz               | 50 Hz               | 50 Hz               | 50 Hz               | 87 Hz                  | 87 Hz               | 50 Hz                 | 87 Hz               |
| CD...                 |                     |                               |                     |                     |                     |                     |                     |                     |                     |                        |                     |                       |                     |
| 63M1-2                | 0,18                | 0,59                          | 0,16                | 0,52                | 0,14                | 0,46                | 0,12                | 0,39                | 0,25                | 0,47                   | -                   | -                     | -                   |
| 63M2-2                | 0,25                | 0,25                          | 0,83                | 0,22                | 0,73                | 0,19                | 0,63                | 0,15                | 0,49                | 0,37                   | 0,7                 | -                     | -                   |
| 71M1-2                | 0,37                | 0,37                          | 1,25                | 0,35                | 1,2                 | 0,3                 | 1                   | 0,22                | 0,74                | 0,55                   | 1                   | -                     | -                   |
| 71M2-2                | 0,55                | 0,55                          | 1,9                 | 0,52                | 1,8                 | 0,45                | 1,5                 | 0,33                | 1,1                 | 0,8                    | 1,5                 | -                     | -                   |

|         |      |                    |      |     |     |     |     |      |     |     |     |      |      |
|---------|------|--------------------|------|-----|-----|-----|-----|------|-----|-----|-----|------|------|
| CD...Y2 |      |                    |      |     |     |     |     |      |     |     |     |      |      |
| 80M1-2  | 0,75 | 0,75               | 2,48 | 0,7 | 2,4 | 0,6 | 2   | 0,5  | 1,7 | 1,1 | 2   | -    | -    |
| 80M2-2  | 1,1  | 1,1                | 3,64 | 1   | 3,4 | 0,9 | 3   | 0,75 | 2,5 | 1,6 | 2,9 | -    | -    |
| 90S-2   | 1,5  | 1,5                | 4,95 | 1,4 | 4,7 | 1,2 | 4   | 1    | 3,3 | 2,2 | 4   | -    | -    |
| 90L-2   | 2,2  | 2,2                | 7,2  | 2   | 6,7 | 1,7 | 5,7 | 1,4  | 4,7 | 3,3 | 6   | -    | -    |
| 100L-2  | 3    | 3                  | 9,8  | 2,7 | 8,9 | 2,2 | 7,2 | 1,8  | 5,9 | 4,5 | 8,2 | -    | -    |
| 112M-2  | 4    | 4                  | 13   | 3,7 | 12  | 3,2 | 11  | 2,5  | 8,2 | 6   | 11  | -    | -    |
| 132S1-2 | 5,5  | 5,5                | 18   | 5   | 16  | 4,5 | 15  | 3,7  | 12  | 8   | 15  | 5,5  | 8    |
| 132S2-2 | 7,5  | 7,5                | 24,4 | 7   | 23  | 6   | 20  | 5    | 16  | 11  | 20  | 7,5  | 10,5 |
| 160M1-2 | 11   | 11                 | 35,7 | 10  | 32  | 9   | 29  | 7,5  | 24  | 16  | 29  | 11   | 15   |
| 160M2-2 | 15   | 14,5 <sup>2)</sup> | 47   | 13  | 42  | 12  | 39  | 10   | 32  | 21  | 38  | 14,5 | 20   |
| 160L-2  | 18,5 | 17,5 <sup>2)</sup> | 57   | 16  | 52  | 15  | 49  | 12,5 | 41  | 26  | 48  | 17,5 | 25   |
| 180M-2  | 22   | 21 <sup>2)</sup>   | 68   | 20  | 65  | 18  | 58  | 15   | 49  | 30  | 55  | 21   | 29   |
| 200L1-2 | 30   | 28 <sup>2)</sup>   | 90   | 27  | 87  | 24  | 77  | 22   | 71  | 40  | 73  | 28   | 38   |
| 200L2-2 | 37   | 32 <sup>2)</sup>   | 103  | 31  | 100 | 28  | 90  | 27   | 87  | 49  | 90  | 32   | 45   |
| 225M-2  | 45   | 38 <sup>2)</sup>   | 123  | 37  | 119 | 34  | 110 | 32   | 103 | 60  | 110 | 38   | 55   |

| Frequency   |     |                  |     |     |     |     |     |     |     | 50-60 Hz <sup>1)</sup> |     | 5-60 Hz <sup>1)</sup> |     |
|-------------|-----|------------------|-----|-----|-----|-----|-----|-----|-----|------------------------|-----|-----------------------|-----|
| Speed range |     |                  |     |     |     |     |     |     |     | 3000-3600 rpm          |     | 300-3600 rpm          |     |
| 250M-2      | 55  | 47 <sup>2)</sup> | 151 | 45  | 145 | 43  | 138 | 41  | 132 | 47                     | 126 | 47                    | 47  |
| 280S-2      | 75  | 62 <sup>2)</sup> | 199 | 60  | 193 | 58  | 186 | 55  | 177 | 62                     | 166 | 62                    | 62  |
| 280M-2      | 90  | 75 <sup>2)</sup> | 241 | 73  | 234 | 70  | 225 | 67  | 215 | 75                     | 201 | 75                    | 75  |
| 315S-2      | 110 | 95 <sup>2)</sup> | 304 | 90  | 288 | 88  | 282 | 85  | 272 | 95                     | 258 | 95                    | 95  |
| 315M-2      | 132 | 115              | 369 | 110 | 353 | 105 | 336 | 100 | 320 | 115                    | 307 | 115                   | 115 |
| 315L1-2     | 160 | 140              | 449 | 135 | 433 | 128 | 410 | 120 | 385 | 140                    | 374 | 140                   | 140 |
| 315L2-2     | 200 | 175              | 560 | 165 | 528 | 160 | 512 | 150 | 480 | 175                    | 467 | 175                   | 175 |
| 315L3-2     | 250 | 215              | 688 | 205 | 656 | 200 | 640 | 185 | 592 | 215                    | 720 | 215                   | 215 |
| 355L1-2     | 315 | 270              | 865 | 260 | 832 | 250 | 800 | 235 | 752 | 270                    | 813 | 270                   | 270 |
| 355L2-2     | 355 | 305              | 976 | 295 | 944 | 285 | 912 | 265 | 848 | 305                    | 918 | 305                   | 305 |

|         |     |     |      |     |      |     |      |     |      |     |      |     |     |
|---------|-----|-----|------|-----|------|-----|------|-----|------|-----|------|-----|-----|
| CD...   |     |     |      |     |      |     |      |     |      |     |      |     |     |
| 355L3-2 | 400 | 345 | 1104 | 335 | 1072 | 320 | 1024 | 300 | 960  | 345 | 1038 | 345 | 345 |
| 400L-2  | 450 | 390 | 1245 | 375 | 1197 | 360 | 1149 | 340 | 1085 | 390 | 201  | 390 | 390 |

## Notes:

- 1) Higher frequencies on request
- 2) For inverter operation with output filter and practically sinusoidal output voltage, output power as P<sub>2</sub>

Overload protection using temperature sensor

V

# IE2

## Mains operation 50 Hz

Temperature class T4,  
ns = 1500 rpm, 2p = 4

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| Frame size                                          | Out-put    | Rated current at   |                   | Speed | Efficiency | Power factor | Torque | Starting torque | Starting current | Stalling torque | Moment of inertia | Weight <sup>2)</sup> | Noise levels with radial-flow fan Type ...A |       |       |        |                                |
|-----------------------------------------------------|------------|--------------------|-------------------|-------|------------|--------------|--------|-----------------|------------------|-----------------|-------------------|----------------------|---------------------------------------------|-------|-------|--------|--------------------------------|
|                                                     |            | 400 V<br>I [A]     | 500 V<br>I [A]    |       |            |              |        |                 |                  |                 |                   |                      | n [rpm]                                     | η [%] | cos φ | M [Nm] | M <sub>A</sub> /M <sub>N</sub> |
| CD... Efficiency according to manufacturer standard |            |                    |                   |       |            |              |        |                 |                  |                 |                   |                      |                                             |       |       |        |                                |
| 63M1-4                                              | 0,12       | 0,43               | 0,34              | 1445  | 62         | 0,60         | 0,79   | 3,9             | 5,6              | 3,9             | 0,00046           | 16                   | 44                                          | 56    | -     | -      |                                |
| 63M2-4                                              | 0,18       | 0,53               | 0,42              | 1415  | 70         | 0,70         | 1,21   | 2,7             | 4,7              | 2,7             | 0,00046           | 16                   | 44                                          | 56    | -     | -      |                                |
| 71M1-4                                              | 0,25       | 0,66               | 0,53              | 1370  | 68,5       | 0,80         | 1,74   | 2               | 3,9              | 2,3             | 0,00046           | 16                   | 45                                          | 57    | -     | -      |                                |
| 71M2-4                                              | 0,37       | 0,94               | 0,75              | 1380  | 71         | 0,80         | 2,56   | 2,2             | 3,9              | 2,3             | 0,00063           | 17                   | 45                                          | 57    | -     | -      |                                |
| 80M1-4                                              | 0,55       | 1,38               | 1,10              | 1380  | 72         | 0,80         | 3,8    | 2               | 3,8              | 2,3             | 0,00092           | 24                   | 46                                          | 58    | -     | -      |                                |
| CD...Y2 IE2 Efficiency according to IEC 60034-30    |            |                    |                   |       |            |              |        |                 |                  |                 |                   |                      |                                             |       |       |        |                                |
| 80M2-4                                              | 0,75       | 1,71               | 1,37              | 1445  | 81         | 0,78         | 5      | 3,2             | 6,8              | 4,2             | 0,0029            | 35                   | 46                                          | 58    | -     | -      |                                |
| 90S-4                                               | 1,1        | 2,4                | 1,92              | 1455  | 82,7       | 0,8          | 7,2    | 2,4             | 6,8              | 3,1             | 0,0046            | 44                   | 49                                          | 61    | -     | -      |                                |
| 90L-4                                               | 1,5        | 3,2                | 2,55              | 1450  | 84         | 0,81         | 9,9    | 2,5             | 6,9              | 3,2             | 0,0056            | 46                   | 49                                          | 61    | -     | -      |                                |
| 100L1-4                                             | 2,2        | 4,4                | 3,55              | 1450  | 85,5       | 0,84         | 14,5   | 2,9             | 7,3              | 3,3             | 0,011             | 59                   | 52                                          | 64    | -     | -      |                                |
| 100L2-4                                             | 3          | 6,0                | 4,75              | 1450  | 86,6       | 0,84         | 18,8   | 3,1             | 7,4              | 3,6             | 0,011             | 59                   | 52                                          | 64    | -     | -      |                                |
| 112M-4                                              | 4          | 7,9                | 6,4               | 1460  | 87,6       | 0,83         | 26,2   | 3               | 7,2              | 3,4             | 0,022             | 100                  | 54                                          | 66    | -     | -      |                                |
| 132S-4                                              | 5,5        | 10,5               | 8,4               | 1460  | 88,6       | 0,85         | 36     | 3,2             | 7,1              | 3,5             | 0,03              | 113                  | 57                                          | 70    | 55    | 68     |                                |
| 132M-4                                              | 7,5        | 14,1               | 11,3              | 1460  | 89,5       | 0,86         | 49     | 3,1             | 7,4              | 3,3             | 0,041             | 125                  | 57                                          | 70    | 55    | 68     |                                |
| 160M-4                                              | 11         | 20,5               | 16,5              | 1470  | 90,6       | 0,85         | 71     | 2,8             | 7,1              | 3,1             | 0,079             | 184                  | 62                                          | 75    | 59    | 69     |                                |
| 160L-4                                              | 15         | 28,5               | 23                | 1470  | 91,3       | 0,83         | 97     | 3               | 7,4              | 3,3             | 0,083             | 187                  | 62                                          | 75    | 59    | 69     |                                |
| 180M-4                                              | 18,5       | 35                 | 28                | 1470  | 91,9       | 0,83         | 120    | 3,3             | 7,4              | 3,4             | 0,155             | 217                  | 60                                          | 73    | 57    | 70     |                                |
| 180L-4                                              | 22         | 41,5               | 33                | 1470  | 92,3       | 0,83         | 143    | 3,3             | 7,3              | 3,3             | 0,164             | 225                  | 60                                          | 73    | 57    | 70     |                                |
| 200L-4                                              | 30         | 55                 | 44                | 1470  | 92,9       | 0,85         | 195    | 3,1             | 7,6              | 3,3             | 0,25              | 274                  | 61                                          | 75    | 58    | 72     |                                |
| 225S-4                                              | 37         | 67                 | 54                | 1475  | 93,3       | 0,85         | 240    | 3               | 7,1              | 2,9             | 0,4               | 372                  | 63                                          | 77    | 59    | 73     |                                |
| 225M-4                                              | 45         | 81                 | 65                | 1475  | 93,6       | 0,86         | 291    | 3,1             | 7,2              | 3               | 0,48              | 402                  | 63                                          | 77    | 59    | 73     |                                |
| 250M-4                                              | 55         | 96                 | 77                | 1475  | 94         | 0,88         | 356    | 3,1             | 7,3              | 3               | 0,75              | 588                  | 65                                          | 79    | 64    | 78     |                                |
| 280S-4                                              | 75         | 135                | 108               | 1480  | 94,5       | 0,85         | 484    | 3               | 7,4              | 2,8             | 1,25              | 740                  | 68                                          | 82    | 66    | 80     |                                |
| 280M-4                                              | 90         | 161                | 129               | 1485  | 94,7       | 0,85         | 579    | 3,2             | 7,8              | 3               | 1,48              | 820                  | 68                                          | 82    | 66    | 80     |                                |
| 315S-4                                              | 110        | 197                | 157               | 1485  | 94,9       | 0,85         | 707    | 2,5             | 6,7              | 2,5             | 2,2               | 1040                 | 69                                          | 84    | 66    | 81     |                                |
| 315M-4                                              | 132        | 235                | 189               | 1485  | 95,1       | 0,85         | 849    | 2,6             | 6,8              | 2,6             | 2,7               | 1120                 | 69                                          | 84    | 66    | 81     |                                |
| 315L1-4                                             | 160        | 280                | 225               | 1485  | 95,3       | 0,86         | 1026   | 2,7             | 6,9              | 2,6             | 3,1               | 1210                 | 69                                          | 84    | 66    | 81     |                                |
| 315L2-4                                             | 200        | 350                | 280               | 1485  | 95,5       | 0,86         | 1286   | 2,7             | 6,9              | 2,6             | 3,9               | 1430                 | 69                                          | 84    | 66    | 81     |                                |
| 315L3-4                                             | 250        | 430 <sup>1)</sup>  | 345               | 1490  | 96,2       | 0,87         | 1602   | 1,7             | 7,3              | 2,7             | 4,6               | 1565                 | 69                                          | 84    | 66    | 81     |                                |
| 355L1-4                                             | 315        | 525 <sup>1)</sup>  | 420 <sup>1)</sup> | 1490  | 96,3       | 0,90         | 2019   | 1,5             | 6,9              | 2,7             | 6,1               | 2050                 | 72                                          | 88    | 68    | 84     |                                |
| 355L2-4                                             | 355        | 590 <sup>1)</sup>  | 470 <sup>1)</sup> | 1490  | 96,6       | 0,90         | 2275   | 1,6             | 6,9              | 2,8             | 6,7               | 2200                 | 72                                          | 88    | 68    | 84     |                                |
| CD... Efficiency according to manufacturer standard |            |                    |                   |       |            |              |        |                 |                  |                 |                   |                      |                                             |       |       |        |                                |
| 355L3-4                                             | 400        | 665 <sup>1)</sup>  | 530 <sup>1)</sup> | 1490  | 97         | 0,90         | 2564   | 1,5             | 7                | 2,8             | 7,4               | 2430                 | 72                                          | 88    | 68    | 84     |                                |
| 400M-4                                              | 450        | 735 <sup>1)</sup>  | 590 <sup>1)</sup> | 1495  | 97         | 0,91         | 2875   | 1,1             | 7,3              | 2,7             | 18                | 2850                 | 78                                          | 94    | -     | -      |                                |
| 400L-4                                              | 500        | 815 <sup>1)</sup>  | 655 <sup>1)</sup> | 1495  | 97,1       | 0,91         | 3194   | 1,1             | 7,3              | 2,7             | 20                | 3230                 | 78                                          | 94    | -     | -      |                                |
| 450M-4                                              | 560        | 915 <sup>1)</sup>  | 730 <sup>1)</sup> | 1495  | 97,2       | 0,91         | 3577   | 1               | 6,8              | 2,7             | 26                | 3500                 | 79                                          | 95    | -     | -      |                                |
| 450L-4                                              | 630        | 1025 <sup>1)</sup> | 820 <sup>1)</sup> | 1495  | 97,4       | 0,91         | 4024   | 1               | 6,8              | 2,7             | 31                | 3800                 | 79                                          | 95    | -     | -      |                                |
| 500...                                              | on request |                    |                   |       |            |              |        |                 |                  |                 |                   |                      |                                             |       |       |        |                                |

### Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns= 1500 rpm, 2p = 4

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Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with        | Mains               | Inverter                      |                     |                              |                     |                              |                     |                              |                     |                              |                     | Inverter                     |                              |
|-----------------------|---------------------|-------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|------------------------------|
| Ventilation           |                     | Self ventilation              |                     |                              |                     |                              |                     |                              |                     |                              |                     | Forced ventilation           |                              |
| Torque characteristic | -                   | decreasing quadratic constant |                     |                              |                     | constant                     |                     | constant                     |                     | constant                     |                     | constant                     |                              |
| Frequency             | 50 Hz               | 5-50 Hz                       |                     | 20-50 Hz                     |                     | 10-50 Hz                     |                     | 5-50 Hz                      |                     | 50-87 Hz <sup>1)</sup>       |                     | 5-87 Hz <sup>1)</sup>        |                              |
| Regelbereich          | -                   | 1:10                          |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     |                              |                     |                              |                              |
| Drehzahlbereich       | -                   | 150-1500 rpm                  |                     | 600-1500 rpm                 |                     | 300-1500 rpm                 |                     | 150-1500 rpm                 |                     | 1500-2610 rpm                |                     | 150-2610 rpm                 |                              |
| Leistung / Moment     | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]<br>50 Hz  | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>87 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | P <sub>U</sub> [kW]<br>87 Hz |
| CD...                 |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                     |                              |                              |
| 63M1-4                | 0,12                | 0,12                          | 0,79                | 0,11                         | 0,73                | 0,09                         | 0,59                | 0,08                         | 0,53                | 0,18                         | 0,68                | -                            | -                            |
| 63M2-4                | 0,18                | 0,18                          | 1,2                 | 0,16                         | 1,08                | 0,14                         | 0,94                | 0,11                         | 0,79                | 0,25                         | 0,96                | -                            | -                            |
| 71M1-4                | 0,25                | 0,25                          | 1,74                | 0,22                         | 1,5                 | 0,19                         | 1,25                | 0,15                         | 1                   | 0,37                         | 1,4                 | -                            | -                            |
| 71M2-4                | 0,37                | 0,37                          | 2,56                | 0,33                         | 2,2                 | 0,28                         | 1,9                 | 0,22                         | 1,5                 | 0,55                         | 2                   | -                            | -                            |
| 80M1-4                | 0,55                | 0,55                          | 3,8                 | 0,52                         | 3,5                 | 0,45                         | 3                   | 0,33                         | 2,2                 | 0,8                          | 2,9                 | -                            | -                            |
| CD...Y2               |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                     |                              |                              |
| 80M2-4                | 0,75                | 0,75                          | 5                   | 0,7                          | 4,8                 | 0,6                          | 4                   | 0,5                          | 3,3                 | 1,1                          | 4                   | -                            | -                            |
| 90S-4                 | 1,1                 | 1,1                           | 7,2                 | 1                            | 6,7                 | 0,9                          | 6                   | 0,75                         | 5                   | 1,6                          | 5,9                 | -                            | -                            |
| 90L-4                 | 1,5                 | 1,5                           | 9,9                 | 1,4                          | 9,5                 | 1,2                          | 8                   | 1                            | 6,7                 | 2,2                          | 8                   | -                            | -                            |
| 100L1-4               | 2,2                 | 2,2                           | 14,5                | 2                            | 13                  | 1,7                          | 11                  | 1,4                          | 9,3                 | 3,3                          | 12                  | -                            | -                            |
| 100L2-4               | 3                   | 3                             | 18,8                | 2,8                          | 19                  | 2,2                          | 15                  | 1,8                          | 12                  | 4,5                          | 16                  | -                            | -                            |
| 112M-4                | 4                   | 4                             | 26,2                | 3,6                          | 24                  | 3                            | 20                  | 2,5                          | 16                  | 6                            | 22                  | -                            | -                            |
| 132S-4                | 5,5                 | 5,5                           | 36                  | 5                            | 33                  | 4,4                          | 29                  | 3,7                          | 24                  | 8                            | 29                  | 5,5                          | 8                            |
| 132M-4                | 7,5                 | 7,5                           | 49                  | 7                            | 46                  | 6                            | 39                  | 5                            | 33                  | 11                           | 40                  | 7,5                          | 10,5                         |
| 160M-4                | 11                  | 11                            | 71                  | 10                           | 65                  | 9                            | 58                  | 7,5                          | 49                  | 16                           | 59                  | 11                           | 15                           |
| 160L-4                | 15                  | 15                            | 97                  | 13,5                         | 88                  | 12                           | 78                  | 10                           | 65                  | 21                           | 79                  | 15                           | 20                           |
| 180M-4                | 18,5                | 18 <sup>2)</sup>              | 118                 | 98                           | 111                 | 15                           | 97                  | 12,5                         | 81                  | 26                           | 95                  | 18                           | 25                           |
| 180L-4                | 22                  | 21 <sup>2)</sup>              | 137                 | 20                           | 130                 | 18                           | 117                 | 15                           | 97                  | 30                           | 110                 | 21                           | 29                           |
| 200L-4                | 30                  | 28 <sup>2)</sup>              | 183                 | 27                           | 176                 | 24                           | 156                 | 21                           | 136                 | 40                           | 146                 | 28                           | 37                           |
| 225S-4                | 37                  | 32 <sup>2)</sup>              | 208                 | 31                           | 201                 | 29                           | 188                 | 26                           | 168                 | 49                           | 179                 | 32                           | 45                           |
| 225M-4                | 45                  | 38 <sup>2)</sup>              | 247                 | 37                           | 240                 | 35                           | 227                 | 32                           | 207                 | 60                           | 220                 | 38                           | 55                           |
| 250M-4                | 55                  | 46 <sup>2)</sup>              | 298                 | 45                           | 291                 | 43                           | 278                 | 41                           | 265                 | 70                           | 256                 | 46                           | 65                           |
| 280S-4                | 75                  | 62 <sup>2)</sup>              | 400                 | 60                           | 386                 | 58                           | 373                 | 55                           | 354                 | 95                           | 348                 | 62                           | 88                           |
| 280M-4                | 90                  | 75 <sup>2)</sup>              | 482                 | 73                           | 470                 | 70                           | 450                 | 66                           | 424                 | 110                          | 402                 | 75                           | 105                          |
| 315S-4                | 110                 | 95 <sup>2)</sup>              | 610                 | 90                           | 577                 | 88                           | 564                 | 83                           | 532                 | 140                          | 512                 | 95                           | 130                          |
| 315M-4                | 132                 | 115                           | 737                 | 110                          | 705                 | 105                          | 673                 | 100                          | 641                 | 165                          | 604                 | 115                          | 157                          |
| 315L1-4               | 160                 | 140                           | 897                 | 135                          | 865                 | 128                          | 820                 | 120                          | 769                 | 200                          | 732                 | 140                          | 190                          |
| 315L2-4               | 200                 | 175                           | 1122                | 165                          | 1058                | 160                          | 1026                | 150                          | 961                 | 250                          | 915                 | 175                          | 240                          |
| 315L3-4               | 250                 | 215                           | 1378                | 205                          | 1314                | 200                          | 1282                | 185                          | 1186                | 310                          | 1134                | 215                          | 305                          |
| 355L1-4               | 315                 | 270                           | 1731                | 260                          | 1666                | 250                          | 1602                | 235                          | 1506                | 395                          | 1445                | 270                          | 385                          |
| 355L2-4               | 355                 | 305                           | 1955                | 295                          | 1891                | 285                          | 1827                | 265                          | 1698                | 440                          | 1610                | 305                          | 425                          |
| CD...                 |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                     |                              |                              |
| 355L3-4               | 400                 | 345                           | 2209                | 335                          | 2145                | 320                          | 2048                | 300                          | 1920                | 495                          | 1820                | 345                          | 480                          |
| 400M-4                | 450                 | 390                           | 2500                | 375                          | 2405                | 360                          | 2307                | 340                          | 2179                | 560                          | 2050                | 390                          | 540                          |
| 400L-4                | 500                 | 435                           | 2778                | 415                          | 2650                | 400                          | 2553                | 380                          | 2425                | 620                          | 2274                | 435                          | 600                          |
| 450M-4                | 560                 | 485                           | 3097                | 465                          | 2969                | 450                          | 2873                | 425                          | 2713                | 695                          | 2549                | 485                          | 670                          |
| 450L-4                | 630                 | 545                           | 3480                | 525                          | 3352                | 505                          | 3224                | 475                          | 3032                | 785                          | 2879                | 545                          | 755                          |

## Notes:

1) Higher frequencies on request.

2) For inverter operation with output filter and practically sinusoidal output voltage, output power as P<sub>2</sub>

Overload protection using temperature sensor

V

# IE2

## Mains Operation 50 Hz

Temperature class T4,  
ns = 1000 rpm, 2p = 6

| Frame size                                                 | Output<br><br>P <sub>2</sub><br>[kW] | Rated current at  |                   | Speed<br><br>n<br>[rpm] | Efficiency<br><br>η<br>[%] | Power factor<br><br>cos φ | Torque<br><br>M<br>[Nm] | Starting torque<br><br>M <sub>A</sub> /M <sub>N</sub> | Starting current<br><br>I <sub>A</sub> /I <sub>N</sub> | Stall-<br>ing torque<br><br>M <sub>K</sub> /M <sub>N</sub> | Moment of inertia<br><br>J<br>[kgm <sup>2</sup> ] | Weight <sup>2)</sup><br><br>m<br>[kg] | Noise levels with radial-flow fan |                           |
|------------------------------------------------------------|--------------------------------------|-------------------|-------------------|-------------------------|----------------------------|---------------------------|-------------------------|-------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------|---------------------------------------|-----------------------------------|---------------------------|
|                                                            |                                      | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] |                         |                            |                           |                         |                                                       |                                                        |                                                            |                                                   |                                       | L <sub>P</sub><br>[dB(A)]         | L <sub>W</sub><br>[dB(A)] |
| <b>CD... Efficiency according to manufacturer standard</b> |                                      |                   |                   |                         |                            |                           |                         |                                                       |                                                        |                                                            |                                                   |                                       |                                   |                           |
| 71M2-6                                                     | 0,25                                 | 0,82              | 0,66              | 920                     | 62                         | 0,71                      | 2,6                     | 2,2                                                   | 3,5                                                    | 2,6                                                        | 0,0012                                            | 17                                    | 44                                | 56                        |
| 80M1-6                                                     | 0,37                                 | 1,12              | 0,90              | 925                     | 67                         | 0,71                      | 3,8                     | 2,5                                                   | 4,1                                                    | 2,8                                                        | 0,0019                                            | 24                                    | 44                                | 56                        |
| 80M2-6                                                     | 0,55                                 | 1,6               | 1,28              | 925                     | 69                         | 0,72                      | 5,7                     | 2,4                                                   | 4                                                      | 2,7                                                        | 0,0025                                            | 25                                    | 44                                | 56                        |
| <b>CD...Y2 IE2 Efficiency according to IEC 60034-30</b>    |                                      |                   |                   |                         |                            |                           |                         |                                                       |                                                        |                                                            |                                                   |                                       |                                   |                           |
| 90S-6                                                      | 0,75                                 | 2                 | 1,60              | 955                     | 77,4                       | 0,70                      | 7,5                     | 2,7                                                   | 5,5                                                    | 3,1                                                        | 0,0080                                            | 44                                    | 47                                | 59                        |
| 90L-6                                                      | 1,1                                  | 2,75              | 2,2               | 955                     | 79,5                       | 0,72                      | 11                      | 2,8                                                   | 5,9                                                    | 3,1                                                        | 0,0095                                            | 46                                    | 47                                | 59                        |
| 100L-6                                                     | 1,5                                  | 3,75              | 3,0               | 965                     | 81,1                       | 0,71                      | 14,8                    | 3                                                     | 6,8                                                    | 3,3                                                        | 0,017                                             | 59                                    | 50                                | 62                        |
| 112M-6                                                     | 2,2                                  | 4,9               | 3,9               | 965                     | 83                         | 0,78                      | 21,8                    | 2,6                                                   | 6,8                                                    | 3,1                                                        | 0,031                                             | 100                                   | 53                                | 65                        |
| 132S-6                                                     | 3                                    | 6,9               | 5,5               | 970                     | 84,4                       | 0,74                      | 29,5                    | 3,2                                                   | 7,1                                                    | 3,7                                                        | 0,031                                             | 100                                   | 56                                | 69                        |
| 132M1-6                                                    | 4                                    | 8,9               | 7,1               | 965                     | 85,7                       | 0,76                      | 39,6                    | 2,9                                                   | 6,9                                                    | 3,7                                                        | 0,037                                             | 104                                   | 56                                | 69                        |
| 132M2-6                                                    | 5,5                                  | 11,3              | 9                 | 965                     | 87                         | 0,81                      | 54                      | 2,7                                                   | 7,2                                                    | 3,4                                                        | 0,048                                             | 117                                   | 56                                | 69                        |
| 160M-6                                                     | 7,5                                  | 14,6              | 11,7              | 970                     | 88,1                       | 0,84                      | 74                      | 2,8                                                   | 7,5                                                    | 3,8                                                        | 0,12                                              | 190                                   | 58                                | 71                        |
| 160L-6                                                     | 11                                   | 22                | 17,5              | 975                     | 89,5                       | 0,81                      | 108                     | 2,9                                                   | 7,6                                                    | 3,9                                                        | 0,12                                              | 190                                   | 58                                | 71                        |
| 180L-6                                                     | 15                                   | 29                | 23,5              | 975                     | 90,4                       | 0,82                      | 147                     | 2,7                                                   | 7,4                                                    | 3,8                                                        | 0,19                                              | 215                                   | 58                                | 71                        |
| 200L1-6                                                    | 18,5                                 | 35,5              | 28,5              | 975                     | 91                         | 0,83                      | 181                     | 2,5                                                   | 7                                                      | 3,5                                                        | 0,28                                              | 270                                   | 58                                | 71                        |
| 200L2-6                                                    | 22                                   | 41,5              | 33                | 975                     | 91,5                       | 0,84                      | 215                     | 2,2                                                   | 6,9                                                    | 3,2                                                        | 0,31                                              | 280                                   | 58                                | 72                        |
| 225M-6                                                     | 30                                   | 57                | 45                | 985                     | 92,3                       | 0,83                      | 291                     | 3                                                     | 6,9                                                    | 2,7                                                        | 0,69                                              | 404                                   | 58                                | 72                        |
| 250M-6                                                     | 37                                   | 69                | 56                | 985                     | 92,7                       | 0,83                      | 359                     | 3                                                     | 6,8                                                    | 2,7                                                        | 1,03                                              | 570                                   | 58                                | 76                        |
| 280S-6                                                     | 45                                   | 84                | 67                | 985                     | 93,5                       | 0,83                      | 436                     | 2,8                                                   | 5,8                                                    | 2,4                                                        | 1,35                                              | 720                                   | 62                                | 77                        |
| 280M-6                                                     | 55                                   | 103               | 83                | 985                     | 93,6                       | 0,82                      | 533                     | 2,7                                                   | 5,8                                                    | 2,3                                                        | 1,7                                               | 770                                   | 62                                | 77                        |
| 315S-6                                                     | 75                                   | 131               | 105               | 990                     | 94,1                       | 0,88                      | 723                     | 3                                                     | 7,2                                                    | 2,7                                                        | 4,3                                               | 995                                   | 65                                | 79                        |
| 315M-6                                                     | 90                                   | 156               | 125               | 990                     | 94,4                       | 0,88                      | 868                     | 3,2                                                   | 7,7                                                    | 2,8                                                        | 5                                                 | 1050                                  | 65                                | 79                        |
| 315L1-6                                                    | 110                                  | 191               | 152               | 990                     | 94,7                       | 0,88                      | 1061                    | 3,3                                                   | 7,8                                                    | 2,8                                                        | 6                                                 | 1145                                  | 69                                | 84                        |
| 315L2-6                                                    | 132                                  | 230               | 182               | 990                     | 95                         | 0,88                      | 1273                    | 3,2                                                   | 7,7                                                    | 2,8                                                        | 7,3                                               | 1265                                  | 69                                | 84                        |
| 315L3-6                                                    | 160                                  | 275               | 220               | 990                     | 95,2                       | 0,88                      | 1543                    | 3,3                                                   | 7,8                                                    | 2,8                                                        | 8,3                                               | 1440                                  | 69                                | 84                        |
| 355M-6                                                     | 200                                  | 345               | 275               | 990                     | 95,5                       | 0,88                      | 1929                    | 1,8                                                   | 6,7                                                    | 2,7                                                        | 11,3                                              | 1750                                  | 74                                | 90                        |
| 355L1-6                                                    | 250                                  | 430 <sup>1)</sup> | 345               | 990                     | 95,9                       | 0,88                      | 2411                    | 1,8                                                   | 6,7                                                    | 2,7                                                        | 13,8                                              | 1950                                  | 74                                | 90                        |
| 355L2-6                                                    | 315                                  | 540 <sup>1)</sup> | 430 <sup>1)</sup> | 990                     | 96                         | 0,88                      | 3039                    | 1,7                                                   | 6,9                                                    | 2,6                                                        | 17,6                                              | 2300                                  | 74                                | 90                        |
| 400M-6                                                     | 355                                  | 595 <sup>1)</sup> | 475 <sup>1)</sup> | 994                     | 96,6                       | 0,89                      | 3411                    | 1,1                                                   | 6,6                                                    | 2,7                                                        | 27                                                | 2850                                  | 78                                | 94                        |
| <b>CD... Efficiency according to manufacturer standard</b> |                                      |                   |                   |                         |                            |                           |                         |                                                       |                                                        |                                                            |                                                   |                                       |                                   |                           |
| 400L-6                                                     | 400                                  | 670 <sup>1)</sup> | 535 <sup>1)</sup> | 994                     | 96,6                       | 0,89                      | 3843                    | 1,1                                                   | 6,8                                                    | 2,6                                                        | 31                                                | 3230                                  | 78                                | 94                        |
| 450M-6                                                     | 450                                  | 755 <sup>1)</sup> | 605 <sup>1)</sup> | 995                     | 96,6                       | 0,89                      | 4319                    | 1,2                                                   | 6,8                                                    | 2,8                                                        | 46                                                | 3500                                  | 78                                | 94                        |
| 450L-6                                                     | 500                                  | 835 <sup>1)</sup> | 670 <sup>1)</sup> | 995                     | 97                         | 0,89                      | 4799                    | 1,1                                                   | 6,8                                                    | 2,7                                                        | 51                                                | 3800                                  | 78                                | 94                        |
| 500...                                                     | on request                           |                   |                   |                         |                            |                           |                         |                                                       |                                                        |                                                            |                                                   |                                       |                                   |                           |

### Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Inverter Operation 50 Hz

Temperature class T4,  
ns = 1000 rpm, 2p = 6

71

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Operation with<br>Ventilation | Mains               | Inverter<br>Self ventilation  |                     |                              |                     |                              |                     |                              |                     |                              |                     | Inverter<br>Forced ventilation |                              |
|-------------------------------|---------------------|-------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|--------------------------------|------------------------------|
| Torque characteristic         | -                   | decreasing quadratic constant |                     |                              |                     | constant                     |                     | constant                     |                     | constant                     |                     | constant                       |                              |
| Frequency                     | 50 Hz               | 5-50 Hz                       |                     | 20-50 Hz                     |                     | 10-50 Hz                     |                     | 5-50 Hz                      |                     | 50-87 Hz <sup>1)</sup>       |                     | 5-87 Hz <sup>1)</sup>          |                              |
| Control range                 | -                   | 1:10                          |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     |                              |                     |                                |                              |
| Speed range                   | -                   | 100-1000 rpm                  |                     | 400-1000 rpm                 |                     | 200-1000 rpm                 |                     | 100-1000 rpm                 |                     | 1000-1740 rpm                |                     | 100-1740 rpm                   |                              |
| Output/torque                 | P <sub>2</sub> [kW] | P <sub>U</sub> [kW]<br>50 Hz  | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>87 Hz | M <sub>U</sub> [Nm] | P <sub>U</sub> [kW]<br>50 Hz   | P <sub>U</sub> [kW]<br>87 Hz |
| CD...                         |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                     |                                |                              |
| 71M2-6                        | 0,25                | 0,25                          | 2,6                 | 0,22                         | 2,2                 | 0,18                         | 1,8                 | 0,16                         | 1,6                 | 0,37                         | 2                   | -                              | -                            |
| 80M1-6                        | 0,37                | 0,37                          | 3,8                 | 0,33                         | 3,4                 | 0,27                         | 2,7                 | 0,22                         | 2,2                 | 0,55                         | 3                   | -                              | -                            |
| 80M2-6                        | 0,55                | 0,55                          | 5,7                 | 0,5                          | 5,1                 | 0,4                          | 4                   | 0,33                         | 3,3                 | 0,8                          | 4,4                 | -                              | -                            |
| CD...Y2                       |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                     |                                |                              |
| 90S-6                         | 0,75                | 0,75                          | 7,5                 | 0,65                         | 6,7                 | 0,55                         | 5,5                 | 0,42                         | 4,2                 | 1,1                          | 6                   | -                              | -                            |
| 90L-6                         | 1,1                 | 1,1                           | 11                  | 0,9                          | 9,2                 | 0,8                          | 8                   | 0,6                          | 6                   | 1,6                          | 8,8                 | -                              | -                            |
| 100L-6                        | 1,5                 | 1,5                           | 14,8                | 1,4                          | 14                  | 1,1                          | 11                  | 0,9                          | 9                   | 2,2                          | 12                  | -                              | -                            |
| 112M-6                        | 2,2                 | 2,2                           | 21,8                | 2                            | 20                  | 1,7                          | 17                  | 1,3                          | 13                  | 3,3                          | 18                  | -                              | -                            |
| 132S1-6                       | 3                   | 3                             | 29,5                | 2,7                          | 27                  | 2,2                          | 22                  | 1,8                          | 18                  | 4,5                          | 25                  | 3                              | 4,2                          |
| 132M1-6                       | 4                   | 4                             | 39,6                | 3,5                          | 35                  | 3                            | 30                  | 2,5                          | 25                  | 6                            | 33                  | 4                              | 5,5                          |
| 132M2-6                       | 5,5                 | 5,5                           | 54                  | 4,8                          | 48                  | 4                            | 40                  | 3,3                          | 33                  | 8                            | 44                  | 5,5                            | 7,6                          |
| 160M-6                        | 7,5                 | 7,5                           | 74                  | 7                            | 69                  | 6                            | 59                  | 5                            | 49                  | 11                           | 60                  | 7,5                            | 10,5                         |
| 160L-6                        | 11                  | 11                            | 108                 | 10                           | 98                  | 9                            | 88                  | 7,5                          | 73                  | 16                           | 88                  | 11                             | 15                           |
| 180L-6                        | 15                  | 15                            | 147                 | 13                           | 128                 | 12                           | 118                 | 10                           | 98                  | 21                           | 115                 | 15                             | 20                           |
| 200L1-6                       | 18,5                | 17,5 <sup>2)</sup>            | 171                 | 16                           | 157                 | 14                           | 137                 | 12                           | 118                 | 26                           | 143                 | 17,5                           | 24                           |
| 200L2-6                       | 22                  | 20 <sup>2)</sup>              | 196                 | 19                           | 186                 | 17                           | 167                 | 15                           | 147                 | 30                           | 165                 | 20                             |                              |
| 225M-6                        | 30                  | 27 <sup>2)</sup>              | 262                 | 25                           | 242                 | 23                           | 223                 | 21                           | 204                 | 40                           | 220                 | 27                             | 37                           |
| 250M-6                        | 37                  | 33 <sup>2)</sup>              | 320                 | 31                           | 301                 | 29                           | 281                 | 26                           | 252                 | 49                           | 269                 | 33                             | 45                           |
| 280S-6                        | 45                  | 40 <sup>2)</sup>              | 386                 | 37                           | 357                 | 35                           | 338                 | 32                           | 309                 | 60                           | 329                 | 40                             | 55                           |
| 280M-6                        | 55                  | 47 <sup>2)</sup>              | 453                 | 45                           | 434                 | 43                           | 415                 | 41                           | 396                 | 70                           | 384                 | 47                             | 65                           |
| 315S-6                        | 75                  | 65 <sup>2)</sup>              | 627                 | 62                           | 598                 | 58                           | 559                 | 56                           | 540                 | 95                           | 521                 | 65                             | 88                           |
| 315M-6                        | 90                  | 78 <sup>2)</sup>              | 752                 | 73                           | 704                 | 70                           | 675                 | 68                           | 656                 | 110                          | 604                 | 78                             | 105                          |
| 315L1-6                       | 110                 | 95 <sup>2)</sup>              | 916                 | 90                           | 868                 | 88                           | 849                 | 85                           | 820                 | 140                          | 768                 | 95                             | 130                          |
| 315L2-6                       | 132                 | 115                           | 1109                | 110                          | 1061                | 105                          | 1013                | 100                          | 965                 | 165                          | 906                 | 115                            | 157                          |
| 315L3-6                       | 160                 | 140                           | 1351                | 135                          | 1302                | 128                          | 1235                | 120                          | 1158                | 200                          | 1098                | 140                            | 190                          |
| 355M-6                        | 200                 | 170                           | 1640                | 165                          | 1592                | 160                          | 1543                | 150                          | 1447                | 250                          | 1372                | 170                            | 240                          |
| 355L1-6                       | 250                 | 215                           | 2074                | 205                          | 1978                | 200                          | 1929                | 190                          | 1833                | 310                          | 1701                | 215                            | 305                          |
| 355L2-6                       | 315                 | 270                           | 2605                | 260                          | 2508                | 250                          | 2412                | 235                          | 2267                | 395                          | 2168                | 270                            | 385                          |
| 400M-6                        | 355                 | 305                           | 2942                | 295                          | 2846                | 285                          | 2749                | 265                          | 2556                | 440                          | 2115                | 305                            | 425                          |
| CD...                         |                     |                               |                     |                              |                     |                              |                     |                              |                     |                              |                     |                                |                              |
| 400L-6                        | 400                 | 345                           | 3328                | 335                          | 3232                | 320                          | 3087                | 300                          | 2894                | 495                          | 2717                | 345                            | 480                          |
| 450M-6                        | 450                 | 390                           | 2762                | 375                          | 3617                | 360                          | 3473                | 340                          | 3280                | 560                          | 3074                | 390                            | 540                          |
| 450L-6                        | 500                 | 435                           | 4196                | 415                          | 4003                | 400                          | 3859                | 375                          | 3618                | 620                          | 3404                | 435                            | 600                          |

## Notes:

1) Higher frequencies on request.

2) For inverter operation with output filter and practically sinusoidal output voltage, output power as P<sub>2</sub>.

Overload protection using temperature sensor

V

# IE3/MEPS

## Mains Operation 50 Hz

Temperature class T4,  
ns = 3000 rpm, 2p = 2

| Frame size | Out-put | Rated current at                              |                   | Speed | Effi-<br>ciency | Power factor                         | Torque | Start-<br>ing torque | Starting current | Stall-<br>ing torque | Moment of inertia | Weight <sup>2)</sup> | Noise levels with radial-flow fan |          | Noise levels with axial-flow fan Type ...A |    |
|------------|---------|-----------------------------------------------|-------------------|-------|-----------------|--------------------------------------|--------|----------------------|------------------|----------------------|-------------------|----------------------|-----------------------------------|----------|--------------------------------------------|----|
|            |         | 400 V<br>I<br>[A]                             | 500 V<br>I<br>[A] |       |                 |                                      |        |                      |                  |                      |                   |                      | n<br>[rpm]                        | η<br>[%] | cos φ                                      | M  |
| CD...      |         | Efficiency according to manufacturer standard |                   |       |                 |                                      |        |                      |                  |                      |                   |                      |                                   |          |                                            |    |
| 63M1-2     | 0,18    | 0,59                                          | 0,47              | 2905  | 66              | 0,67                                 | 0,59   | 4,6                  | 6,8              | 6,5                  | 0,00028           | 16                   | 49                                | 61       | -                                          | -  |
| 63M2-2     | 0,25    | 0,69                                          | 0,55              | 2860  | 70              | 0,75                                 | 0,83   | 3,4                  | 5,8              | 4,7                  | 0,00028           | 16                   | 49                                | 61       | -                                          | -  |
| 71M1-2     | 0,37    | 0,89                                          | 0,71              | 2800  | 71,5            | 0,84                                 | 1,26   | 2,7                  | 5,2              | 3,5                  | 0,00028           | 16                   | 51                                | 63       | -                                          | -  |
| 71M2-2     | 0,55    | 1,34                                          | 1,08              | 2810  | 72              | 0,82                                 | 1,87   | 2,8                  | 5,5              | 3,6                  | 0,00039           | 17                   | 51                                | 63       | -                                          | -  |
|            |         |                                               |                   |       |                 |                                      |        |                      |                  |                      |                   |                      |                                   |          |                                            |    |
| CD...Y3    |         |                                               |                   | IE3   |                 | Efficiency according to IEC 60034-30 |        |                      |                  |                      |                   |                      |                                   |          |                                            |    |
| 80M1-2     | 0,75    | 1,5                                           | 1,20              | 2890  | 82,8            | 0,87                                 | 2,48   | 3                    | 6,6              | 3,6                  | 0,0013            | 31                   | 55                                | 67       | -                                          | -  |
| 80M2-2     | 1,1     | 2,2                                           | 1,74              | 2885  | 83,7            | 0,87                                 | 3,64   | 2,9                  | 6,5              | 3,5                  | 0,0018            | 35                   | 55                                | 67       | -                                          | -  |
| 90S-2      | 1,5     | 2,9                                           | 2,3               | 2895  | 84,7            | 0,88                                 | 4,95   | 3                    | 6,8              | 3,5                  | 0,0029            | 45                   | 60                                | 72       | -                                          | -  |
| 90L-2      | 2,2     | 4,2                                           | 3,35              | 2900  | 86,4            | 0,88                                 | 7,2    | 3                    | 6,9              | 3,6                  | 0,0039            | 48                   | 60                                | 72       | -                                          | -  |
| 100L-2     | 3       | 5,6                                           | 4,45              | 2910  | 88,1            | 0,88                                 | 9,8    | 2,5                  | 6,9              | 2,9                  | 0,0051            | 53                   | 63                                | 75       | -                                          | -  |
| 112M-2     | 4       | 7,5                                           | 6                 | 2930  | 88,4            | 0,87                                 | 13     | 2,8                  | 6,9              | 3,6                  | 0,0089            | 95                   | 63                                | 76       | 55                                         | 67 |
| 132S1-2    | 5,5     | 10                                            | 8                 | 2925  | 89,5            | 0,89                                 | 18     | 2,5                  | 7                | 3,3                  | 0,0125            | 103                  | 63                                | 76       | 55                                         | 68 |
| 132S2-2    | 7,5     | 13,5                                          | 10,8              | 2930  | 90,3            | 0,89                                 | 24,4   | 2,7                  | 7,1              | 3,5                  | 0,0177            | 115                  | 63                                | 76       | 55                                         | 68 |
| 160M1-2    | 11      | 20                                            | 16                | 2940  | 91,3            | 0,87                                 | 35,7   | 3                    | 7,3              | 3,6                  | 0,032             | 163                  | 66                                | 79       | 56                                         | 69 |
| 160M2-2    | 15      | 26                                            | 21                | 2940  | 92              | 0,9                                  | 48,7   | 2,8                  | 7,2              | 3,2                  | 0,043             | 173                  | 66                                | 79       | 56                                         | 69 |
| 160L-2     | 18,5    | 31,5                                          | 25,5              | 2940  | 92,5            | 0,91                                 | 60     | 2,7                  | 7,2              | 3,1                  | 0,052             | 188                  | 66                                | 79       | 56                                         | 69 |
| 180M-2     | 22      | 37,5                                          | 30                | 2945  | 92,9            | 0,91                                 | 71     | 2,6                  | 7,5              | 3,2                  | 0,075             | 196                  | 69                                | 82       | 58                                         | 71 |
| 200L1-2    | 30      | 51                                            | 41                | 2955  | 93,5            | 0,9                                  | 97     | 2,7                  | 7,5              | 3,1                  | 0,13              | 254                  | 71                                | 85       | 60                                         | 74 |
| 200L2-2    | 37      | 63                                            | 51                | 2955  | 93,8            | 0,9                                  | 120    | 2,8                  | 7,6              | 3,2                  | 0,16              | 278                  | 71                                | 85       | 60                                         | 74 |
| 225M-2     | 45      | 77                                            | 61                | 2960  | 94,2            | 0,9                                  | 145    | 2,7                  | 7,3              | 3                    | 0,24              | 400                  | 72                                | 86       | 60                                         | 74 |
| 250M-2     | 55      | 96                                            | 76                | 2970  | 94,4            | 0,88                                 | 177    | 2,8                  | 7,5              | 3,1                  | 0,4               | 545                  | 75                                | 89       | 64                                         | 78 |
| 280S-2     | 75      | 130                                           | 104               | 2975  | 94,8            | 0,88                                 | 241    | 2,3                  | 7,1              | 2,8                  | 0,65              | 700                  | 76                                | 90       | 66                                         | 80 |
| 280M-2     | 90      | 157                                           | 126               | 2980  | 95,1            | 0,87                                 | 288    | 2,4                  | 7,4              | 2,9                  | 0,78              | 762                  | 76                                | 90       | 66                                         | 80 |
| 315S-2     | 110     | 187                                           | 150               | 2975  | 95,4            | 0,89                                 | 353    | 2,2                  | 7,1              | 2,6                  | 1,4               | 960                  | 76                                | 91       | 66                                         | 81 |
| 315M-2     | 132     | 220                                           | 177               | 2975  | 95,8            | 0,9                                  | 424    | 2,1                  | 6,8              | 2,5                  | 1,6               | 1025                 | 76                                | 91       | 66                                         | 81 |
| 315L1-2    | 160     | 270                                           | 215               | 2980  | 95,9            | 0,9                                  | 514    | 2,4                  | 7,4              | 2,7                  | 1,7               | 1065                 | 76                                | 91       | 66                                         | 81 |
| 315L2-2    | 200     | 335                                           | 265               | 2980  | 96              | 0,9                                  | 614    | 2,3                  | 6,9              | 2,6                  | 2,2               | 1270                 | 76                                | 91       | 66                                         | 81 |
| 315L3-2    | 250     | 410 <sup>1)</sup>                             | 325               | 2980  | 96              | 0,92                                 | 801    | 1,7                  | 7,2              | 2,7                  | 2,8               | 1420                 | 76                                | 91       | 66                                         | 81 |
| 355L1-2    | 315     | 510 <sup>1)</sup>                             | 410 <sup>1)</sup> | 2980  | 96,6            | 0,92                                 | 1009   | 1,5                  | 6,7              | 2,8                  | 4,5               | 1900                 | 81                                | 97       | 68                                         | 84 |
| 355L2-2    | 355     | 570 <sup>1)</sup>                             | 455 <sup>1)</sup> | 2985  | 96,8            | 0,93                                 | 1136   | 1,4                  | 6,9              | 2,7                  | 5                 | 2050                 | 81                                | 97       | 68                                         | 84 |
| CD...      |         | Efficiency according to manufacturer standard |                   |       |                 |                                      |        |                      |                  |                      |                   |                      |                                   |          |                                            |    |
| 355L3-2    | 400     | 640 <sup>1)</sup>                             | 515 <sup>1)</sup> | 2985  | 96,8            | 0,93                                 | 1280   | 1,3                  | 7                | 2,8                  | 5,5               | 2350                 | 81                                | 97       | 68                                         | 84 |
| 400L-2     | 450     | 710 <sup>1)</sup>                             | 570 <sup>1)</sup> | 2990  | 97              | 0,94                                 | 1437   | 1,1                  | 7,2              | 2,8                  | 8,5               | 2910                 | 81                                | 97       | -                                          | -  |

### Notes:

Efficiency according to AS/NZS 1359.5 in the 0.75 kW to 185 kW output range, CD...Y series.  
For inverter data, see page 67

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series.

Temperature class T4,  
ns = 1500 rpm, 2p = 4

| Frame size                                          | Out-put    | Rated current          |                   | Speed<br>n<br>[rpm] | Effi-<br>ciency<br>η<br>[%] | Power<br>factor<br>cos φ | Torque<br>M<br>[Nm] | Start-<br>ing<br>torque<br>M <sub>A</sub> /M <sub>N</sub> | Starting<br>current<br>I <sub>A</sub> /I <sub>N</sub> | Stall-<br>ing<br>torque<br>M <sub>K</sub> /M <sub>N</sub> | Moment<br>of<br>inertia<br>J<br>[kgm²] | Weight <sup>2)</sup><br>m<br>[kg] | Noise levels with<br>radial-flow fan |                           | Noise levels<br>with axial-flow fan<br>Type ...A |                           |
|-----------------------------------------------------|------------|------------------------|-------------------|---------------------|-----------------------------|--------------------------|---------------------|-----------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------|----------------------------------------|-----------------------------------|--------------------------------------|---------------------------|--------------------------------------------------|---------------------------|
|                                                     |            | 400 V<br>I<br>[A]      | 500 V<br>I<br>[A] |                     |                             |                          |                     |                                                           |                                                       |                                                           |                                        |                                   | L <sub>p</sub><br>[dB(A)]            | L <sub>w</sub><br>[dB(A)] | L <sub>p</sub><br>[dB(A)]                        | L <sub>w</sub><br>[dB(A)] |
|                                                     | CD...      | P <sub>2</sub><br>[kW] |                   |                     |                             |                          |                     |                                                           |                                                       |                                                           |                                        |                                   |                                      |                           |                                                  |                           |
| Efficiency according to manufacturer standard       |            |                        |                   |                     |                             |                          |                     |                                                           |                                                       |                                                           |                                        |                                   |                                      |                           |                                                  |                           |
| 63M1-4                                              | 0,12       | 0,43                   | 0,34              | 1445                | 62                          | 0,60                     | 0,79                | 3,9                                                       | 5,6                                                   | 3,9                                                       | 0,00046                                | 16                                | 44                                   | 56                        | -                                                | -                         |
| 63M2-4                                              | 0,18       | 0,53                   | 0,42              | 1415                | 70                          | 0,70                     | 1,21                | 2,7                                                       | 4,7                                                   | 2,7                                                       | 0,00046                                | 16                                | 44                                   | 56                        | -                                                | -                         |
| 71M1-4                                              | 0,25       | 0,66                   | 0,53              | 1370                | 68,5                        | 0,80                     | 1,74                | 2                                                         | 3,9                                                   | 2,3                                                       | 0,00046                                | 16                                | 45                                   | 57                        | -                                                | -                         |
| 71M2-4                                              | 0,37       | 0,94                   | 0,75              | 1380                | 71                          | 0,80                     | 2,56                | 2,2                                                       | 3,9                                                   | 2,3                                                       | 0,00063                                | 17                                | 45                                   | 57                        | -                                                | -                         |
| 80M1-4                                              | 0,55       | 1,38                   | 1,10              | 1380                | 72                          | 0,80                     | 3,8                 | 2                                                         | 3,8                                                   | 2,3                                                       | 0,00092                                | 24                                | 46                                   | 58                        | -                                                | -                         |
| CD...Y3 IE3 Efficiency according to IEC 60034-30    |            |                        |                   |                     |                             |                          |                     |                                                           |                                                       |                                                           |                                        |                                   |                                      |                           |                                                  |                           |
| 80M2-4                                              | 0,75       | 1,68                   | 1,34              | 1445                | 82,6                        | 0,78                     | 5                   | 3,2                                                       | 6,8                                                   | 4,2                                                       | 0,0029                                 | 35                                | 46                                   | 58                        | -                                                | -                         |
| 90S-4                                               | 1,1        | 2,35                   | 1,89              | 1455                | 84,2                        | 0,8                      | 7,2                 | 2,4                                                       | 6,8                                                   | 3,1                                                       | 0,0046                                 | 44                                | 49                                   | 61                        | -                                                | -                         |
| 90L-4                                               | 1,5        | 3,15                   | 2,5               | 1450                | 85,5                        | 0,81                     | 9,9                 | 2,5                                                       | 6,9                                                   | 3,2                                                       | 0,0056                                 | 46                                | 49                                   | 61                        | -                                                | -                         |
| 100L1-4                                             | 2,2        | 4,35                   | 3,45              | 1450                | 87,1                        | 0,84                     | 14,5                | 2,9                                                       | 7,3                                                   | 3,3                                                       | 0,011                                  | 59                                | 52                                   | 64                        | -                                                | -                         |
| 100L2-4                                             | 3          | 5,9                    | 4,7               | 1450                | 87,8                        | 0,84                     | 18,8                | 3,1                                                       | 7,4                                                   | 3,6                                                       | 0,011                                  | 59                                | 52                                   | 64                        | -                                                | -                         |
| 112M-4                                              | 4          | 7,8                    | 6,3               | 1460                | 88,7                        | 0,83                     | 26,2                | 3                                                         | 7,2                                                   | 3,4                                                       | 0,022                                  | 100                               | 54                                   | 66                        | -                                                | -                         |
| 132S-4                                              | 5,5        | 10,4                   | 8,3               | 1460                | 89,6                        | 0,85                     | 36                  | 3,2                                                       | 7,1                                                   | 3,5                                                       | 0,03                                   | 113                               | 57                                   | 70                        | 55                                               | 68                        |
| 132M-4                                              | 7,5        | 13,9                   | 11,1              | 1460                | 90,5                        | 0,86                     | 49                  | 3,1                                                       | 7,4                                                   | 3,3                                                       | 0,041                                  | 125                               | 57                                   | 70                        | 55                                               | 68                        |
| 160M-4                                              | 11         | 20,5                   | 16,3              | 1470                | 91,5                        | 0,85                     | 71                  | 2,8                                                       | 7,1                                                   | 3,1                                                       | 0,079                                  | 184                               | 62                                   | 75                        | 59                                               | 69                        |
| 160L-4                                              | 15         | 28,5                   | 22,5              | 1470                | 92,1                        | 0,83                     | 97                  | 3,1                                                       | 7,4                                                   | 3,4                                                       | 0,092                                  | 208                               | 62                                   | 75                        | 59                                               | 69                        |
| 180M-4                                              | 18,5       | 34,5                   | 28                | 1470                | 92,7                        | 0,83                     | 120                 | 3,3                                                       | 7,4                                                   | 3,4                                                       | 0,155                                  | 217                               | 60                                   | 73                        | 57                                               | 70                        |
| 180L-4                                              | 22         | 41                     | 33                | 1470                | 93,2                        | 0,83                     | 143                 | 3,2                                                       | 7,3                                                   | 3,4                                                       | 0,25                                   | 274                               | 60                                   | 73                        | 57                                               | 70                        |
| 200L-4                                              | 30         | 54                     | 43,5              | 1470                | 93,8                        | 0,85                     | 195                 | 3,1                                                       | 7,6                                                   | 3,3                                                       | 0,25                                   | 274                               | 61                                   | 75                        | 58                                               | 72                        |
| 225S-4                                              | 37         | 67                     | 54                | 1475                | 93,9                        | 0,85                     | 240                 | 3                                                         | 7,1                                                   | 2,9                                                       | 0,4                                    | 372                               | 63                                   | 77                        | 59                                               | 73                        |
| 225M-4                                              | 45         | 80                     | 64                | 1475                | 94,3                        | 0,86                     | 291                 | 3,1                                                       | 7,2                                                   | 3                                                         | 0,48                                   | 402                               | 63                                   | 77                        | 59                                               | 73                        |
| 250M-4                                              | 55         | 95                     | 76                | 1475                | 94,6                        | 0,88                     | 356                 | 3,1                                                       | 7,3                                                   | 3                                                         | 0,75                                   | 588                               | 65                                   | 79                        | 64                                               | 78                        |
| 280S-4                                              | 75         | 134                    | 107               | 1480                | 95,2                        | 0,85                     | 484                 | 3                                                         | 7,4                                                   | 2,8                                                       | 1,25                                   | 740                               | 68                                   | 82                        | 66                                               | 80                        |
| 280M-4                                              | 90         | 160                    | 128               | 1485                | 95,3                        | 0,85                     | 579                 | 3,2                                                       | 7,8                                                   | 3                                                         | 1,48                                   | 820                               | 68                                   | 82                        | 66                                               | 80                        |
| 315S-4                                              | 110        | 198                    | 158               | 1485                | 95,6                        | 0,84                     | 707                 | 2,7                                                       | 6,9                                                   | 2,7                                                       | 2,2                                    | 1040                              | 69                                   | 84                        | 66                                               | 81                        |
| 315M-4                                              | 132        | 235                    | 189               | 1485                | 95,8                        | 0,84                     | 849                 | 2,7                                                       | 7                                                     | 2,7                                                       | 2,7                                    | 1120                              | 69                                   | 84                        | 66                                               | 81                        |
| 315L1-4                                             | 160        | 285                    | 230               | 1490                | 96                          | 0,84                     | 1026                | 2,8                                                       | 7,4                                                   | 2,8                                                       | 3,1                                    | 1210                              | 69                                   | 84                        | 66                                               | 81                        |
| 315L2-4                                             | 200        | 355                    | 285               | 1490                | 96,1                        | 0,85                     | 1286                | 2,6                                                       | 6,9                                                   | 2,6                                                       | 3,9                                    | 1430                              | 69                                   | 84                        | 66                                               | 81                        |
| 315L3-4                                             | 250        | 430 <sup>1)</sup>      | 345               | 1490                | 96,2                        | 0,87                     | 1602                | 1,7                                                       | 7,3                                                   | 2,7                                                       | 4,6                                    | 1565                              | 69                                   | 84                        | 66                                               | 81                        |
| 355L1-4                                             | 315        | 525 <sup>1)</sup>      | 420 <sup>1)</sup> | 1490                | 96,3                        | 0,90                     | 2019                | 1,5                                                       | 6,9                                                   | 2,7                                                       | 6,1                                    | 2050                              | 72                                   | 88                        | 68                                               | 84                        |
| 355L2-4                                             | 355        | 590 <sup>1)</sup>      | 470 <sup>1)</sup> | 1490                | 96,6                        | 0,90                     | 2275                | 1,6                                                       | 6,9                                                   | 2,8                                                       | 6,7                                    | 2200                              | 72                                   | 88                        | 68                                               | 84                        |
| CD... Efficiency according to manufacturer standard |            |                        |                   |                     |                             |                          |                     |                                                           |                                                       |                                                           |                                        |                                   |                                      |                           |                                                  |                           |
| 355L3-4                                             | 400        | 665 <sup>1)</sup>      | 530 <sup>1)</sup> | 1490                | 97                          | 0,90                     | 2564                | 1,5                                                       | 7                                                     | 2,8                                                       | 7,4                                    | 2430                              | 72                                   | 88                        | 68                                               | 84                        |
| 400M-4                                              | 450        | 735 <sup>1)</sup>      | 590 <sup>1)</sup> | 1495                | 97                          | 0,91                     | 2875                | 1,1                                                       | 7,3                                                   | 2,7                                                       | 18                                     | 2850                              | 78                                   | 94                        | -                                                | -                         |
| 400L-4                                              | 500        | 815 <sup>1)</sup>      | 655 <sup>1)</sup> | 1495                | 97,1                        | 0,91                     | 3194                | 1,1                                                       | 7,3                                                   | 2,7                                                       | 20                                     | 3230                              | 78                                   | 94                        | -                                                | -                         |
| 450M-4                                              | 560        | 915 <sup>1)</sup>      | 730 <sup>1)</sup> | 1495                | 97,2                        | 0,91                     | 3577                | 1                                                         | 6,8                                                   | 2,7                                                       | 26                                     | 3500                              | 79                                   | 95                        | -                                                | -                         |
| 450L-4                                              | 630        | 1025 <sup>1)</sup>     | 820 <sup>1)</sup> | 1495                | 97,4                        | 0,91                     | 4024                | 1                                                         | 6,8                                                   | 2,7                                                       | 31                                     | 3800                              | 79                                   | 95                        | -                                                | -                         |
| 500...                                              | on request |                        |                   |                     |                             |                          |                     |                                                           |                                                       |                                                           |                                        |                                   |                                      |                           |                                                  |                           |

#### Notes:

Efficiency according to AS/NZS 1359.5 in the 0.75 kW to 185 kW output range, CD...Y series.  
For inverter data, see page 67.

1) Two parallel cables are required in each case

2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# IE3 / MEPS

## Mains Operation 50 Hz

Temperature class T4,  
ns = 1000 rpm, 2p = 6

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| Frame size                                       | Out-put    | Rated current at  |                   | Speed | Effi-<br>cien-<br>cy | Power factor | Torque | Start-<br>ing torque | Starting current | Stall-<br>ing torque | Moment of inertia | Weight <sup>2)</sup> | Noise levels with radial-flow fan |          |
|--------------------------------------------------|------------|-------------------|-------------------|-------|----------------------|--------------|--------|----------------------|------------------|----------------------|-------------------|----------------------|-----------------------------------|----------|
|                                                  |            | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] |       |                      |              |        |                      |                  |                      |                   |                      | n<br>[rpm]                        | η<br>[%] |
| CD...                                            |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |
| Efficiency according to manufacturer standard    |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |
| 71M2-6                                           | 0,25       | 0,82              | 0,66              | 920   | 62                   | 0,71         | 2,6    | 2,2                  | 3,5              | 2,6                  | 0,0012            | 17                   | 44                                | 56       |
| 80M1-6                                           | 0,37       | 1,12              | 0,90              | 925   | 67                   | 0,71         | 3,8    | 2,5                  | 4,1              | 2,8                  | 0,0019            | 24                   | 44                                | 56       |
| 80M2-6                                           | 0,55       | 1,6               | 1,28              | 925   | 69                   | 0,72         | 5,7    | 2,4                  | 4                | 2,7                  | 0,0025            | 25                   | 44                                | 56       |
| CD...Y3 IE3 Efficiency according to IEC 60034-30 |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |
| 90S-6                                            | 0,75       | 1,96              | 1,56              | 955   | 79,1                 | 0,70         | 7,5    | 2,7                  | 5,5              | 3,1                  | 0,0080            | 44                   | 47                                | 59       |
| 90L-6                                            | 1,1        | 2,7               | 2,15              | 955   | 81,4                 | 0,72         | 11     | 2,8                  | 5,9              | 3,1                  | 0,0095            | 46                   | 47                                | 59       |
| 100L-6                                           | 1,5        | 3,65              | 2,9               | 965   | 83,5                 | 0,71         | 14,8   | 3                    | 6,8              | 3,3                  | 0,017             | 59                   | 50                                | 62       |
| 112M-6                                           | 2,2        | 4,75              | 3,8               | 965   | 85,5                 | 0,78         | 21,8   | 2,6                  | 6,8              | 3,1                  | 0,031             | 100                  | 53                                | 65       |
| 132S-6                                           | 3          | 6,8               | 5,5               | 970   | 85,7                 | 0,74         | 29,5   | 3,2                  | 7,1              | 3,7                  | 0,031             | 100                  | 56                                | 69       |
| 132M1-6                                          | 4          | 8,7               | 7                 | 965   | 87                   | 0,76         | 39,6   | 2,9                  | 6,9              | 3,7                  | 0,037             | 104                  | 56                                | 69       |
| 132M2-6                                          | 5,5        | 11,1              | 8,9               | 965   | 88,3                 | 0,81         | 54     | 2,7                  | 7,2              | 3,4                  | 0,048             | 117                  | 56                                | 69       |
| 160M-6                                           | 7,5        | 14,4              | 11,5              | 970   | 89,4                 | 0,84         | 74     | 2,8                  | 7,5              | 3,8                  | 0,12              | 190                  | 58                                | 71       |
| 160L-6                                           | 11         | 21                | 16,7              | 975   | 90,5                 | 0,84         | 108    | 3                    | 7,6              | 3,9                  | 0,14              | 220                  | 58                                | 71       |
| 180L-6                                           | 15         | 29                | 23                | 975   | 91,5                 | 0,82         | 147    | 2,7                  | 7,4              | 3,8                  | 0,19              | 215                  | 58                                | 71       |
| 200L1-6                                          | 18,5       | 35                | 28                | 975   | 92                   | 0,83         | 181    | 2,5                  | 7                | 3,5                  | 0,28              | 270                  | 58                                | 71       |
| 200L2-6                                          | 22         | 41                | 32,5              | 975   | 92,4                 | 0,84         | 215    | 2,2                  | 6,9              | 3,2                  | 0,31              | 280                  | 58                                | 72       |
| 225M-6                                           | 30         | 56                | 45                | 985   | 93                   | 0,83         | 291    | 3                    | 6,9              | 2,7                  | 0,69              | 404                  | 58                                | 72       |
| 250M-6                                           | 37         | 69                | 55                | 985   | 93,5                 | 0,83         | 359    | 3                    | 6,8              | 2,7                  | 1,03              | 570                  | 58                                | 76       |
| 280S-6                                           | 45         | 84                | 67                | 990   | 93,9                 | 0,82         | 434    | 2,8                  | 6,6              | 2,4                  | 1,35              | 720                  | 62                                | 77       |
| 280M-6                                           | 55         | 104               | 83                | 985   | 94,4                 | 0,81         | 533    | 2,8                  | 6,5              | 2,4                  | 1,7               | 770                  | 62                                | 77       |
| 315S-6                                           | 75         | 130               | 104               | 990   | 94,9                 | 0,88         | 723    | 3                    | 7,2              | 2,7                  | 4,3               | 995                  | 65                                | 79       |
| 315M-6                                           | 90         | 155               | 124               | 990   | 95,2                 | 0,88         | 868    | 3,2                  | 7,7              | 2,8                  | 5                 | 1050                 | 65                                | 79       |
| 315L1-6                                          | 110        | 189               | 151               | 990   | 95,5                 | 0,88         | 1061   | 3,3                  | 7,8              | 2,8                  | 6                 | 1145                 | 69                                | 84       |
| 315L2-6                                          | 132        | 225               | 181               | 990   | 95,6                 | 0,88         | 1273   | 3,2                  | 7,7              | 2,8                  | 7,3               | 1265                 | 69                                | 84       |
| 315L3-6                                          | 160        | 275               | 220               | 990   | 95,8                 | 0,88         | 1543   | 3,3                  | 7,8              | 2,8                  | 8,3               | 1440                 | 69                                | 84       |
| 355M-6                                           | 200        | 345               | 275               | 990   | 95,9                 | 0,87         | 1929   | 1,8                  | 6,7              | 2,7                  | 11,3              | 1750                 | 74                                | 90       |
| 355L1-6                                          | 250        | 430 <sup>1)</sup> | 345               | 990   | 95,9                 | 0,88         | 2411   | 1,8                  | 6,7              | 2,7                  | 13,8              | 1950                 | 74                                | 90       |
| 355L2-6                                          | 315        | 540 <sup>1)</sup> | 430 <sup>1)</sup> | 990   | 96                   | 0,88         | 3039   | 1,7                  | 6,9              | 2,6                  | 17,6              | 2300                 | 74                                | 90       |
| 400M-6                                           | 355        | 595 <sup>1)</sup> | 475 <sup>1)</sup> | 994   | 96,6                 | 0,89         | 3411   | 1,1                  | 6,6              | 2,7                  | 27                | 2850                 | 78                                | 94       |
| CD...                                            |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |
| Efficiency according to manufacturer standard    |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |
| 400L-6                                           | 400        | 670 <sup>1)</sup> | 535 <sup>1)</sup> | 994   | 96,6                 | 0,89         | 3843   | 1,1                  | 6,8              | 2,6                  | 31                | 3230                 | 78                                | 94       |
| 450M-6                                           | 450        | 755 <sup>1)</sup> | 605 <sup>1)</sup> | 995   | 96,6                 | 0,89         | 4319   | 1,2                  | 6,8              | 2,8                  | 46                | 3500                 | 78                                | 94       |
| 450L-6                                           | 500        | 835 <sup>1)</sup> | 670 <sup>1)</sup> | 995   | 97                   | 0,89         | 4799   | 1,1                  | 6,8              | 2,7                  | 51                | 3800                 | 78                                | 94       |
| 500...                                           | on request |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |

### Notes:

Efficiency according to AS/NZS 1359.5 in the 0.75 kW to 185 kW output range, CD...Y series.  
For inverter data, see page 67.

1) Two parallel cables are required in each case

2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series.

# MEPS

## Mains Operation 50 Hz

Temperature class T4,  
ns = 750 rpm, 2p = 8

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| Frame size                                    | Out-put    | Rated current at  |                   | Speed | Effi-<br>cien-<br>cy | Power factor | Torque | Start-<br>ing torque | Starting current | Stall-<br>ing torque | Moment of inertia | Weight <sup>2)</sup> | Noise levels with radial-flow fan |          |       |
|-----------------------------------------------|------------|-------------------|-------------------|-------|----------------------|--------------|--------|----------------------|------------------|----------------------|-------------------|----------------------|-----------------------------------|----------|-------|
|                                               |            | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] |       |                      |              |        |                      |                  |                      |                   |                      | n<br>[rpm]                        | η<br>[%] | cos φ |
| CD...                                         |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |
| Efficiency according to manufacturer standard |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |
| 71M2-8                                        | 0,12       | 0,52              | 0,42              | 680   | 51                   | 0,65         | 1,7    | 1,9                  | 2,6              | 2,4                  | 0,0012            | 17                   | 41                                | 53       |       |
| 80M1-8                                        | 0,18       | 0,66              | 0,52              | 690   | 61                   | 0,65         | 2,5    | 2,2                  | 3,2              | 2,6                  | 0,0019            | 24                   | 42                                | 54       |       |
| 80M2-8                                        | 0,25       | 0,91              | 0,73              | 690   | 62                   | 0,64         | 3,5    | 2,2                  | 3,2              | 2,5                  | 0,0025            | 25                   | 42                                | 54       |       |
| 90S-8                                         | 0,37       | 1,30              | 1,04              | 690   | 63                   | 0,65         | 5,1    | 1,8                  | 3                | 2,2                  | 0,0033            | 31                   | 46                                | 58       |       |
| 90L-8                                         | 0,55       | 1,85              | 1,48              | 690   | 67                   | 0,65         | 7,6    | 1,8                  | 3,1              | 2,2                  | 0,0046            | 35                   | 46                                | 58       |       |
| CD...Y                                        |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |
| Efficiency according to AS/NZS 1359,5         |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |
| 100L1-8                                       | 0,75       | 2,2               | 1,76              | 720   | 77                   | 0,64         | 9,9    | 2,3                  | 5                | 2,9                  | 0,017             | 59                   | 49                                | 61       |       |
| 100L2-8                                       | 1,1        | 3,0               | 2,4               | 715   | 78                   | 0,68         | 14,7   | 2,2                  | 4,8              | 2,7                  | 0,017             | 59                   | 49                                | 61       |       |
| 112M-8                                        | 1,5        | 3,55              | 2,85              | 705   | 80,6                 | 0,76         | 20,3   | 2                    | 4,9              | 2,6                  | 0,029             | 97                   | 52                                | 64       |       |
| 132S-8                                        | 2,2        | 5,4               | 4,35              | 710   | 81,2                 | 0,72         | 29,6   | 2,3                  | 5,4              | 2,7                  | 0,029             | 97                   | 53                                | 66       |       |
| 132M-8                                        | 3          | 7,3               | 5,8               | 715   | 82,9                 | 0,72         | 40     | 2,7                  | 6,3              | 3,1                  | 0,036             | 113                  | 53                                | 66       |       |
| 160M1-8                                       | 4          | 8,8               | 7                 | 725   | 85,5                 | 0,77         | 53     | 1,9                  | 5,6              | 2,6                  | 0,071             | 157                  | 54                                | 67       |       |
| 160M2-8                                       | 5,5        | 12                | 9,6               | 725   | 87,1                 | 0,76         | 72     | 2,3                  | 6                | 3,1                  | 0,105             | 170                  | 54                                | 67       |       |
| 160L-8                                        | 7,5        | 16,6              | 13,3              | 725   | 87,9                 | 0,74         | 99     | 2,4                  | 6,1              | 3,2                  | 0,136             | 190                  | 54                                | 67       |       |
| 180L-8                                        | 11         | 23                | 18,3              | 725   | 89,2                 | 0,78         | 145    | 2,6                  | 6,9              | 3,3                  | 0,22              | 215                  | 56                                | 69       |       |
| 200L-8                                        | 15         | 31                | 25                | 730   | 90,3                 | 0,77         | 196    | 2,4                  | 7,1              | 3,3                  | 0,4               | 280                  | 56                                | 70       |       |
| 225S-8                                        | 18,5       | 37,5              | 30                | 735   | 91,1                 | 0,78         | 240    | 2,3                  | 7,1              | 3,1                  | 0,56              | 372                  | 57                                | 71       |       |
| 225M-8                                        | 22         | 44,5              | 35,5              | 735   | 91,5                 | 0,78         | 286    | 2,4                  | 7,2              | 3,4                  | 0,69              | 404                  | 57                                | 71       |       |
| 250M-8                                        | 30         | 57                | 45,5              | 735   | 92,5                 | 0,82         | 390    | 2                    | 6,8              | 2,8                  | 1,2               | 550                  | 58                                | 72       |       |
| 280S-8                                        | 37         | 70                | 56                | 735   | 92,9                 | 0,82         | 481    | 2                    | 6,5              | 2,9                  | 1,9               | 740                  | 61                                | 75       |       |
| 280M-8                                        | 45         | 85                | 68                | 740   | 93,2                 | 0,82         | 581    | 2,2                  | 6,7              | 2,9                  | 2,3               | 800                  | 61                                | 75       |       |
| 315S-8                                        | 55         | 106               | 84                | 740   | 94                   | 0,8          | 710    | 2                    | 7,1              | 2,7                  | 4,3               | 995                  | 68                                | 83       |       |
| 315M-8                                        | 75         | 143               | 115               | 740   | 94,5                 | 0,8          | 968    | 2                    | 7                | 2,7                  | 5                 | 1050                 | 68                                | 83       |       |
| 315L1-8                                       | 90         | 171               | 137               | 740   | 94,9                 | 0,8          | 1161   | 2,1                  | 7,2              | 2,8                  | 6                 | 1145                 | 68                                | 83       |       |
| 315L2-8                                       | 110        | 205               | 165               | 740   | 95,2                 | 0,81         | 1420   | 2                    | 7,1              | 2,7                  | 7,3               | 1265                 | 68                                | 83       |       |
| 315L3-8                                       | 132        | 250               | 200               | 740   | 95,4                 | 0,8          | 1704   | 2,1                  | 7,3              | 2,8                  | 8,3               | 1440                 | 68                                | 83       |       |
| 355M-8                                        | 160        | 295               | 235               | 745   | 95,8                 | 0,82         | 2051   | 1,9                  | 7,2              | 2,7                  | 11,4              | 1750                 | 70                                | 86       |       |
| CD...                                         |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |
| Efficiency according to manufacturer standard |            |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |
| 355L1-8                                       | 200        | 370               | 295               | 745   | 95,8                 | 0,82         | 2564   | 1,7                  | 6,6              | 2,5                  | 13,9              | 1950                 | 70                                | 86       |       |
| 355L2-8                                       | 250        | 460 <sup>1)</sup> | 370               | 745   | 95,8                 | 0,82         | 3205   | 1,2                  | 6,1              | 2,4                  | 17,7              | 2300                 | 70                                | 86       |       |
| 400M-8                                        | 315        | 570 <sup>1)</sup> | 455 <sup>1)</sup> | 745   | 96,2                 | 0,83         | 4038   | 1,2                  | 6,2              | 2,4                  | 30                | 3100                 | 73                                | 89       |       |
| 400L-8                                        | 355        | 640 <sup>1)</sup> | 515 <sup>1)</sup> | 745   | 96,3                 | 0,83         | 4551   | 1                    | 6,1              | 2,36                 | 34                | 3440                 | 73                                | 89       |       |
| 450M-8                                        | 400        | 710 <sup>1)</sup> | 570 <sup>1)</sup> | 745   | 96,6                 | 0,84         | 5128   | 1                    | 6,1              | 2,2                  | 51                | 3750                 | 74                                | 90       |       |
| 450L-8                                        | 450        | 800 <sup>1)</sup> | 640 <sup>1)</sup> | 745   | 96,7                 | 0,84         | 5768   | 1                    | 6,1              | 2,2                  | 57                | 4050                 | 74                                | 90       |       |
| 500...                                        | on request |                   |                   |       |                      |              |        |                      |                  |                      |                   |                      |                                   |          |       |

### Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series.  
For inverter data, see page 65.

# IE1

## Partial Load Data 50 Hz

76

Efficiency [%]

| Frame size | 2p = 2<br>P / P <sub>N</sub> |      |      |      | 2p = 4<br>P / P <sub>N</sub> |      |      |      | 2p = 6<br>P / P <sub>N</sub> |      |      |      | 2p = 8<br>P / P <sub>N</sub> |      |      |      |
|------------|------------------------------|------|------|------|------------------------------|------|------|------|------------------------------|------|------|------|------------------------------|------|------|------|
| CD...      | 0,25                         | 0,5  | 0,75 | 1    | 0,25                         | 0,5  | 0,75 | 1    | 0,25                         | 0,5  | 0,75 | 1    | 0,25                         | 0,5  | 0,75 | 1    |
| 63M1       | 38                           | 53   | 62   | 66   | 40                           | 55   | 63   | 67   | -                            | -    | -    | -    | -                            | -    | -    | -    |
| 63M2       | 46                           | 61   | 67   | 70   | 50                           | 63   | 68   | 70   | -                            | -    | -    | -    | -                            | -    | -    | -    |
| 71M1       | 53                           | 65   | 71   | 71,5 | 56                           | 67   | 69   | 68,5 | -                            | -    | -    | -    | -                            | -    | -    | -    |
| 71M2       | 54                           | 67   | 71,5 | 72   | 60                           | 70   | 72   | 71   | 38                           | 53   | 60   | 62   | 27                           | 41   | 48   | 51   |
| 80M1       | 58                           | 69   | 74   | 74,5 | 62                           | 71   | 73   | 72   | 44                           | 60   | 65   | 67   | 37                           | 52,5 | 58,5 | 61   |
| 80M2       | 63                           | 74   | 78   | 78   | 64                           | 75   | 76,5 | 75,5 | 49                           | 64   | 68,5 | 69   | 38                           | 53   | 59   | 62   |
| 90S        | 64                           | 75   | 77   | 77,8 | 64                           | 74   | 76,5 | 76   | 54                           | 67   | 70   | 70,2 | 39                           | 54   | 61   | 63   |
| 90L        | 68                           | 78,5 | 81   | 82   | 67,5                         | 77,5 | 79,5 | 79   | 55                           | 68,5 | 72,7 | 73   | 46                           | 61   | 66,5 | 67   |
| 100L1      | -                            | -    | -    | -    | 65                           | 77   | 79,5 | 80   | -                            | -    | -    | -    | 47                           | 62   | 68,5 | 71   |
| 100L/L2    | 69                           | 79,5 | 81,5 | 82   | 68                           | 78,5 | 81,5 | 81,7 | 61,5                         | 73   | 76,8 | 77   | 53                           | 65,5 | 69,3 | 69   |
| 112M       | 75                           | 84   | 85,5 | 85   | 75                           | 83   | 85,2 | 85   | 68                           | 77,5 | 80,5 | 81   | 62                           | 73,5 | 77   | 78   |
| 132S/S1    | 70                           | 81   | 84,5 | 85,5 | 77                           | 85   | 86,8 | 86,5 | 71,6                         | 80,1 | 82,5 | 82,6 | 68,5                         | 78,7 | 81   | 80   |
| 132S2      | 74                           | 83,5 | 86   | 86,5 | -                            | -    | -    | -    | -                            | -    | -    | -    | -                            | -    | -    | -    |
| 132M/M1    | -                            | -    | -    | -    | 79,5                         | 87   | 88,3 | 88   | 72,1                         | 81   | 83,5 | 83,6 | 69                           | 79   | 81,4 | 81   |
| 132M2      | -                            | -    | -    | -    | -                            | -    | -    | -    | 76,8                         | 84   | 84,7 | 84,6 | -                            | -    | -    | -    |
| 160M/M1    | 76                           | 86   | 88,5 | 89   | 81,5                         | 87,7 | 89,7 | 89,5 | 77,3                         | 84,2 | 86,1 | 86,1 | 72,5                         | 82   | 84,9 | 85   |
| 160M2      | 81                           | 87,5 | 89   | 89   | -                            | -    | -    | -    | -                            | -    | -    | -    | 73,5                         | 82,5 | 85,2 | 85   |
| 160L       | 83,5                         | 89,5 | 90,7 | 90,5 | 83,7                         | 89,3 | 90,3 | 90   | 81,5                         | 87   | 88   | 87,5 | 77                           | 84,8 | 86,5 | 86,5 |
| 180M       | 86,6                         | 91   | 91,5 | 91,2 | 85,8                         | 90,8 | 91,5 | 91   | -                            | -    | -    | -    | -                            | -    | -    | -    |
| 180L       | -                            | -    | -    | -    | 88,2                         | 91,3 | 91,8 | 91,5 | 82,6                         | 88,8 | 89,3 | 89,1 | 82                           | 88,3 | 89,5 | 89   |
| 200L/L1    | 85,6                         | 90,7 | 92,1 | 92   | 88,2                         | 92,3 | 92,5 | 92,2 | 86,2                         | 89,7 | 90   | 89,7 | 85,5                         | 89,5 | 90   | 89,5 |
| 200L2      | 86                           | 91,8 | 92,5 | 92,5 | -                            | -    | -    | -    | 85,5                         | 89,6 | 90,4 | 90,4 | -                            | -    | -    | -    |
| 225S       | -                            | -    | -    | -    | 87,9                         | 92   | 92,7 | 92,6 | -                            | -    | -    | -    | 82,5                         | 88,7 | 90   | 90   |
| 225M       | 86                           | 91,5 | 92,7 | 92,8 | 88,1                         | 92,2 | 92,9 | 92,8 | 86,5                         | 90,7 | 91,3 | 90,9 | 84,3                         | 89,8 | 91,2 | 91   |
| 250M       | 86,3                         | 91,8 | 93,1 | 93,2 | 89,8                         | 92,9 | 93,3 | 93,2 | 86,5                         | 90,9 | 91,6 | 91,4 | 88                           | 92   | 92,7 | 92,5 |
| 280S       | 87,6                         | 92,3 | 93,4 | 93,6 | 90                           | 93,3 | 94   | 93,8 | 87,4                         | 91,8 | 92,5 | 92,4 | 88                           | 92   | 92,5 | 92,8 |
| 280M       | 88                           | 92,5 | 93,7 | 93,8 | 90,1                         | 93,4 | 94,1 | 94   | 87,6                         | 92   | 92,6 | 92,5 | 88,1                         | 92,3 | 93   | 92,8 |
| 315S       | 91,6                         | 93,9 | 94,3 | 94   | 90,9                         | 93,5 | 94,3 | 94,2 | 90                           | 92,8 | 93,4 | 93   | 88                           | 92   | 92,9 | 92,5 |
| 315M       | 91,3                         | 93,8 | 94,2 | 94,3 | 90,9                         | 93,6 | 94,5 | 94,4 | 90,1                         | 93   | 93,6 | 93,3 | 88,5                         | 92,5 | 93,4 | 93   |
| 315L1      | 91,7                         | 94   | 94,3 | 94,5 | 91,2                         | 94,1 | 94,9 | 94,7 | 90,6                         | 93,3 | 94   | 93,6 | 89                           | 92,8 | 93,5 | 93,2 |
| 315L2      | 91,9                         | 94,1 | 94,5 | 94,7 | 91,5                         | 94,2 | 95   | 94,9 | 91,1                         | 93,6 | 94,2 | 93,8 | 89,5                         | 93   | 93,6 | 93,2 |
| 315L3      | 92                           | 95,1 | 95,8 | 96   | 92,3                         | 95,2 | 96,2 | 96,2 | 91,6                         | 94,2 | 94,6 | 94,3 | 90                           | 93,2 | 93,8 | 93,4 |
| 355M       | -                            | -    | -    | -    | -                            | -    | -    | -    | 92,3                         | 94,8 | 95   | 94,8 | 91                           | 94,5 | 95   | 95,1 |
| 355L1      | 93                           | 96,5 | 96,8 | 96,6 | 93                           | 96   | 96,5 | 96,3 | 93,2                         | 95,7 | 96,1 | 95,9 | 91,7                         | 95   | 95,7 | 95,8 |
| 355L2      | 93,3                         | 95,7 | 96,8 | 96,8 | 93,2                         | 96,2 | 96,6 | 96,6 | 93,3                         | 95,8 | 96,1 | 96   | 91,7                         | 95   | 95,8 | 95,8 |
| 355L3      | 93,2                         | 95,7 | 96,9 | 96,8 | 93,6                         | 96,5 | 97,1 | 97   | -                            | -    | -    | -    | -                            | -    | -    | -    |
| 400M       | -                            | -    | -    | -    | 93,9                         | 96,4 | 96,9 | 97   | 94,3                         | 96,4 | 96,8 | 96,6 | 94                           | 95,8 | 96,3 | 96,2 |
| 400L       | 93,7                         | 96,2 | 97   | 97   | 94,4                         | 96,6 | 97,1 | 97,1 | 94,1                         | 96,3 | 96,8 | 96,6 | 93,5                         | 95,7 | 96,3 | 96,3 |
| 450M       | -                            | -    | -    | -    | 93,8                         | 96,3 | 97,1 | 97,2 | 93,5                         | 96,4 | 96,6 | 96,6 | 94,1                         | 96,3 | 96,7 | 96,6 |
| 450L       | -                            | -    | -    | -    | 95,1                         | 97   | 97,4 | 97,4 | 94,8                         | 96,8 | 97,1 | 97   | 94,5                         | 96,4 | 96,8 | 96,7 |

| Frame size | 2p = 2<br>P / P <sub>N</sub> |      |      |             | 2p = 4<br>P / P <sub>N</sub> |      |      |             | 2p = 6<br>P / P <sub>N</sub> |      |      |             | 2p = 8<br>P / P <sub>N</sub> |      |      |             |
|------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|
| CD...      | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           |
| 63M1       | 0,38                         | 0,50 | 0,60 | <b>0,67</b> | 0,31                         | 0,42 | 0,52 | <b>0,60</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 63M2       | 0,41                         | 0,56 | 0,67 | <b>0,75</b> | 0,35                         | 0,49 | 0,61 | <b>0,70</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 71M1       | 0,49                         | 0,65 | 0,78 | <b>0,84</b> | 0,42                         | 0,62 | 0,73 | <b>0,80</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 71M2       | 0,48                         | 0,64 | 0,76 | <b>0,82</b> | 0,42                         | 0,62 | 0,73 | <b>0,80</b> | 0,36                         | 0,49 | 0,61 | <b>0,71</b> | 0,36                         | 0,46 | 0,56 | <b>0,65</b> |
| 80M1       | 0,53                         | 0,70 | 0,80 | <b>0,84</b> | 0,43                         | 0,62 | 0,74 | <b>0,80</b> | 0,33                         | 0,48 | 0,61 | <b>0,71</b> | 0,34                         | 0,46 | 0,56 | <b>0,65</b> |
| 80M2       | 0,45                         | 0,67 | 0,78 | <b>0,82</b> | 0,42                         | 0,61 | 0,72 | <b>0,79</b> | 0,36                         | 0,52 | 0,64 | <b>0,72</b> | 0,31                         | 0,43 | 0,53 | <b>0,64</b> |
| 90S        | 0,48                         | 0,69 | 0,80 | <b>0,86</b> | 0,46                         | 0,66 | 0,77 | <b>0,83</b> | 0,37                         | 0,55 | 0,67 | <b>0,75</b> | 0,31                         | 0,44 | 0,56 | <b>0,65</b> |
| 90L        | 0,48                         | 0,69 | 0,79 | <b>0,85</b> | 0,45                         | 0,65 | 0,77 | <b>0,82</b> | 0,35                         | 0,52 | 0,64 | <b>0,73</b> | 0,30                         | 0,44 | 0,57 | <b>0,65</b> |
| 100L1      | -                            | -    | -    | -           | 0,39                         | 0,60 | 0,72 | <b>0,80</b> | -                            | -    | -    | -           | 0,32                         | 0,44 | 0,56 | <b>0,66</b> |
| 100L/L2    | 0,50                         | 0,70 | 0,80 | <b>0,87</b> | 0,39                         | 0,44 | 0,65 | <b>0,76</b> | 0,35                         | 0,54 | 0,67 | <b>0,75</b> | 0,35                         | 0,50 | 0,64 | <b>0,73</b> |
| 112M       | 0,59                         | 0,78 | 0,85 | <b>0,88</b> | 0,44                         | 0,65 | 0,77 | <b>0,84</b> | 0,36                         | 0,54 | 0,66 | <b>0,75</b> | 0,30                         | 0,47 | 0,56 | <b>0,67</b> |
| 132S/S1    | 0,56                         | 0,76 | 0,84 | <b>0,87</b> | 0,50                         | 0,70 | 0,80 | <b>0,85</b> | 0,37                         | 0,57 | 0,69 | <b>0,78</b> | 0,41                         | 0,60 | 0,72 | <b>0,79</b> |
| 132S2      | 0,55                         | 0,75 | 0,83 | <b>0,87</b> | -                            | -    | -    | -           | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 132M/M1    | -                            | -    | -    | -           | 0,51                         | 0,72 | 0,81 | <b>0,86</b> | 0,38                         | 0,57 | 0,72 | <b>0,79</b> | 0,39                         | 0,58 | 0,70 | <b>0,77</b> |
| 132M2      | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,41                         | 0,62 | 0,75 | <b>0,81</b> | -                            | -    | -    | -           |
| 160M/M1    | 0,62                         | 0,80 | 0,86 | <b>0,89</b> | 0,51                         | 0,72 | 0,81 | <b>0,85</b> | 0,49                         | 0,70 | 0,80 | <b>0,85</b> | 0,41                         | 0,61 | 0,72 | <b>0,78</b> |
| 160M2      | 0,71                         | 0,86 | 0,90 | <b>0,91</b> | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,39                         | 0,59 | 0,71 | <b>0,77</b> |
| 160L       | 0,72                         | 0,87 | 0,91 | <b>0,92</b> | 0,56                         | 0,76 | 0,83 | <b>0,86</b> | 0,53                         | 0,73 | 0,82 | <b>0,86</b> | 0,37                         | 0,58 | 0,70 | <b>0,77</b> |
| 180M       | 0,72                         | 0,86 | 0,89 | <b>0,92</b> | 0,51                         | 0,73 | 0,81 | <b>0,84</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 180L       | -                            | -    | -    | -           | 0,53                         | 0,74 | 0,81 | <b>0,84</b> | 0,48                         | 0,70 | 0,79 | <b>0,84</b> | 0,39                         | 0,61 | 0,74 | <b>0,79</b> |
| 200L/L1    | 0,65                         | 0,83 | 0,88 | <b>0,90</b> | 0,60                         | 0,79 | 0,86 | <b>0,88</b> | 0,51                         | 0,72 | 0,80 | <b>0,84</b> | 0,40                         | 0,60 | 0,74 | <b>0,80</b> |
| 200L2      | 0,68                         | 0,85 | 0,89 | <b>0,91</b> | -                            | -    | -    | -           | 0,5                          | 0,71 | 0,82 | <b>0,85</b> | -                            | -    | -    | -           |
| 225S       | -                            | -    | -    | -           | 0,63                         | 0,82 | 0,87 | <b>0,88</b> | -                            | -    | -    | -           | 0,40                         | 0,62 | 0,73 | <b>0,79</b> |
| 225M       | 0,65                         | 0,84 | 0,88 | <b>0,89</b> | 0,62                         | 0,81 | 0,86 | <b>0,88</b> | 0,52                         | 0,72 | 0,81 | <b>0,84</b> | 0,39                         | 0,61 | 0,73 | <b>0,79</b> |
| 250M       | 0,70                         | 0,88 | 0,89 | <b>0,89</b> | 0,64                         | 0,82 | 0,88 | <b>0,89</b> | 0,53                         | 0,74 | 0,81 | <b>0,84</b> | 0,47                         | 0,69 | 0,78 | <b>0,82</b> |
| 280S       | 0,69                         | 0,85 | 0,89 | <b>0,89</b> | 0,62                         | 0,80 | 0,85 | <b>0,86</b> | 0,53                         | 0,74 | 0,8  | <b>0,83</b> | 0,45                         | 0,66 | 0,77 | <b>0,82</b> |
| 280M       | 0,72                         | 0,88 | 0,90 | <b>0,90</b> | 0,62                         | 0,80 | 0,85 | <b>0,86</b> | 0,53                         | 0,74 | 0,81 | <b>0,82</b> | 0,45                         | 0,68 | 0,78 | <b>0,82</b> |
| 315S       | 0,74                         | 0,87 | 0,89 | <b>0,89</b> | 0,62                         | 0,80 | 0,84 | <b>0,85</b> | 0,58                         | 0,78 | 0,85 | <b>0,87</b> | 0,46                         | 0,68 | 0,78 | <b>0,83</b> |
| 315M       | 0,75                         | 0,87 | 0,89 | <b>0,89</b> | 0,62                         | 0,80 | 0,84 | <b>0,85</b> | 0,62                         | 0,81 | 0,87 | <b>0,88</b> | 0,47                         | 0,69 | 0,79 | <b>0,83</b> |
| 315L1      | 0,73                         | 0,87 | 0,90 | <b>0,90</b> | 0,59                         | 0,79 | 0,85 | <b>0,86</b> | 0,60                         | 0,80 | 0,86 | <b>0,88</b> | 0,47                         | 0,68 | 0,79 | <b>0,83</b> |
| 315L2      | 0,75                         | 0,87 | 0,90 | <b>0,90</b> | 0,58                         | 0,78 | 0,85 | <b>0,86</b> | 0,62                         | 0,81 | 0,86 | <b>0,88</b> | 0,47                         | 0,68 | 0,78 | <b>0,82</b> |
| 315L3      | 0,79                         | 0,87 | 0,91 | <b>0,92</b> | 0,64                         | 0,80 | 0,85 | <b>0,87</b> | 0,61                         | 0,8  | 0,86 | <b>0,88</b> | 0,48                         | 0,69 | 0,78 | <b>0,82</b> |
| 355M       | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,60                         | 0,80 | 0,86 | <b>0,88</b> | 0,45                         | 0,67 | 0,78 | <b>0,83</b> |
| 355L1      | 0,83                         | 0,91 | 0,92 | <b>0,92</b> | 0,67                         | 0,84 | 0,89 | <b>0,90</b> | 0,61                         | 0,81 | 0,85 | <b>0,88</b> | 0,46                         | 0,67 | 0,78 | <b>0,82</b> |
| 355L2      | 0,83                         | 0,91 | 0,92 | <b>0,93</b> | 0,70                         | 0,85 | 0,89 | <b>0,90</b> | 0,61                         | 0,81 | 0,85 | <b>0,88</b> | 0,48                         | 0,69 | 0,79 | <b>0,82</b> |
| 355L3      | 0,83                         | 0,91 | 0,92 | <b>0,93</b> | 0,70                         | 0,85 | 0,89 | <b>0,90</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 400M       | -                            | -    | -    | -           | 0,65                         | 0,83 | 0,89 | <b>0,91</b> | 0,68                         | 0,84 | 0,88 | <b>0,89</b> | 0,50                         | 0,71 | 0,80 | <b>0,83</b> |
| 400L       | 0,82                         | 0,92 | 0,93 | <b>0,94</b> | 0,67                         | 0,85 | 0,89 | <b>0,91</b> | 0,68                         | 0,84 | 0,88 | <b>0,89</b> | 0,49                         | 0,71 | 0,80 | <b>0,83</b> |
| 450M       | -                            | -    | -    | -           | 0,68                         | 0,84 | 0,89 | <b>0,91</b> | 0,65                         | 0,83 | 0,88 | <b>0,89</b> | 0,53                         | 0,74 | 0,81 | <b>0,84</b> |
| 450L       | -                            | -    | -    | -           | 0,69                         | 0,85 | 0,90 | <b>0,91</b> | 0,61                         | 0,83 | 0,88 | <b>0,89</b> | 0,54                         | 0,75 | 0,82 | <b>0,84</b> |

# IE2

## Partial Load Data 50 Hz

78

Efficiency [%]

| Frame size | 2p = 2<br>P / P <sub>N</sub> |      |      |             | 2p = 4<br>P / P <sub>N</sub> |      |      |             | 2p = 6<br>P / P <sub>N</sub> |      |      |             |
|------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|
| CD...[Y2]  | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           |
| 63M1       | 38                           | 53   | 62   | <b>66</b>   | 40                           | 55   | 63   | <b>67</b>   | -                            | -    | -    | -           |
| 63M2       | 46                           | 61   | 67   | <b>70</b>   | 50                           | 63   | 68   | <b>70</b>   | -                            | -    | -    | -           |
| 71M1       | 53                           | 65   | 71   | <b>71,5</b> | 56                           | 67   | 69   | <b>68,5</b> | -                            | -    | -    | -           |
| 71M2       | 54                           | 67   | 71,5 | <b>72</b>   | 60                           | 70   | 72   | <b>71</b>   | 38                           | 53   | 60   | <b>62</b>   |
| 80M1       | 64                           | 75,5 | 78,5 | <b>79</b>   | 62                           | 71   | 73   | <b>72</b>   | 44                           | 60   | 65   | <b>67</b>   |
| 80M2       | 64,5                         | 77,7 | 80,6 | <b>81,1</b> | 63,5                         | 76,5 | 80   | <b>81</b>   | 49                           | 64   | 68,5 | <b>69</b>   |
| 90S        | 70,2                         | 79,9 | 82,4 | <b>82,7</b> | 66,5                         | 78   | 82   | <b>82,7</b> | 57                           | 71,5 | 76   | <b>77,4</b> |
| 90L        | 74,7                         | 82,6 | 84,5 | <b>84,5</b> | 68,5                         | 80,5 | 83,5 | <b>84</b>   | 62,5                         | 75   | 78,8 | <b>79,5</b> |
| 100L1      | -                            | -    | -    | -           | 74                           | 83   | 85,5 | <b>85,5</b> | -                            | -    | -    | -           |
| 100L/L2    | 79,7                         | 85,3 | 86,3 | <b>85,8</b> | 76                           | 84   | 86,5 | <b>86,6</b> | 64                           | 75,5 | 80,6 | <b>81,1</b> |
| 112M       | 77,7                         | 84,8 | 86,6 | <b>86,9</b> | 77,4                         | 85,4 | 87,4 | <b>87,6</b> | 70                           | 80,2 | 82,8 | <b>83</b>   |
| 132S/S1    | 81                           | 87,1 | 88,2 | <b>88,1</b> | 78,7                         | 86,3 | 88,3 | <b>88,6</b> | 71                           | 81,8 | 84   | <b>84,4</b> |
| 132S2      | 82,6                         | 88,3 | 89,3 | <b>89,1</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 132M/M1    | -                            | -    | -    | -           | 80,4                         | 87,8 | 89,5 | <b>89,5</b> | 76,3                         | 84   | 85,8 | <b>85,7</b> |
| 132M2      | -                            | -    | -    | -           | -                            | -    | -    | -           | 75,8                         | 84,5 | 86,8 | <b>87</b>   |
| 160M/M1    | 82,9                         | 88,9 | 90,2 | <b>90,3</b> | 82                           | 88,7 | 90,4 | <b>90,6</b> | 79,3                         | 86,3 | 88   | <b>88,1</b> |
| 160M2      | 85,9                         | 90,4 | 91,3 | <b>91,1</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 160L       | 87,7                         | 91,3 | 91,9 | <b>91,6</b> | 82,9                         | 89,4 | 91,1 | <b>91,3</b> | 78,5                         | 86,3 | 89,3 | <b>89,5</b> |
| 180M       | 84,7                         | 90,4 | 91,8 | <b>92</b>   | 85,7                         | 90,8 | 92   | <b>91,9</b> | -                            | -    | -    | -           |
| 180L       | -                            | -    | -    | -           | 86,6                         | 91,4 | 92,4 | <b>92,3</b> | 82,9                         | 89   | 90,4 | <b>90,4</b> |
| 200L/L1    | 86                           | 91,2 | 92,5 | <b>92,7</b> | 87                           | 92   | 93   | <b>92,9</b> | 86                           | 89,5 | 91,4 | <b>91</b>   |
| 200L2      | 86                           | 91,7 | 93   | <b>93,1</b> | -                            | -    | -    | -           | 86,7                         | 91,2 | 92   | <b>91,5</b> |
| 225S       | -                            | -    | -    | -           | 88                           | 92,4 | 93,5 | <b>93,3</b> | -                            | -    | -    | -           |
| 225M       | 88,5                         | 92,4 | 93,3 | <b>93,4</b> | 89,1                         | 93   | 93,8 | <b>93,6</b> | 87,1                         | 91,7 | 92,4 | <b>92,3</b> |
| 250M       | 86,5                         | 91,8 | 93,5 | <b>93,8</b> | 90,3                         | 93,4 | 94,1 | <b>94</b>   | 86,3                         | 91,6 | 92,8 | <b>92,7</b> |
| 280S       | 88,2                         | 92,8 | 93,9 | <b>94,2</b> | 89,3                         | 93,5 | 94,4 | <b>94,5</b> | 88,4                         | 92,8 | 93,6 | <b>93,5</b> |
| 280M       | 88,7                         | 93   | 94,2 | <b>94,5</b> | 90,3                         | 93,9 | 94,7 | <b>94,7</b> | 88,7                         | 92,9 | 93,6 | <b>93,6</b> |
| 315S       | 92,5                         | 94,8 | 95   | <b>94,8</b> | 91                           | 94,1 | 95   | <b>94,9</b> | 91                           | 93,8 | 94,5 | <b>94,1</b> |
| 315M       | 92,4                         | 94,7 | 95   | <b>95</b>   | 91,5                         | 94,3 | 95,1 | <b>95,1</b> | 91                           | 94   | 94,6 | <b>94,4</b> |
| 315L1      | 92,5                         | 94,8 | 95,1 | <b>95,2</b> | 91,7                         | 94,7 | 95,3 | <b>95,3</b> | 91,5                         | 94,2 | 94,9 | <b>94,7</b> |
| 315L2      | 92,7                         | 94,9 | 95,2 | <b>95,4</b> | 92                           | 94,8 | 95,6 | <b>95,5</b> | 92                           | 94,5 | 95,2 | <b>95</b>   |
| 315L3      | 92                           | 95,1 | 95,8 | <b>96</b>   | 92,3                         | 95,2 | 96,2 | <b>96,2</b> | 92,3                         | 94,9 | 95,5 | <b>95,2</b> |
| 355M       | -                            | -    | -    | -           | -                            | -    | -    | -           | 93                           | 95,5 | 95,8 | <b>95,5</b> |
| 355L1      | 93                           | 96,5 | 96,8 | <b>96,6</b> | 93                           | 96   | 96,5 | <b>96,3</b> | 93,2                         | 95,7 | 96,1 | <b>95,9</b> |
| 355L2      | 93,3                         | 95,7 | 96,8 | <b>96,8</b> | 93,2                         | 96,2 | 96,6 | <b>96,6</b> | 93,3                         | 95,8 | 96,1 | <b>96</b>   |
| 355L3      | 93,2                         | 95,7 | 96,9 | <b>96,8</b> | 93,6                         | 96,5 | 97,1 | <b>97</b>   | -                            | -    | -    | -           |
| 400M       | -                            | -    | -    | -           | 93,9                         | 96,4 | 96,9 | <b>97</b>   | 94,3                         | 96,4 | 96,8 | <b>96,6</b> |
| 400L       | 93,7                         | 96,2 | 97   | <b>97</b>   | 94,4                         | 96,6 | 97,1 | <b>97,1</b> | 94,1                         | 96,3 | 96,8 | <b>96,6</b> |
| 450M       | -                            | -    | -    | -           | 93,8                         | 96,3 | 97,1 | <b>97,2</b> | 93,5                         | 96,4 | 96,6 | <b>96,6</b> |
| 450L       | -                            | -    | -    | -           | 95,1                         | 97   | 97,4 | <b>97,4</b> | 94,8                         | 96,8 | 97,1 | <b>97</b>   |

| Frame size | 2p = 2<br>P / P <sub>N</sub> |      |      |             | 2p = 4<br>P / P <sub>N</sub> |      |      |             | 2p = 6<br>P / P <sub>N</sub> |      |      |             |
|------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|
| CD...[Y2]  | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           |
| 63M1       | 0,38                         | 0,50 | 0,60 | <b>0,67</b> | 0,31                         | 0,42 | 0,52 | <b>0,60</b> | -                            | -    | -    | -           |
| 63M2       | 0,41                         | 0,56 | 0,67 | <b>0,75</b> | 0,35                         | 0,49 | 0,61 | <b>0,70</b> | -                            | -    | -    | -           |
| 71M1       | 0,49                         | 0,65 | 0,78 | <b>0,84</b> | 0,42                         | 0,62 | 0,73 | <b>0,80</b> | -                            | -    | -    | -           |
| 71M2       | 0,48                         | 0,64 | 0,76 | <b>0,82</b> | 0,42                         | 0,62 | 0,73 | <b>0,80</b> | 0,36                         | 0,49 | 0,61 | <b>0,71</b> |
| 80M1       | 0,52                         | 0,73 | 0,83 | <b>0,87</b> | 0,43                         | 0,62 | 0,74 | <b>0,80</b> | 0,33                         | 0,48 | 0,61 | <b>0,71</b> |
| 80M2       | 0,56                         | 0,75 | 0,83 | <b>0,87</b> | 0,38                         | 0,59 | 0,71 | <b>0,78</b> | 0,36                         | 0,52 | 0,64 | <b>0,72</b> |
| 90S        | 0,57                         | 0,76 | 0,84 | <b>0,88</b> | 0,39                         | 0,60 | 0,72 | <b>0,80</b> | 0,32                         | 0,49 | 0,61 | <b>0,70</b> |
| 90L        | 0,57                         | 0,77 | 0,85 | <b>0,88</b> | 0,39                         | 0,61 | 0,73 | <b>0,81</b> | 0,32                         | 0,51 | 0,64 | <b>0,72</b> |
| 100L1      | -                            | -    | -    | -           | 0,46                         | 0,68 | 0,79 | <b>0,84</b> | -                            | -    | -    | -           |
| 100L/L2    | 0,60                         | 0,79 | 0,85 | <b>0,88</b> | 0,45                         | 0,66 | 0,78 | <b>0,84</b> | 0,30                         | 0,48 | 0,63 | <b>0,71</b> |
| 112M       | 0,53                         | 0,74 | 0,83 | <b>0,87</b> | 0,43                         | 0,65 | 0,77 | <b>0,83</b> | 0,35                         | 0,58 | 0,71 | <b>0,78</b> |
| 132S/S1    | 0,64                         | 0,82 | 0,87 | <b>0,89</b> | 0,47                         | 0,69 | 0,80 | <b>0,85</b> | 0,32                         | 0,55 | 0,67 | <b>0,74</b> |
| 132S2      | 0,64                         | 0,81 | 0,87 | <b>0,89</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 132M/M1    | -                            | -    | -    | -           | 0,48                         | 0,71 | 0,81 | <b>0,86</b> | 0,36                         | 0,57 | 0,69 | <b>0,76</b> |
| 132M2      | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,36                         | 0,61 | 0,75 | <b>0,81</b> |
| 160M/M1    | 0,56                         | 0,77 | 0,84 | <b>0,87</b> | 0,52                         | 0,73 | 0,82 | <b>0,85</b> | 0,45                         | 0,67 | 0,79 | <b>0,84</b> |
| 160M2      | 0,65                         | 0,83 | 0,88 | <b>0,90</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 160L       | 0,66                         | 0,83 | 0,89 | <b>0,91</b> | 0,45                         | 0,67 | 0,78 | <b>0,83</b> | 0,32                         | 0,60 | 0,74 | <b>0,81</b> |
| 180M       | 0,64                         | 0,82 | 0,89 | <b>0,91</b> | 0,49                         | 0,70 | 0,79 | <b>0,83</b> | -                            | -    | -    | -           |
| 180L       | -                            | -    | -    | -           | 0,51                         | 0,72 | 0,80 | <b>0,83</b> | 0,43                         | 0,65 | 0,76 | <b>0,82</b> |
| 200L/L1    | 0,65                         | 0,82 | 0,88 | <b>0,90</b> | 0,50                         | 0,72 | 0,81 | <b>0,85</b> | 0,45                         | 0,67 | 0,77 | <b>0,83</b> |
| 200L2      | 0,68                         | 0,85 | 0,89 | <b>0,91</b> | -                            | -    | -    | -           | 0,47                         | 0,69 | 0,79 | <b>0,84</b> |
| 225S       | -                            | -    | -    | -           | 0,57                         | 0,76 | 0,83 | <b>0,85</b> | -                            | -    | -    | -           |
| 225M       | 0,67                         | 0,84 | 0,89 | <b>0,90</b> | 0,56                         | 0,76 | 0,83 | <b>0,86</b> | 0,50                         | 0,72 | 0,8  | <b>0,83</b> |
| 250M       | 0,70                         | 0,88 | 0,89 | <b>0,89</b> | 0,63                         | 0,79 | 0,86 | <b>0,88</b> | 0,49                         | 0,71 | 0,80 | <b>0,83</b> |
| 280S       | 0,69                         | 0,85 | 0,89 | <b>0,89</b> | 0,55                         | 0,76 | 0,82 | <b>0,85</b> | 0,53                         | 0,74 | 0,80 | <b>0,83</b> |
| 280M       | 0,72                         | 0,88 | 0,90 | <b>0,90</b> | 0,59                         | 0,77 | 0,83 | <b>0,85</b> | 0,53                         | 0,74 | 0,81 | <b>0,82</b> |
| 315S       | 0,74                         | 0,87 | 0,89 | <b>0,89</b> | 0,62                         | 0,80 | 0,84 | <b>0,85</b> | 0,62                         | 0,8  | 0,87 | <b>0,88</b> |
| 315M       | 0,75                         | 0,87 | 0,89 | <b>0,89</b> | 0,62                         | 0,80 | 0,84 | <b>0,85</b> | 0,62                         | 0,81 | 0,87 | <b>0,88</b> |
| 315L1      | 0,73                         | 0,87 | 0,90 | <b>0,90</b> | 0,59                         | 0,79 | 0,85 | <b>0,86</b> | 0,60                         | 0,80 | 0,86 | <b>0,88</b> |
| 315L2      | 0,75                         | 0,87 | 0,90 | <b>0,90</b> | 0,58                         | 0,78 | 0,85 | <b>0,86</b> | 0,62                         | 0,81 | 0,86 | <b>0,88</b> |
| 315L3      | 0,79                         | 0,87 | 0,91 | <b>0,92</b> | 0,64                         | 0,80 | 0,85 | <b>0,87</b> | 0,61                         | 0,8  | 0,86 | <b>0,88</b> |
| 355M       | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,60                         | 0,80 | 0,86 | <b>0,88</b> |
| 355L1      | 0,83                         | 0,91 | 0,92 | <b>0,92</b> | 0,67                         | 0,84 | 0,89 | <b>0,90</b> | 0,61                         | 0,81 | 0,85 | <b>0,88</b> |
| 355L2      | 0,83                         | 0,91 | 0,92 | <b>0,93</b> | 0,70                         | 0,85 | 0,89 | <b>0,90</b> | 0,61                         | 0,81 | 0,85 | <b>0,88</b> |
| 355L3      | 0,83                         | 0,91 | 0,92 | <b>0,93</b> | 0,70                         | 0,85 | 0,89 | <b>0,90</b> | -                            | -    | -    | -           |
| 400M       | -                            | -    | -    | -           | 0,65                         | 0,83 | 0,89 | <b>0,91</b> | 0,68                         | 0,84 | 0,88 | <b>0,89</b> |
| 400L       | 0,82                         | 0,92 | 0,93 | <b>0,94</b> | 0,67                         | 0,85 | 0,89 | <b>0,91</b> | 0,68                         | 0,84 | 0,88 | <b>0,89</b> |
| 450M       | -                            | -    | -    | -           | 0,68                         | 0,84 | 0,89 | <b>0,91</b> | 0,65                         | 0,83 | 0,88 | <b>0,89</b> |
| 450L       | -                            | -    | -    | -           | 0,69                         | 0,85 | 0,90 | <b>0,91</b> | 0,61                         | 0,83 | 0,88 | <b>0,89</b> |

# IE3 / MEPS

## Partial Load Data 50 Hz

80

Efficiency [%]

| Frame size<br>CD...[Y3/Y] | 2p = 2<br>P / P <sub>N</sub> |      |      |             | 2p = 4<br>P / P <sub>N</sub> |      |      |             | 2p = 6<br>P / P <sub>N</sub> |      |      |             |
|---------------------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|
|                           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           |
| 63M1                      | 38                           | 53   | 62   | <b>66</b>   | 40                           | 55   | 63   | <b>67</b>   | -                            | -    | -    | -           |
| 63M2                      | 46                           | 61   | 67   | <b>70</b>   | 50                           | 63   | 68   | <b>70</b>   | -                            | -    | -    | -           |
| 71M1                      | 53                           | 65   | 71   | <b>71,5</b> | 56                           | 67   | 69   | <b>68,5</b> | -                            | -    | -    | -           |
| 71M2                      | 54                           | 67   | 71,5 | <b>72</b>   | 60                           | 70   | 72   | <b>71</b>   | 38                           | 53   | 60   | <b>62</b>   |
| 80M1                      | 68                           | 79,2 | 82,3 | <b>82,8</b> | 62                           | 71   | 73   | <b>72</b>   | 44                           | 60   | 65   | <b>67</b>   |
| 80M2                      | 70                           | 80,2 | 83,4 | <b>83,7</b> | 64,7                         | 77,8 | 81,7 | <b>82,6</b> | 49                           | 64   | 68,5 | <b>69</b>   |
| 90S                       | 71,9                         | 81,8 | 84,4 | <b>84,7</b> | 67,6                         | 79,3 | 83,3 | <b>84,2</b> | 60,5                         | 74,2 | 78,1 | <b>79,1</b> |
| 90L                       | 76,4                         | 84,5 | 86,4 | <b>86,4</b> | 70                           | 81,9 | 85   | <b>85,5</b> | 63                           | 76,3 | 80,5 | <b>81,4</b> |
| 100L1                     | -                            | -    | -    | -           | 75,5                         | 84,7 | 86,9 | <b>87,1</b> | -                            | -    | -    | -           |
| 100L/L2                   | 81,8                         | 87,6 | 88,6 | <b>88,1</b> | 77                           | 85,1 | 87,6 | <b>87,8</b> | 66                           | 77,7 | 83   | <b>83,5</b> |
| 112M                      | 79                           | 86,3 | 88,1 | <b>88,4</b> | 78,4                         | 86,5 | 88,5 | <b>88,7</b> | 71,8                         | 82,6 | 85,3 | <b>85,5</b> |
| 132S/S1                   | 82,3                         | 88,5 | 89,7 | <b>89,5</b> | 79,6                         | 87,3 | 89,3 | <b>89,6</b> | 71,9                         | 83,1 | 85,5 | <b>85,7</b> |
| 132S2                     | 83,7                         | 89,5 | 90,5 | <b>90,3</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 132M/M1                   | -                            | -    | -    | -           | 81,4                         | 88,8 | 90,5 | <b>90,5</b> | 77,5                         | 85,2 | 87,1 | <b>87</b>   |
| 132M2                     | -                            | -    | -    | -           | -                            | -    | -    | -           | 77                           | 85,8 | 88,1 | <b>88,3</b> |
| 160M/M1                   | 83,8                         | 89,9 | 91,2 | <b>91,3</b> | 82,9                         | 89,6 | 91,2 | <b>91,5</b> | 80,5                         | 87,6 | 89,3 | <b>89,4</b> |
| 160M2                     | 86,7                         | 91,3 | 92,2 | <b>92</b>   | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 160L                      | 88,6                         | 92,2 | 92,8 | <b>92,5</b> | 84,1                         | 90,3 | 91,9 | <b>92,1</b> | 81                           | 89   | 90,5 | <b>90,5</b> |
| 180M                      | 85,6                         | 91,3 | 92,7 | <b>92,9</b> | 86,4                         | 91,6 | 92,8 | <b>92,7</b> | -                            | -    | -    | -           |
| 180L                      | -                            | -    | -    | -           | 87,4                         | 92,3 | 93,3 | <b>93,2</b> | 83,9                         | 90,1 | 91,5 | <b>91,5</b> |
| 200L/L1                   | 87,7                         | 92,5 | 93,5 | <b>93,5</b> | 87,8                         | 92,9 | 93,9 | <b>93,8</b> | 87,3                         | 91,9 | 92,4 | <b>92</b>   |
| 200L2                     | 88,7                         | 92,9 | 93,9 | <b>93,8</b> | -                            | -    | -    | -           | 87,5                         | 92,1 | 92,8 | <b>92,4</b> |
| 225S                      | -                            | -    | -    | -           | 88,8                         | 92,9 | 94   | <b>93,9</b> | -                            | -    | -    | -           |
| 225M                      | 88,6                         | 93,1 | 94,1 | <b>94,2</b> | 89,8                         | 93,7 | 94,5 | <b>94,3</b> | 87,7                         | 92,4 | 93,1 | <b>93</b>   |
| 250M                      | 86,3                         | 92,3 | 94,2 | <b>94,4</b> | 90,9                         | 93,9 | 94,7 | <b>94,6</b> | 87,1                         | 92,4 | 93,6 | <b>93,5</b> |
| 280S                      | 88,5                         | 93,1 | 94,3 | <b>94,8</b> | 89,8                         | 94,1 | 95,1 | <b>95,2</b> | 88,6                         | 93,1 | 93,9 | <b>93,9</b> |
| 280M                      | 89                           | 93,3 | 94,7 | <b>95,1</b> | 90,8                         | 94,5 | 95,3 | <b>95,3</b> | 88,9                         | 93,3 | 94,3 | <b>94,4</b> |
| 315S                      | 92,7                         | 95   | 95,5 | <b>95,4</b> | 91,6                         | 94,9 | 95,6 | <b>95,6</b> | 91,2                         | 94,5 | 95,1 | <b>94,9</b> |
| 315M                      | 92,3                         | 94,8 | 95,6 | <b>95,8</b> | 92,4                         | 95,3 | 95,9 | <b>95,8</b> | 91,3                         | 94,7 | 95,2 | <b>95,2</b> |
| 315L1                     | 92,8                         | 95   | 95,8 | <b>95,9</b> | 92,6                         | 95,5 | 96,1 | <b>96</b>   | 91,6                         | 94,9 | 95,6 | <b>95,5</b> |
| 315L2                     | 93                           | 95   | 95,5 | <b>96</b>   | 93,3                         | 95,8 | 96,3 | <b>96,1</b> | 92,3                         | 95,1 | 95,7 | <b>95,6</b> |
| 315L3                     | 92                           | 95,1 | 95,8 | <b>96</b>   | 92,3                         | 95,2 | 96,2 | <b>96,2</b> | 92,6                         | 95,3 | 95,8 | <b>95,8</b> |
| 355M                      | -                            | -    | -    | -           | -                            | -    | -    | -           | 93,2                         | 95,7 | 96   | <b>95,9</b> |
| 355L1                     | 93                           | 96,5 | 96,8 | <b>96,6</b> | 93                           | 96   | 96,5 | <b>96,3</b> | 93,2                         | 95,7 | 96,1 | <b>95,9</b> |
| 355L2                     | 93,3                         | 95,7 | 96,8 | <b>96,8</b> | 93,2                         | 96,2 | 96,6 | <b>96,6</b> | 93,3                         | 95,8 | 96,1 | <b>96</b>   |
| 355L3                     | 93,2                         | 95,7 | 96,9 | <b>96,8</b> | 93,6                         | 96,5 | 97,1 | <b>97</b>   | -                            | -    | -    | -           |
| 400M                      | -                            | -    | -    | -           | 93,9                         | 96,4 | 96,9 | <b>97</b>   | 94,3                         | 96,4 | 96,8 | <b>96,6</b> |
| 400L                      | 93,7                         | 96,2 | 97   | <b>97</b>   | 94,4                         | 96,6 | 97,1 | <b>97,1</b> | 94,1                         | 96,3 | 96,8 | <b>96,6</b> |
| 450M                      | -                            | -    | -    | -           | 93,8                         | 96,3 | 97,1 | <b>97,2</b> | 93,5                         | 96,4 | 96,6 | <b>96,6</b> |
| 450L                      | -                            | -    | -    | -           | 95,1                         | 97   | 97,4 | <b>97,4</b> | 94,8                         | 96,8 | 97,1 | <b>97</b>   |

## Power factor

| Frame size  | 2p = 2<br>P / P <sub>N</sub> |      |      |             | 2p = 4<br>P / P <sub>N</sub> |      |      |             | 2p = 6<br>P / P <sub>N</sub> |      |      |             |
|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|------------------------------|------|------|-------------|
| CD...(Y3/Y) | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           | 0,25                         | 0,5  | 0,75 | 1           |
| 63M1        | 0,38                         | 0,50 | 0,60 | <b>0,67</b> | 0,31                         | 0,42 | 0,52 | <b>0,60</b> | -                            | -    | -    | -           |
| 63M2        | 0,41                         | 0,56 | 0,67 | <b>0,75</b> | 0,35                         | 0,49 | 0,61 | <b>0,70</b> | -                            | -    | -    | -           |
| 71M1        | 0,49                         | 0,65 | 0,78 | <b>0,84</b> | 0,42                         | 0,62 | 0,73 | <b>0,80</b> | -                            | -    | -    | -           |
| 71M2        | 0,48                         | 0,64 | 0,76 | <b>0,82</b> | 0,42                         | 0,62 | 0,73 | <b>0,80</b> | 0,36                         | 0,49 | 0,61 | <b>0,71</b> |
| 80M1        | 0,52                         | 0,73 | 0,83 | <b>0,87</b> | 0,43                         | 0,62 | 0,74 | <b>0,80</b> | 0,33                         | 0,48 | 0,61 | <b>0,71</b> |
| 80M2        | 0,56                         | 0,75 | 0,83 | <b>0,87</b> | 0,38                         | 0,59 | 0,71 | <b>0,78</b> | 0,36                         | 0,52 | 0,64 | <b>0,72</b> |
| 90S         | 0,57                         | 0,76 | 0,84 | <b>0,88</b> | 0,39                         | 0,60 | 0,72 | <b>0,80</b> | 0,32                         | 0,49 | 0,61 | <b>0,70</b> |
| 90L         | 0,57                         | 0,77 | 0,85 | <b>0,88</b> | 0,39                         | 0,61 | 0,73 | <b>0,81</b> | 0,32                         | 0,51 | 0,64 | <b>0,72</b> |
| 100L1       | -                            | -    | -    | -           | 0,46                         | 0,68 | 0,79 | <b>0,84</b> | -                            | -    | -    | -           |
| 100L/L2     | 0,60                         | 0,79 | 0,85 | <b>0,88</b> | 0,45                         | 0,66 | 0,78 | <b>0,84</b> | 0,30                         | 0,48 | 0,63 | <b>0,71</b> |
| 112M        | 0,53                         | 0,74 | 0,83 | <b>0,87</b> | 0,43                         | 0,65 | 0,77 | <b>0,83</b> | 0,35                         | 0,58 | 0,71 | <b>0,78</b> |
| 132S/S1     | 0,64                         | 0,82 | 0,87 | <b>0,89</b> | 0,47                         | 0,69 | 0,80 | <b>0,85</b> | 0,32                         | 0,55 | 0,67 | <b>0,74</b> |
| 132S2       | 0,64                         | 0,81 | 0,87 | <b>0,89</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 132M/M1     | -                            | -    | -    | -           | 0,48                         | 0,71 | 0,81 | <b>0,86</b> | 0,36                         | 0,57 | 0,69 | <b>0,76</b> |
| 132M2       | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,36                         | 0,61 | 0,75 | <b>0,81</b> |
| 160M/M1     | 0,56                         | 0,77 | 0,84 | <b>0,87</b> | 0,52                         | 0,73 | 0,82 | <b>0,85</b> | 0,45                         | 0,67 | 0,79 | <b>0,84</b> |
| 160M2       | 0,65                         | 0,83 | 0,88 | <b>0,90</b> | -                            | -    | -    | -           | -                            | -    | -    | -           |
| 160L        | 0,66                         | 0,83 | 0,89 | <b>0,91</b> | 0,45                         | 0,67 | 0,78 | <b>0,83</b> | 0,42                         | 0,66 | 0,78 | <b>0,84</b> |
| 180M        | 0,64                         | 0,82 | 0,89 | <b>0,91</b> | 0,49                         | 0,70 | 0,79 | <b>0,83</b> | -                            | -    | -    | -           |
| 180L        | -                            | -    | -    | -           | 0,51                         | 0,72 | 0,80 | <b>0,83</b> | 0,43                         | 0,65 | 0,76 | <b>0,82</b> |
| 200L/L1     | 0,65                         | 0,82 | 0,88 | <b>0,90</b> | 0,50                         | 0,72 | 0,81 | <b>0,85</b> | 0,45                         | 0,67 | 0,77 | <b>0,83</b> |
| 200L2       | 0,68                         | 0,85 | 0,89 | <b>0,90</b> | -                            | -    | -    | -           | 0,47                         | 0,69 | 0,79 | <b>0,84</b> |
| 225S        | -                            | -    | -    | -           | 0,57                         | 0,76 | 0,83 | <b>0,85</b> | -                            | -    | -    | -           |
| 225M        | 0,67                         | 0,84 | 0,89 | <b>0,90</b> | 0,56                         | 0,76 | 0,83 | <b>0,86</b> | 0,50                         | 0,72 | 0,80 | <b>0,83</b> |
| 250M        | 0,60                         | 0,80 | 0,86 | <b>0,88</b> | 0,63                         | 0,79 | 0,86 | <b>0,88</b> | 0,49                         | 0,71 | 0,80 | <b>0,83</b> |
| 280S        | 0,67                         | 0,82 | 0,88 | <b>0,88</b> | 0,55                         | 0,76 | 0,82 | <b>0,85</b> | 0,51                         | 0,72 | 0,79 | <b>0,82</b> |
| 280M        | 0,65                         | 0,81 | 0,86 | <b>0,87</b> | 0,59                         | 0,77 | 0,83 | <b>0,85</b> | 0,50                         | 0,71 | 0,78 | <b>0,81</b> |
| 315S        | 0,74                         | 0,87 | 0,89 | <b>0,89</b> | 0,61                         | 0,79 | 0,83 | <b>0,84</b> | 0,62                         | 0,8  | 0,87 | <b>0,88</b> |
| 315M        | 0,75                         | 0,87 | 0,89 | <b>0,90</b> | 0,61                         | 0,78 | 0,83 | <b>0,84</b> | 0,62                         | 0,81 | 0,87 | <b>0,88</b> |
| 315L1       | 0,73                         | 0,87 | 0,90 | <b>0,90</b> | 0,59                         | 0,77 | 0,83 | <b>0,84</b> | 0,60                         | 0,80 | 0,86 | <b>0,88</b> |
| 315L2       | 0,75                         | 0,87 | 0,90 | <b>0,90</b> | 0,58                         | 0,78 | 0,83 | <b>0,85</b> | 0,62                         | 0,81 | 0,86 | <b>0,88</b> |
| 315L3       | 0,79                         | 0,87 | 0,91 | <b>0,92</b> | 0,64                         | 0,80 | 0,85 | <b>0,87</b> | 0,61                         | 0,8  | 0,86 | <b>0,88</b> |
| 355M        | -                            | -    | -    | -           | -                            | -    | -    | -           | 0,60                         | 0,80 | 0,85 | <b>0,87</b> |
| 355L1       | 0,83                         | 0,91 | 0,92 | <b>0,92</b> | 0,67                         | 0,84 | 0,89 | <b>0,90</b> | 0,61                         | 0,81 | 0,85 | <b>0,88</b> |
| 355L2       | 0,83                         | 0,91 | 0,92 | <b>0,93</b> | 0,70                         | 0,85 | 0,89 | <b>0,90</b> | 0,61                         | 0,81 | 0,85 | <b>0,88</b> |
| 355L3       | 0,83                         | 0,91 | 0,92 | <b>0,93</b> | 0,70                         | 0,85 | 0,89 | <b>0,90</b> | -                            | -    | -    | -           |
| 400M        | -                            | -    | -    | -           | 0,65                         | 0,83 | 0,89 | <b>0,91</b> | 0,68                         | 0,84 | 0,88 | <b>0,89</b> |
| 400L        | 0,82                         | 0,92 | 0,93 | <b>0,94</b> | 0,67                         | 0,85 | 0,89 | <b>0,91</b> | 0,68                         | 0,84 | 0,88 | <b>0,89</b> |
| 450M        | -                            | -    | -    | -           | 0,68                         | 0,84 | 0,89 | <b>0,91</b> | 0,65                         | 0,83 | 0,88 | <b>0,89</b> |
| 450L        | -                            | -    | -    | -           | 0,69                         | 0,85 | 0,90 | <b>0,91</b> | 0,61                         | 0,83 | 0,88 | <b>0,89</b> |

# Increased Output Mains Operation 50 Hz

82

Temperature class T4,  
ns = 3000 rpm, 2p = 2

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Frame size                                    | Output                 | Rated current at  |                   | Speed      | Efficiency | Power factor | Torque    | Starting torque                | Starting current               | Stalling torque                | Moment of inertia        | Weight <sup>1)</sup> | Noise levels with radial-flow fan |                           |
|-----------------------------------------------|------------------------|-------------------|-------------------|------------|------------|--------------|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------|----------------------|-----------------------------------|---------------------------|
| CD...X                                        | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]   | cos φ        | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | L <sub>P</sub><br>[dB(A)]         | L <sub>W</sub><br>[dB(A)] |
| Efficiency according to manufacturer standard |                        |                   |                   |            |            |              |           |                                |                                |                                |                          |                      |                                   |                           |
| 63M1-2                                        | 0,25                   | 0,69              | 0,55              | 2860       | 70         | 0,75         | 0,83      | 3,4                            | 5,8                            | 4,7                            | 0,00028                  | 16                   | 49                                | 61                        |
| 63M2-2                                        | 0,37                   | 0,89              | 0,71              | 2800       | 71,5       | 0,84         | 1,26      | 2,7                            | 5,2                            | 3,5                            | 0,00028                  | 16                   | 49                                | 61                        |
| 71M1-2                                        | 0,46                   | 1,43              | 1,15              | 2720       | 66         | 0,84         | 1,62      | 2,1                            | 4,2                            | 2,5                            | 0,00028                  | 16                   | 57                                | 69                        |
| 71M2-2                                        | 0,75                   | 1,91              | 1,53              | 2730       | 70         | 0,81         | 2,62      | 2,7                            | 4,7                            | 3,2                            | 0,00039                  | 17                   | 57                                | 69                        |
| 80M1-2                                        | 1                      | 2,65              | 2,1               | 2750       | 68         | 0,80         | 3,47      | 2,4                            | 4,2                            | 3                              | 0,00058                  | 24                   | 59                                | 71                        |
| 80M2-2                                        | 1,4                    | 3,3               | 2,65              | 2805       | 76,5       | 0,80         | 4,8       | 3,2                            | 5,6                            | 3,6                            | 0,0008                   | 25                   | 59                                | 71                        |
| 90S-2                                         | 1,9                    | 4,2               | 3,35              | 2830       | 78         | 0,84         | 6,4       | 2,2                            | 5,8                            | 3,1                            | 0,0013                   | 31                   | 60                                | 72                        |
| 90L-2                                         | 2,7                    | 6,2               | 4,95              | 2830       | 78         | 0,81         | 9,1       | 2,5                            | 5,5                            | 3,5                            | 0,0018                   | 35                   | 60                                | 72                        |
| 100L-2                                        | 3,4                    | 7,5               | 6                 | 2845       | 80         | 0,82         | 11,4      | 2,8                            | 5,8                            | 3,5                            | 0,0029                   | 45                   | 64                                | 76                        |
| 112M-2                                        | 5                      | 9,9               | 7,9               | 2870       | 83,5       | 0,87         | 16,6      | 2,3                            | 6,8                            | 3                              | 0,0051                   | 53                   | 66                                | 78                        |
| 132S1-2                                       | 6,6                    | 14,3              | 11,4              | 2900       | 81,5       | 0,82         | 21,7      | 2,7                            | 6,4                            | 3,2                            | 0,0089                   | 95                   | 69                                | 82                        |
| 132S2-2                                       | 9                      | 18,7              | 15                | 2910       | 83,5       | 0,83         | 29,5      | 2,7                            | 6,8                            | 3,5                            | 0,0125                   | 100                  | 69                                | 82                        |
| 160M1-2                                       | 13,5                   | 27                | 21,5              | 2930       | 86         | 0,84         | 44        | 2,5                            | 6,9                            | 3,2                            | 0,032                    | 163                  | 80                                | 93                        |
| 160M2-2                                       | 18,5                   | 34,5              | 27,5              | 2910       | 87,5       | 0,89         | 61        | 2,5                            | 6,5                            | 3,2                            | 0,043                    | 173                  | 80                                | 93                        |
| 160L-2                                        | 22                     | 39,5              | 31,5              | 2915       | 89         | 0,9          | 72        | 2,8                            | 6,9                            | 3,4                            | 0,052                    | 188                  | 80                                | 93                        |
| 180M-2                                        | 30                     | 55                | 44                | 2915       | 89,5       | 0,88         | 98        | 2,7                            | 6,9                            | 3,1                            | 0,075                    | 196                  | 83                                | 96                        |
| 200L1-2                                       | 37                     | 66                | 53                | 2955       | 91,4       | 0,89         | 120       | 3                              | 7,2                            | 3,3                            | 0,13                     | 254                  | 85                                | 99                        |
| 200L2-2                                       | 45                     | 81                | 65                | 2955       | 92         | 0,87         | 145       | 2,8                            | 7,2                            | 3,3                            | 0,16                     | 278                  | 85                                | 99                        |
| 225M-2                                        | 55                     | 103               | 81                | 2965       | 92,6       | 0,84         | 177       | 2,9                            | 7,1                            | 3,7                            | 0,24                     | 400                  | 87                                | 101                       |
| 250M-2                                        | 70                     | 139               | 111               | 2970       | 91         | 0,80         | 225       | 2,9                            | 7,2                            | 3,5                            | 0,4                      | 545                  | 87                                | 101                       |
| 280S-2                                        | 90                     | 162               | 130               | 2970       | 92,2       | 0,87         | 289       | 2,2                            | 6,6                            | 2,5                            | 0,65                     | 700                  | 89                                | 103                       |
| 280M-2                                        | 110                    | 200               | 160               | 2975       | 93,3       | 0,85         | 353       | 2,4                            | 7,3                            | 2,6                            | 0,78                     | 762                  | 89                                | 103                       |
| 315S-2                                        | 132                    | 230               | 185               | 2975       | 93,6       | 0,88         | 242       | 1,9                            | 6,5                            | 2,3                            | 1,4                      | 960                  | 90                                | 105                       |
| 315M-2                                        | 160                    | 280               | 225               | 2975       | 93         | 0,89         | 514       | 1,8                            | 6,7                            | 2,4                            | 1,6                      | 1025                 | 90                                | 105                       |
| 315L1-2                                       | 200                    | 320               | 255               | 2975       | 93,5       | 0,89         | 594       | 2                              | 6,9                            | 2,6                            | 1,9                      | 1065                 | 90                                | 105                       |
| 315L2-2                                       | 230                    | 400               | 320               | 2975       | 93,5       | 0,89         | 738       | 2                              | 6,9                            | 2,6                            | 2,2                      | 1270                 | 90                                | 105                       |

## Note:

1) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

Temperature class T4,  
ns = 3000 rpm, 2p = 2

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Frame size                                    | Output                 | Rated current at  |                   | Speed      | Efficiency | Power factor | Torque    | Starting torque                | Starting current               | Stalling torque                | Moment of inertia        | Weight <sup>2)</sup> | Noise levels with radial-flow fan |                           |
|-----------------------------------------------|------------------------|-------------------|-------------------|------------|------------|--------------|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------|----------------------|-----------------------------------|---------------------------|
| CD...X                                        | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]   | cos φ        | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | L <sub>p</sub><br>[dB(A)]         | L <sub>w</sub><br>[dB(A)] |
| Efficiency according to manufacturer standard |                        |                   |                   |            |            |              |           |                                |                                |                                |                          |                      |                                   |                           |
| 63M1-4                                        | 0,18                   | 0,53              | 0,42              | 1415       | 70         | 0,70         | 1,2       | 2,7                            | 4,7                            | 2,7                            | 0,00046                  | 16                   | 44                                | 56                        |
| 63M2-4                                        | 0,25                   | 0,66              | 0,53              | 1370       | 68,5       | 0,80         | 1,74      | 2                              | 3,9                            | 2,5                            | 0,00046                  | 16                   | 44                                | 56                        |
| 71M1-4                                        | 0,37                   | 1,03              | 0,82              | 1350       | 65         | 0,80         | 2,62      | 1,7                            | 3,6                            | 2,3                            | 0,00046                  | 16                   | 46                                | 58                        |
| 71M2-4                                        | 0,5                    | 1,42              | 1,15              | 1335       | 67         | 0,79         | 3,58      | 2,1                            | 3,6                            | 2,7                            | 0,00063                  | 17                   | 46                                | 58                        |
| 80M1-4                                        | 0,7                    | 1,99              | 1,59              | 1310       | 65         | 0,78         | 5,1       | 2                              | 3,5                            | 2,2                            | 0,00092                  | 24                   | 47                                | 59                        |
| 80M2-4                                        | 1                      | 2,7               | 2,15              | 1350       | 70         | 0,77         | 7,1       | 2,3                            | 4,1                            | 2,5                            | 0,0013                   | 25                   | 47                                | 59                        |
| 90S-4                                         | 1,4                    | 3,25              | 2,6               | 1380       | 75,5       | 0,83         | 9,7       | 2                              | 4,9                            | 2,5                            | 0,0021                   | 31                   | 49                                | 61                        |
| 90L-4                                         | 2                      | 4,6               | 3,7               | 1360       | 75         | 0,83         | 14        | 2                              | 4,2                            | 2,2                            | 0,0029                   | 35                   | 49                                | 61                        |
| 100L1-4                                       | 2,5                    | 6,2               | 4,9               | 1415       | 76         | 0,77         | 16,9      | 2,3                            | 5,7                            | 2,7                            | 0,0046                   | 44                   | 52                                | 64                        |
| 100L2-4                                       | 3,4                    | 7,6               | 6,1               | 1400       | 78,8       | 0,82         | 23,2      | 2,1                            | 5,5                            | 2,8                            | 0,0056                   | 46                   | 52                                | 64                        |
| 112M-4                                        | 5                      | 11,1              | 8,9               | 1420       | 81         | 0,80         | 33,6      | 2,6                            | 6,4                            | 3                              | 0,011                    | 59                   | 54                                | 66                        |
| 132S-4                                        | 6,6                    | 13,4              | 10,7              | 1435       | 83,6       | 0,85         | 44        | 2,6                            | 6,3                            | 2,9                            | 0,022                    | 100                  | 59                                | 72                        |
| 132M-4                                        | 9                      | 18,3              | 14,6              | 1435       | 85,7       | 0,83         | 60        | 2,7                            | 6,3                            | 3                              | 0,03                     | 110                  | 59                                | 72                        |
| 160M-4                                        | 13,5                   | 27,5              | 22                | 1460       | 87,5       | 0,81         | 88        | 2,6                            | 6,9                            | 3                              | 0,057                    | 168                  | 67                                | 80                        |
| 160L-4                                        | 17,5                   | 34                | 27                | 1455       | 88,6       | 0,84         | 115       | 2,5                            | 6,8                            | 2,9                            | 0,079                    | 184                  | 67                                | 80                        |
| 180M-4                                        | 22                     | 43,5              | 35                | 1460       | 90         | 0,81         | 144       | 3,1                            | 6,7                            | 3,2                            | 0,13                     | 198                  | 73                                | 86                        |
| 180L-4                                        | 27                     | 52                | 42                | 1460       | 91         | 0,82         | 177       | 3                              | 7,2                            | 3,1                            | 0,155                    | 217                  | 73                                | 86                        |
| 200L-4                                        | 37                     | 68                | 55                | 1460       | 91         | 0,86         | 242       | 2,9                            | 7,2                            | 3                              | 0,25                     | 274                  | 76                                | 90                        |
| 225S-4                                        | 45                     | 81                | 65                | 1465       | 92         | 0,87         | 293       | 2,6                            | 6,5                            | 2,6                            | 0,4                      | 372                  | 79                                | 93                        |
| 225M-4                                        | 55                     | 100               | 80                | 1475       | 92,5       | 0,86         | 356       | 2,6                            | 6,5                            | 2,8                            | 0,48                     | 402                  | 79                                | 93                        |
| 250M-4                                        | 70                     | 127               | 102               | 1475       | 92         | 0,86         | 453       | 2,9                            | 7,2                            | 3,4                            | 0,75                     | 573                  | 80                                | 94                        |
| 280S-4                                        | 90                     | 168               | 134               | 1480       | 93,2       | 0,83         | 581       | 2,8                            | 6,9                            | 2,8                            | 1,25                     | 740                  | 82                                | 96                        |
| 280M-4                                        | 110                    | 200               | 161               | 1480       | 93,7       | 0,84         | 710       | 2,9                            | 6,9                            | 3                              | 1,48                     | 820                  | 82                                | 96                        |
| 315S-4                                        | 132                    | 245               | 194               | 1480       | 93,5       | 0,84         | 851       | 2,2                            | 6,9                            | 2,4                            | 2,2                      | 1040                 | 84                                | 99                        |
| 315M-4                                        | 160                    | 290               | 230               | 1480       | 94         | 0,85         | 1032      | 2,4                            | 6,5                            | 2,6                            | 2,7                      | 1120                 | 84                                | 99                        |
| 315L1-4                                       | 200                    | 360               | 290               | 1485       | 94,3       | 0,85         | 1190      | 2,5                            | 6,9                            | 2,5                            | 3,3                      | 1210                 | 84                                | 99                        |
| 315L2-4                                       | 230                    | 410 <sup>1)</sup> | 325               | 1485       | 94,7       | 0,86         | 1479      | 2,5                            | 6,9                            | 2,7                            | 3,9                      | 1430                 | 84                                | 99                        |

**Notes:**

- 1) Two parallel cables are required in each case  
2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Pole-changing Motors Mains Operation 50 Hz

Temperature class T4,  
ns = 1500/3000 rpm, 2p = 4/2

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Frame size | Output                 | Rated current at  |                   | Speed      | Efficiency | Power factor | Torque    | Starting torque                | Starting current               | Stall-<br>ing torque           | Moment of inertia        | Weight <sup>2)</sup> | Noise levels with radial-flow fan |                           |
|------------|------------------------|-------------------|-------------------|------------|------------|--------------|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------|----------------------|-----------------------------------|---------------------------|
| CD...      | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]   | cos φ        | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | L <sub>p</sub><br>[dB(A)]         | L <sub>w</sub><br>[dB(A)] |
| 80M1-4/2   | 0,5                    | 1,45              | 1,16              | 1400       | 66,5       | 0,75         | 3,4       | 1,9                            | 3,9                            | 2,5                            | 0,00111                  | 24                   | 47                                | 59                        |
|            | 0,65                   | 1,69              | 1,35              | 2800       | 62,5       | 0,89         | 2,2       | 2,2                            | 4,2                            | 3                              |                          |                      | 65                                | 77                        |
| 80M2-4/2   | 0,7                    | 1,92              | 1,54              | 1400       | 70         | 0,75         | 4,8       | 2,1                            | 4                              | 2,7                            | 0,00148                  | 25                   | 47                                | 59                        |
|            | 0,85                   | 2,15              | 1,71              | 2820       | 66         | 0,87         | 2,9       | 2,4                            | 4,8                            | 3,2                            |                          |                      | 65                                | 77                        |
| 90S-4/2    | 1,1                    | 2,7               | 2,15              | 1390       | 70         | 0,84         | 7,6       | 1,8                            | 4,2                            | 2,2                            | 0,00238                  | 31                   | 52                                | 64                        |
|            | 1,4                    | 3,15              | 2,5               | 2810       | 70         | 0,92         | 4,8       | 1,9                            | 4,9                            | 3                              |                          |                      | 69                                | 81                        |
| 90L-4/2    | 1,5                    | 3,55              | 2,85              | 1400       | 74         | 0,82         | 10,2      | 2                              | 4,7                            | 2,3                            | 0,00318                  | 35                   | 52                                | 64                        |
|            | 1,9                    | 4,1               | 3,25              | 2840       | 73         | 0,92         | 6,4       | 2,2                            | 5,4                            | 3,1                            |                          |                      | 69                                | 81                        |
| 100L-4/2   | 2,6                    | 5,9               | 4,7               | 1410       | 78         | 0,82         | 17,6      | 2,2                            | 4,8                            | 2,7                            | 0,00608                  | 46                   | 55                                | 67                        |
|            | 3,2                    | 6,5               | 5,2               | 2870       | 78         | 0,91         | 10,6      | 2                              | 5,8                            | 2,8                            |                          |                      | 75                                | 87                        |
| 112M-4/2   | 3,7                    | 7,6               | 6,1               | 1430       | 82,5       | 0,85         | 24,7      | 2,1                            | 6,1                            | 3                              | 0,0122                   | 59                   | 56                                | 68                        |
|            | 4,4                    | 8,9               | 7,1               | 2895       | 78,5       | 0,91         | 14,5      | 2,5                            | 6,8                            | 3,3                            |                          |                      | 76                                | 88                        |
| 132S-4/2   | 5                      | 10,1              | 8,1               | 1440       | 85         | 0,84         | 33,2      | 2                              | 5,6                            | 2,8                            | 0,0238                   | 100                  | 62                                | 75                        |
|            | 6                      | 12,2              | 9,7               | 2905       | 79         | 0,90         | 19,7      | 2,5                            | 6,6                            | 3,3                            |                          |                      | 80                                | 93                        |
| 132M-4/2   | 7                      | 14,1              | 11,3              | 1445       | 86,5       | 0,83         | 46        | 2,6                            | 6,5                            | 2,9                            | 0,0323                   | 110                  | 62                                | 75                        |
|            | 9                      | 17,5              | 14                | 2910       | 82,5       | 0,90         | 29,5      | 2,4                            | 6,9                            | 3,3                            |                          |                      | 80                                | 93                        |
| 160M-4/2   | 9,5                    | 18,7              | 14,9              | 1455       | 87,5       | 0,84         | 62        | 2,3                            | 6                              | 2,8                            | 0,0625                   | 168                  | 57                                | 70                        |
|            | 11                     | 20                | 16                | 2930       | 87         | 0,91         | 36        | 2,6                            | 6,9                            | 3,2                            |                          |                      | 68                                | 81                        |
| 160L-4/2   | 13                     | 25                | 20                | 1455       | 88,5       | 0,84         | 85        | 2,3                            | 6                              | 2,8                            | 0,085                    | 184                  | 57                                | 70                        |
|            | 16                     | 28,5              | 23                | 2930       | 87,5       | 0,92         | 52        | 2,6                            | 6,9                            | 3,2                            |                          |                      | 68                                | 81                        |
| 180M-4/2   | 16,5                   | 32                | 25,5              | 1460       | 89,5       | 0,83         | 108       | 2,8                            | 6,5                            | 2,7                            | 0,13                     | 198                  | 58                                | 71                        |
|            | 20                     | 36,5              | 29,5              | 2930       | 87,5       | 0,90         | 65        | 2,8                            | 7                              | 3,1                            |                          |                      | 69                                | 82                        |
| 180L-4/2   | 19                     | 36,5              | 29,5              | 1465       | 90         | 0,83         | 124       | 3,1                            | 6,6                            | 2,9                            | 0,155                    | 217                  | 58                                | 71                        |
|            | 25                     | 45,5              | 36,5              | 2940       | 88         | 0,90         | 81        | 2,9                            | 7,1                            | 3,2                            |                          |                      | 69                                | 82                        |
| 200L-4/2   | 26                     | 47                | 37,5              | 1470       | 91,5       | 0,87         | 169       | 2,8                            | 6,8                            | 3,1                            | 0,25                     | 274                  | 60                                | 74                        |
|            | 31                     | 54                | 43                | 2955       | 90         | 0,92         | 100       | 2,7                            | 7,2                            | 3,5                            |                          |                      | 73                                | 87                        |
| 225S-4/2   | 32                     | 59                | 47                | 1470       | 91,5       | 0,86         | 208       | 2,6                            | 6,5                            | 2,5                            | 0,4                      | 372                  | 61                                | 75                        |
|            | 38                     | 66                | 53                | 2950       | 90         | 0,92         | 123       | 2,6                            | 7,2                            | 3                              |                          |                      | 74                                | 88                        |
| 225M-4/2   | 38                     | 69                | 55                | 1470       | 92,5       | 0,86         | 247       | 2,8                            | 6,5                            | 2,7                            | 0,48                     | 402                  | 61                                | 75                        |
|            | 46                     | 79                | 63                | 2955       | 91,5       | 0,92         | 149       | 2,8                            | 7,2                            | 3,2                            |                          |                      | 74                                | 88                        |
| 250M-4/2   | 46                     | 82                | 65                | 1470       | 92,5       | 0,88         | 299       | 2,7                            | 6,5                            | 2,8                            | 0,75                     | 573                  | 63                                | 77                        |
|            | 55                     | 94                | 75                | 2955       | 91         | 0,93         | 178       | 2,9                            | 7,1                            | 3,3                            |                          |                      | 76                                | 90                        |
| 280S-4/2   | 63                     | 113               | 90                | 1480       | 93,5       | 0,86         | 407       | 2,8                            | 6,5                            | 2,5                            | 1,25                     | 740                  | 65                                | 79                        |
|            | 75                     | 129               | 103               | 2975       | 92         | 0,91         | 241       | 2,6                            | 7                              | 3,1                            |                          |                      | 78                                | 92                        |
| 280M-4/2   | 73                     | 131               | 105               | 1485       | 93,5       | 0,86         | 469       | 2,8                            | 6,5                            | 2,6                            | 1,48                     | 820                  | 65                                | 79                        |
|            | 87                     | 150               | 120               | 2970       | 92         | 0,91         | 280       | 2,4                            | 7,1                            | 3,2                            |                          |                      | 78                                | 92                        |
| 315S-4/2   | 85                     | 155               | 124               | 1485       | 94         | 0,84         | 547       | 2,5                            | 6,5                            | 2,4                            | 2,2                      | 1040                 | 67                                | 82                        |
|            | 100                    | 174               | 139               | 2975       | 92         | 0,90         | 321       | 2,1                            | 7                              | 2,8                            |                          |                      | 80                                | 95                        |
| 315M-4/2   | 100                    | 179               | 143               | 1485       | 95         | 0,85         | 643       | 2,6                            | 6,6                            | 2,6                            | 2,7                      | 1120                 | 67                                | 82                        |
|            | 125                    | 215               | 172               | 2975       | 92         | 0,91         | 401       | 2,3                            | 7,1                            | 3                              |                          |                      | 80                                | 95                        |
| 315L1-4/2  | 120                    | 215               | 172               | 1485       | 95         | 0,85         | 772       | 2,6                            | 6,5                            | 2,4                            | 3,3                      | 1210                 | 67                                | 82                        |
|            | 150                    | 260               | 205               | 2975       | 92         | 0,91         | 482       | 2,3                            | 7                              | 2,9                            |                          |                      | 80                                | 95                        |
| 315L2-4/2  | 145                    | 260               | 205               | 1485       | 95         | 0,85         | 932       | 2,6                            | 6,5                            | 2,4                            | 3,8                      | 1430                 | 67                                | 82                        |
|            | 175                    | 300               | 240               | 2975       | 92         | 0,91         | 562       | 2,3                            | 7                              | 2,9                            |                          |                      | 80                                | 95                        |
| 355S-4/2   | 160                    | 280               | 220               | 1485       | 95,5       | 0,87         | 1029      | 1,3                            | 6,4                            | 2,4                            | 5,1                      | 1800                 | 70                                | 86                        |
|            | 200                    | 330               | 265               | 2980       | 94         | 0,93         | 641       | 1,4                            | 6,9                            | 2,7                            |                          |                      | 82                                | 98                        |
| 355M1-4/2  | 180                    | 315               | 250               | 1485       | 95,5       | 0,87         | 1158      | 1,3                            | 6,6                            | 2,3                            | 5,6                      | 1900                 | 70                                | 86                        |
|            | 220                    | 365               | 290               | 2980       | 94         | 0,93         | 705       | 1,3                            | 7,1                            | 2,6                            |                          |                      | 82                                | 98                        |
| 355M2-4/2  | 200                    | 345               | 280               | 1485       | 95,5       | 0,87         | 1286      | 1,3                            | 6,5                            | 2,3                            | 6                        | 2050                 | 70                                | 86                        |
|            | 250                    | 415 <sup>1)</sup> | 330               | 2985       | 94         | 0,93         | 800       | 1,3                            | 7                              | 2,6                            |                          |                      | 82                                | 98                        |
| 355L-4/2   | 220                    | 380               | 305               | 1485       | 96         | 0,87         | 1415      | 1,3                            | 6,5                            | 2,3                            | 6,7                      | 2200                 | 70                                | 86                        |
|            | 280                    | 460 <sup>1)</sup> | 370               | 2985       | 94,5       | 0,93         | 896       | 1,3                            | 7                              | 2,6                            |                          |                      | 82                                | 98                        |

## Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

Temperature class T4

ns = 1000/1500 rpm, 2p = 6/4

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Frame size | Output                 | Rated current at  |                   | Speed      | Efficiency | Power factor | Torque    | Starting torque                | Starting current               | Stalling torque                | Moment of inertia        | Weight <sup>1)</sup> | Noise levels with radial-flow fan |                           |
|------------|------------------------|-------------------|-------------------|------------|------------|--------------|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------|----------------------|-----------------------------------|---------------------------|
| CD...      | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]   | cos φ        | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | L <sub>p</sub><br>[dB(A)]         | L <sub>w</sub><br>[dB(A)] |
| 90S-6/4    | 0,45                   | 1,5               | 1,2               | 940        | 62         | 0,70         | 4,6       | 1,8                            | 3,5                            | 2,3                            | 0,0038                   | 31                   | 52                                | 64                        |
|            | 0,65                   | 1,77              | 1,42              | 1435       | 68         | 0,78         | 4,3       | 1,7                            | 4,2                            | 2,5                            |                          |                      | 55                                | 67                        |
| 90L-6/4    | 0,6                    | 1,91              | 1,53              | 940        | 63         | 0,72         | 6,1       | 1,8                            | 3,6                            | 2,3                            | 0,0051                   | 35                   | 52                                | 64                        |
|            | 0,9                    | 2,3               | 1,86              | 1435       | 71         | 0,80         | 6         | 1,7                            | 4,6                            | 2,5                            |                          |                      | 55                                | 67                        |
| 100L1-6/4  | 0,9                    | 2,5               | 1,98              | 945        | 69         | 0,76         | 9,1       | 1,7                            | 3,8                            | 2,1                            | 0,008                    | 44                   | 53                                | 65                        |
|            | 1,3                    | 3,05              | 2,45              | 1450       | 76,5       | 0,80         | 8,6       | 2                              | 5,9                            | 2,8                            |                          |                      | 57                                | 69                        |
| 100L2-6/4  | 1,1                    | 3,05              | 2,4               | 940        | 69         | 0,76         | 11,2      | 1,7                            | 3,8                            | 2,1                            | 0,0105                   | 46                   | 53                                | 65                        |
|            | 1,7                    | 3,95              | 3,15              | 1445       | 77,5       | 0,8          | 11,2      | 1,9                            | 5,5                            | 2,6                            |                          |                      | 57                                | 69                        |
| 112M-6/4   | 1,5                    | 3,6               | 2,9               | 950        | 74         | 0,81         | 15,1      | 1,8                            | 4,6                            | 2,2                            | 0,019                    | 59                   | 54                                | 66                        |
|            | 2,4                    | 5,1               | 4,05              | 1425       | 76,5       | 0,89         | 16,1      | 1,7                            | 4,8                            | 2,4                            |                          |                      | 59                                | 71                        |
| 132S-6/4   | 2,2                    | 5,2               | 4,2               | 960        | 75         | 0,81         | 21,9      | 1,6                            | 4,6                            | 2,6                            | 0,033                    | 104                  | 59                                | 72                        |
|            | 3,3                    | 7,1               | 5,7               | 1450       | 78         | 0,86         | 21,7      | 1,7                            | 5,9                            | 2,6                            |                          |                      | 62                                | 75                        |
| 132M-6/4   | 3                      | 7                 | 5,6               | 965        | 76,5       | 0,81         | 29,7      | 1,7                            | 5,5                            | 2,6                            | 0,046                    | 112                  | 59                                | 72                        |
|            | 4,5                    | 9,2               | 7,4               | 1455       | 80         | 0,88         | 29,5      | 1,8                            | 6,3                            | 2,7                            |                          |                      | 62                                | 75                        |
| 160M-6/4   | 4,5                    | 10                | 8                 | 970        | 80,5       | 0,81         | 44,3      | 2,1                            | 6,4                            | 2,9                            | 0,095                    | 170                  | 64                                | 77                        |
|            | 6,6                    | 12,8              | 10,2              | 1445       | 82         | 0,91         | 43,6      | 1,8                            | 6,3                            | 2,7                            |                          |                      | 70                                | 83                        |
| 160L-6/4   | 6,5                    | 13,2              | 10,5              | 960        | 81         | 0,88         | 65        | 1,6                            | 5,5                            | 2,5                            | 0,13                     | 190                  | 64                                | 77                        |
|            | 9,5                    | 18,1              | 14,5              | 1465       | 85         | 0,89         | 62        | 1,9                            | 6,9                            | 3                              |                          |                      | 70                                | 83                        |
| 180L-6/4   | 11                     | 23,5              | 18,9              | 975        | 85         | 0,79         | 108       | 2,4                            | 6,9                            | 3,2                            | 0,155                    | 215                  | 56                                | 69                        |
|            | 16                     | 29,5              | 23,5              | 1465       | 87         | 0,90         | 104       | 1,8                            | 6,6                            | 2,8                            |                          |                      | 63                                | 76                        |
| 200L-6/4   | 16                     | 32,5              | 26                | 975        | 86,5       | 0,82         | 155       | 2                              | 6,6                            | 2,9                            | 0,338                    | 280                  | 56                                | 70                        |
|            | 24                     | 43,5              | 35                | 1470       | 89         | 0,89         | 156       | 1,8                            | 6,9                            | 2,9                            |                          |                      | 63                                | 77                        |
| 225S-6/4   | 21                     | 40                | 32                | 975        | 89         | 0,85         | 206       | 2,8                            | 6,5                            | 2,8                            | 0,4                      | 372                  | 60                                | 74                        |
|            | 31                     | 54                | 43                | 1470       | 90         | 0,92         | 201       | 2,2                            | 6,7                            | 2,9                            |                          |                      | 67                                | 81                        |
| 225M-6/4   | 25                     | 47                | 37,5              | 975        | 89,5       | 0,86         | 245       | 2,9                            | 6,7                            | 2,9                            | 0,48                     | 404                  | 60                                | 74                        |
|            | 37                     | 64                | 51                | 1470       | 91         | 0,92         | 240       | 2,4                            | 6,9                            | 3                              |                          |                      | 67                                | 81                        |
| 250M-6/4   | 32                     | 59                | 47                | 975        | 90         | 0,87         | 313       | 2,9                            | 6,9                            | 2,8                            | 0,75                     | 570                  | 61                                | 75                        |
|            | 47                     | 81                | 65                | 1475       | 91         | 0,92         | 304       | 2,4                            | 7,1                            | 2,9                            |                          |                      | 68                                | 82                        |
| 280S-6/4   | 45                     | 89                | 71                | 980        | 91         | 0,8          | 439       | 2,9                            | 6,3                            | 2,8                            | 1,02                     | 740                  | 62                                | 76                        |
|            | 66                     | 118               | 86                | 1480       | 92,5       | 0,87         | 426       | 2,7                            | 7,1                            | 3,1                            |                          |                      | 70                                | 84                        |
| 280M-6/4   | 54                     | 107               | 86                | 980        | 91         | 0,80         | 526       | 3,2                            | 6,7                            | 3                              | 1,27                     | 820                  | 62                                | 76                        |
|            | 80                     | 142               | 113               | 1475       | 92,5       | 0,88         | 518       | 2,6                            | 7                              | 3                              |                          |                      | 70                                | 84                        |
| 315S-6/4   | 60                     | 114               | 91                | 985        | 92,5       | 0,82         | 582       | 2,4                            | 6,6                            | 2,3                            | 2,2                      | 996                  | 63                                | 78                        |
|            | 85                     | 147               | 118               | 1480       | 93,5       | 0,89         | 547       | 2,5                            | 6,9                            | 2,5                            |                          |                      | 71                                | 86                        |
| 315M-6/4   | 70                     | 134               | 107               | 985        | 93         | 0,81         | 679       | 2,5                            | 6,7                            | 2,4                            | 2,7                      | 1096                 | 63                                | 78                        |
|            | 100                    | 173               | 138               | 1480       | 94         | 0,89         | 643       | 2,6                            | 6,9                            | 2,5                            |                          |                      | 71                                | 86                        |
| 315L1-6/4  | 85                     | 161               | 129               | 985        | 93         | 0,82         | 824       | 2,6                            | 6,8                            | 2,5                            | 3,3                      | 1221                 | 63                                | 78                        |
|            | 120                    | 205               | 164               | 1480       | 94         | 0,90         | 772       | 2,7                            | 7                              | 2,6                            |                          |                      | 71                                | 86                        |
| 315L2-6/4  | 100                    | 182               | 145               | 985        | 93,5       | 0,85         | 970       | 2,6                            | 6,8                            | 2,5                            | 3,9                      | 1290                 | 63                                | 78                        |
|            | 140                    | 235               | 189               | 1485       | 95         | 0,90         | 900       | 2,7                            | 7                              | 2,6                            |                          |                      | 71                                | 86                        |
| 355S-6/4   | 110                    | 192               | 154               | 985        | 94         | 0,88         | 1067      | 1,7                            | 6,8                            | 2,4                            | 8,9                      | 1750                 | 83                                | 83                        |
|            | 160                    | 265               | 215               | 1485       | 95         | 0,91         | 1029      | 1,6                            | 6,8                            | 2,3                            |                          |                      | 92                                | 92                        |
| 355M-6/4   | 130                    | 225               | 181               | 985        | 94         | 0,88         | 1260      | 1,7                            | 6,8                            | 2,3                            | 10,9                     | 1950                 | 83                                | 83                        |
|            | 180                    | 300               | 240               | 1485       | 95         | 0,91         | 1152      | 1,6                            | 7                              | 2,2                            |                          |                      | 92                                | 92                        |
| 355L-6/4   | 150                    | 260               | 210               | 990        | 94,5       | 0,88         | 1454      | 1,6                            | 6,9                            | 2,3                            | 12,6                     | 2200                 | 83                                | 83                        |
|            | 210                    | 350               | 280               | 1485       | 95         | 0,91         | 1351      | 1,6                            | 6,9                            | 2,3                            |                          |                      | 92                                | 92                        |

## Notes:

1) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

# Pole-changing Motors Mains Operation 50 Hz

Temperature class T4,  
ns = 750/1500 rpm, 2p = 8/4

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Frame size | Out-put                | Rated current at  |                   | Speed      | Efficiency | Power factor | Torque    | Starting torque                | Starting current               | Stalling torque                | Moment of inertia        | Weight <sup>1)</sup> | Noise levels with radial-flow fan |                           |
|------------|------------------------|-------------------|-------------------|------------|------------|--------------|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------|----------------------|-----------------------------------|---------------------------|
| CD...      | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]   | cos φ        | M<br>[Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | L <sub>p</sub><br>[dB(A)]         | L <sub>w</sub><br>[dB(A)] |
| 90S-8/4    | 0,4                    | 1,62              | 1,3               | 695        | 57,5       | 0,62         | 5,5       | 1,6                            | 2,9                            | 2                              | 0,0038                   | 31                   | 49                                | 61                        |
|            | 0,6                    | 1,46              | 1,17              | 1395       | 69         | 0,86         | 4,1       | 1,6                            | 4,2                            | 2,3                            |                          |                      | 52                                | 64                        |
| 90L-8/4    | 0,55                   | 2,1               | 1,68              | 700        | 60         | 0,63         | 7,5       | 1,6                            | 3,3                            | 2,2                            | 0,0051                   | 35                   | 49                                | 61                        |
|            | 0,8                    | 1,84              | 1,47              | 1410       | 72         | 0,87         | 5,4       | 1,8                            | 4,6                            | 2,6                            |                          |                      | 52                                | 64                        |
| 100L1-8/4  | 0,9                    | 3,05              | 2,45              | 690        | 60         | 0,71         | 12,5      | 1,6                            | 3,2                            | 2,1                            | 0,008                    | 44                   | 52                                | 64                        |
|            | 1,3                    | 3                 | 2,45              | 1385       | 69,5       | 0,89         | 8,9       | 1,6                            | 4,2                            | 2,2                            |                          |                      | 55                                | 67                        |
| 100L2-8/4  | 1                      | 3,1               | 2,5               | 700        | 65         | 0,71         | 13,6      | 1,7                            | 3,7                            | 2,2                            | 0,011                    | 46                   | 52                                | 64                        |
|            | 1,6                    | 3,6               | 2,9               | 1395       | 71         | 0,9          | 11        | 1,7                            | 4,5                            | 2,4                            |                          |                      | 55                                | 67                        |
| 112M-8/4   | 1,5                    | 4,6               | 3,7               | 710        | 72,5       | 0,65         | 20,2      | 2                              | 4,4                            | 2,2                            | 0,019                    | 59                   | 52                                | 64                        |
|            | 2,5                    | 5,1               | 4,1               | 1410       | 78         | 0,90         | 16,9      | 1,9                            | 5,2                            | 2,3                            |                          |                      | 56                                | 68                        |
| 132S-8/4   | 2,3                    | 6,8               | 5,4               | 720        | 75         | 0,65         | 30,5      | 1,8                            | 4,4                            | 2,6                            | 0,0325                   | 97                   | 53                                | 66                        |
|            | 3,6                    | 7,2               | 5,8               | 1440       | 81         | 0,89         | 23,8      | 1,8                            | 5,8                            | 2,5                            |                          |                      | 62                                | 75                        |
| 132M-8/4   | 3                      | 8,5               | 6,7               | 720        | 78         | 0,66         | 40        | 2                              | 4,6                            | 2,7                            | 0,046                    | 113                  | 53                                | 66                        |
|            | 5                      | 9,7               | 7,8               | 1440       | 82,5       | 0,90         | 33        | 1,9                            | 5,8                            | 2,6                            |                          |                      | 62                                | 75                        |
| 160M1-8/4  | 4,7                    | 11,5              | 9,2               | 720        | 81         | 0,73         | 62        | 1,7                            | 4,8                            | 2,5                            | 0,081                    | 157                  | 54                                | 67                        |
|            | 5,5                    | 12,2              | 9,8               | 1445       | 76,5       | 0,85         | 36,3      | 2,1                            | 5,7                            | 3                              |                          |                      | 66                                | 79                        |
| 160M2-8/4  | 5,5                    | 12,3              | 9,8               | 715        | 83         | 0,78         | 73        | 1,7                            | 4,6                            | 2,2                            | 0,108                    | 170                  | 54                                | 67                        |
|            | 7,5                    | 14,8              | 11,9              | 1440       | 81         | 0,90         | 50        | 2                              | 6,1                            | 2,8                            |                          |                      | 66                                | 79                        |
| 160L-8/4   | 7                      | 16,3              | 13                | 720        | 84         | 0,74         | 93        | 2                              | 5,5                            | 2,7                            | 0,145                    | 190                  | 54                                | 67                        |
|            | 11                     | 22                | 17,5              | 1445       | 81,5       | 0,89         | 73        | 2                              | 6,6                            | 3                              |                          |                      | 66                                | 79                        |
| 180L-8/4   | 11                     | 25                | 20                | 725        | 86,5       | 0,73         | 145       | 2                              | 6                              | 2,8                            | 0,243                    | 215                  | 53                                | 66                        |
|            | 18                     | 32                | 25,5              | 1460       | 88,5       | 0,92         | 118       | 2                              | 6,9                            | 3,1                            |                          |                      | 63                                | 76                        |
| 200L-8/4   | 17                     | 41                | 33                | 730        | 88         | 0,68         | 222       | 2,2                            | 6,4                            | 3,5                            | 0,438                    | 280                  | 53                                | 67                        |
|            | 27                     | 47                | 37,5              | 1470       | 91         | 0,91         | 175       | 2                              | 7,3                            | 3,6                            |                          |                      | 63                                | 77                        |
| 225S-8/4   | 22                     | 48,5              | 39                | 730        | 88,5       | 0,74         | 288       | 2,3                            | 6,4                            | 3,3                            | 0,625                    | 372                  | 56                                | 70                        |
|            | 32                     | 56                | 45                | 1470       | 90,5       | 0,91         | 208       | 2,1                            | 7,3                            | 3,5                            |                          |                      | 67                                | 81                        |
| 225M-8/4   | 26                     | 53                | 43                | 730        | 90         | 0,78         | 340       | 2,4                            | 6,5                            | 3,4                            | 0,75                     | 404                  | 56                                | 70                        |
|            | 38                     | 65                | 52                | 1470       | 91         | 0,91         | 247       | 2,2                            | 7,3                            | 3,6                            |                          |                      | 67                                | 81                        |
| 250M-8/4   | 32                     | 65                | 52                | 735        | 90,8       | 0,78         | 416       | 1,9                            | 6,8                            | 2,9                            | 1,28                     | 570                  | 55                                | 69                        |
|            | 47                     | 80                | 64                | 1480       | 92         | 0,92         | 303       | 2                              | 7,4                            | 3,3                            |                          |                      | 68                                | 82                        |
| 280S-8/4   | 42                     | 85                | 68                | 735        | 91,5       | 0,78         | 546       | 2,1                            | 6,4                            | 2,5                            | 2                        | 740                  | 58                                | 72                        |
|            | 60                     | 101               | 81                | 1475       | 92,5       | 0,93         | 388       | 2,1                            | 7,2                            | 3,1                            |                          |                      | 70                                | 84                        |
| 280M-8/4   | 50                     | 98                | 78                | 735        | 92         | 0,80         | 650       | 2,1                            | 6,5                            | 2,4                            | 2,4                      | 810                  | 58                                | 72                        |
|            | 72                     | 120               | 96                | 1475       | 93         | 0,93         | 466       | 2                              | 7,2                            | 3                              |                          |                      | 70                                | 84                        |
| 315S-8/4   | 60                     | 114               | 91                | 740        | 92,5       | 0,82         | 774       | 2,6                            | 6,5                            | 2,5                            | 4,4                      | 996                  | 67                                | 82                        |
|            | 90                     | 150               | 120               | 1480       | 93         | 0,93         | 581       | 2,5                            | 7                              | 2,6                            |                          |                      | 79                                | 94                        |
| 315M-8/4   | 75                     | 143               | 114               | 740        | 92,5       | 0,82         | 968       | 2,6                            | 6,3                            | 2,5                            | 5,4                      | 1096                 | 67                                | 82                        |
|            | 110                    | 184               | 147               | 1480       | 93         | 0,93         | 710       | 2,5                            | 7,1                            | 2,7                            |                          |                      | 79                                | 94                        |
| 315L1-8/4  | 90                     | 170               | 136               | 740        | 93         | 0,82         | 1161      | 2,7                            | 6,6                            | 2,6                            | 6,6                      | 1221                 | 67                                | 82                        |
|            | 132                    | 220               | 175               | 1480       | 93,5       | 0,93         | 852       | 2,5                            | 7,1                            | 2,9                            |                          |                      | 79                                | 94                        |
| 315L2-8/4  | 115                    | 215               | 173               | 740        | 92,5       | 0,83         | 1484      | 2,6                            | 6,6                            | 2,5                            | 8                        | 1320                 | 67                                | 82                        |
|            | 160                    | 265               | 215               | 1480       | 93         | 0,93         | 1032      | 2,6                            | 7,1                            | 3                              |                          |                      | 79                                | 94                        |
| 355M-8/4   | 120                    | 230               | 185               | 745        | 94         | 0,8          | 1538      | 1,3                            | 6,6                            | 2,4                            | 8,9                      | 1750                 | 69                                | 85                        |
|            | 175                    | 320               | 255               | 1485       | 94,5       | 0,93         | 1125      | 1,5                            | 7,3                            | 2,5                            |                          |                      | 76                                | 92                        |
| 355L1-8/4  | 140                    | 265               | 215               | 745        | 95         | 0,80         | 1795      | 1,4                            | 6,9                            | 2,5                            | 10,9                     | 1950                 | 69                                | 85                        |
|            | 215                    | 345               | 275               | 1490       | 95,3       | 0,95         | 1378      | 1,6                            | 7,6                            | 2,3                            |                          |                      | 76                                | 92                        |
| 355L2-8/4  | 165                    | 315               | 250               | 745        | 95         | 0,80         | 2115      | 1,3                            | 6,8                            | 2,4                            | 12,6                     | 2200                 | 69                                | 85                        |
|            | 250                    | 400               | 320               | 1490       | 95,5       | 0,94         | 1602      | 1,5                            | 7,6                            | 2,4                            |                          |                      | 76                                | 92                        |

## Notes:

1) Construction type B3 with terminal box of type EAR

These values also apply to the BD... series

Temperature class T4,  
fan design

Ambient temperature 40 °C, winding temperature increase within thermal class F

| Frame size | 2p = 4/2<br>1500/3000 rpm<br>Output<br>P <sub>2</sub> [kW] |      | Frame size | 2p = 6/4<br>1000/1500 rpm<br>Output<br>P <sub>2</sub> [kW] |     | Frame size | 2p = 8/4<br>750/1500 rpm<br>Output<br>P <sub>2</sub> [kW] |     |
|------------|------------------------------------------------------------|------|------------|------------------------------------------------------------|-----|------------|-----------------------------------------------------------|-----|
| CD...      |                                                            |      | CD...      |                                                            |     | CD...      |                                                           |     |
| 80M1       | 0,17                                                       | 0,65 | -          | -                                                          | -   | -          | -                                                         | -   |
| 80M2       | 0,25                                                       | 0,85 | -          | -                                                          | -   | -          | -                                                         | -   |
| 90S        | 0,37                                                       | 1,4  | 90S        | 0,3                                                        | 1   | 90S        | 0,13                                                      | 0,6 |
| 90L        | 0,5                                                        | 1,9  | 90L        | 0,4                                                        | 1,3 | 90L        | 0,18                                                      | 0,8 |
| 100L       | 0,85                                                       | 3,2  | 100L1      | 0,6                                                        | 1,8 | 100L1      | 0,3                                                       | 1,3 |
| -          | -                                                          | -    | 100L2      | 0,75                                                       | 2,4 | 100L2      | 0,33                                                      | 1,6 |
| 112M       | 1,2                                                        | 4,4  | 112M       | 0,9                                                        | 3   | 112M       | 0,5                                                       | 2,5 |
| 132S       | 1,7                                                        | 6    | 132S       | 1,3                                                        | 4,3 | 132S       | 0,75                                                      | 3,6 |
| 132M       | 2,3                                                        | 9    | 132M       | 1,8                                                        | 5,5 | 132M       | 1                                                         | 5   |
| 160M       | 3,1                                                        | 11   | 160M       | 3                                                          | 9   | 160M1      | 1,6                                                       | 5,5 |
| 160L       | 4,3                                                        | 16   | 160L       | 3,5                                                        | 12  | 160M2      | 1,8                                                       | 7,5 |
| -          | -                                                          | -    | -          | -                                                          | -   | 160L       | 2,3                                                       | 11  |
| 180M       | 5,5                                                        | 20   | -          | -                                                          | -   | -          | -                                                         | -   |
| 180L       | 6,3                                                        | 25   | 180L       | 6,5                                                        | 19  | 180L       | 3,7                                                       | 18  |
| 200L       | 8,7                                                        | 31   | 200L       | 9,5                                                        | 26  | 200L       | 5,7                                                       | 27  |
| 225S       | 11                                                         | 38   | 225S       | 12                                                         | 34  | 225S       | 7,3                                                       | 32  |
| 225M       | 13                                                         | 46   | 225M       | 14,5                                                       | 40  | 225M       | 8,7                                                       | 38  |
| 250M       | 15                                                         | 55   | 250M       | 18                                                         | 52  | 250M       | 11                                                        | 47  |
| 280S       | 21                                                         | 75   | 280S       | 25                                                         | 70  | 280S       | 14                                                        | 60  |
| 280M       | 24                                                         | 87   | 280M       | 30                                                         | 82  | 280M       | 17                                                        | 72  |
| 315S       | 28                                                         | 100  | 315S       | 32                                                         | 95  | 315S       | 20                                                        | 90  |
| 315M       | 33                                                         | 125  | 315M       | 37                                                         | 115 | 315M       | 25                                                        | 110 |
| 315L1      | 40                                                         | 150  | 315L1      | 47                                                         | 135 | 315L1      | 30                                                        | 132 |
| 315L2      | 48                                                         | 175  | 315L2      | 55                                                         | 160 | 315L2      | 38                                                        | 160 |
| 355S       | 53                                                         | 200  | 355S       | 60                                                         | 185 | -          | -                                                         | -   |
| 355M1      | 60                                                         | 220  | 355M       | 70                                                         | 200 | 355M       | 40                                                        | 175 |
| 355M2      | 67                                                         | 250  | 355L       | 80                                                         | 230 | 355L1      | 47                                                        | 215 |
| 355L       | 73                                                         | 280  | -          | -                                                          | -   | 355L2      | 55                                                        | 250 |

These values also apply to the BD... series

# Motors with Integral Brake

## Mains Operation 50 Hz

Temperature class T4

2p = 2, 4, 6, 8

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| Frame size            | Output                 | Rated current at  |                   | Speed                                         | Efficiency | Power factor | Starting torque                | Starting current               | Motor torque | Braking torque <sup>1)</sup> | Brake type | Moment of inertia        | Weight <sup>2)</sup> | Permissible switching operations for operating mode S4 |                 |                 |                 |
|-----------------------|------------------------|-------------------|-------------------|-----------------------------------------------|------------|--------------|--------------------------------|--------------------------------|--------------|------------------------------|------------|--------------------------|----------------------|--------------------------------------------------------|-----------------|-----------------|-----------------|
| BD...B                | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm]                                    | η<br>[%]   | cos φ        | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M<br>[Nm]    | M <sub>B</sub><br>[Nm]       |            | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | Fl = 1,5<br>[S/h]                                      | Fl = 2<br>[S/h] | Fl = 3<br>[S/h] | Fl = 4<br>[S/h] |
| ns = 3000 rpm, 2p = 2 |                        |                   |                   | Efficiency according to manufacturer standard |            |              |                                |                                |              |                              |            |                          |                      |                                                        |                 |                 |                 |
| 80M1-2                | 0,75                   | 1,84              | 1,47              | 2790                                          | 70         | 0,84         | 2,7                            | 4,8                            | 2,57         | 10                           | M 8        | 0,000925                 | 26                   | 1110                                                   | 935             | 710             | 570             |
| 80M2-2                | 1,1                    | 2,6               | 2,05              | 2820                                          | 75         | 0,82         | 2,8                            | 5,5                            | 3,7          | 10                           | M 8        | 0,00118                  | 27                   | 580                                                    | 495             | 435             | 320             |
| 90S-2                 | 1,5                    | 3,25              | 2,6               | 2840                                          | 77         | 0,86         | 2,7                            | 5,5                            | 5            | 20                           | M 16       | 0,00193                  | 38                   | 130                                                    | 115             | 90              | 80              |
| 90L-2                 | 2,2                    | 4,6               | 3,7               | 2850                                          | 81         | 0,85         | 2,7                            | 5,6                            | 7,4          | 20                           | M 16       | 0,00240                  | 42                   | 184                                                    | 165             | 135             | 115             |
| 100L-2                | 3                      | 6,1               | 4,85              | 2850                                          | 82         | 0,87         | 2,7                            | 6,8                            | 10,1         | 46                           | M 32       | 0,00365                  | 51                   | 71                                                     | 65              | 54              | 47              |
| 112M-2                | 4                      | 7,8               | 6,2               | 2880                                          | 84         | 0,88         | 2,3                            | 6,5                            | 13,3         | 46                           | M 32       | 0,00638                  | 64                   | 140                                                    | 120             | 95              | 75              |
| 132S1-2               | 5,5                    | 10,9              | 8,7               | 2880                                          | 84         | 0,87         | 2,5                            | 6,4                            | 18,2         | 86                           | M 60       | 0,013                    | 113                  | 53                                                     | 46              | 37              | 30              |
| 132S1-2               | 7,5                    | 14,6              | 11,7              | 2910                                          | 85         | 0,87         | 2,7                            | 6,8                            | 24,7         | 86                           | M 60       | 0,0159                   | 118                  | 70                                                     | 60              | 45              | 40              |
| ns = 1500 rpm, 2p = 4 |                        |                   |                   | Efficiency according to manufacturer standard |            |              |                                |                                |              |                              |            |                          |                      |                                                        |                 |                 |                 |
| 80M1-4                | 0,55                   | 1,38              | 1,1               | 1380                                          | 72         | 0,8          | 2                              | 3,8                            | 3,8          | 10                           | M 8        | 0,0013                   | 26                   | 1340                                                   | 1185            | 960             | 800             |
| 80M2-4                | 0,75                   | 1,85              | 1,48              | 1400                                          | 74         | 0,79         | 2,1                            | 4,2                            | 5,2          | 10                           | M 8        | 0,00168                  | 27                   | 1340                                                   | 1170            | 930             | 640             |
| 90S-4                 | 1,1                    | 2,55              | 2,05              | 1400                                          | 75         | 0,83         | 2,1                            | 4,8                            | 7,5          | 20                           | M 16       | 0,003                    | 38                   | 230                                                    | 205             | 170             | 145             |
| 90L-4                 | 1,5                    | 3,4               | 2,7               | 1405                                          | 78         | 0,82         | 2,3                            | 5                              | 10,3         | 20                           | M 16       | 0,00525                  | 42                   | 270                                                    | 245             | 200             | 170             |
| 100L1-4               | 2,2                    | 5                 | 4                 | 1420                                          | 79         | 0,8          | 2,4                            | 5,4                            | 14,8         | 46                           | M 32       | 0,00688                  | 51                   | 235                                                    | 215             | 185             | 165             |
| 100L2-4               | 3                      | 6,6               | 5,2               | 1415                                          | 79,5       | 0,83         | 2,3                            | 5,5                            | 20,1         | 46                           | M 32       | 0,007                    | 54                   | 110                                                    | 105             | 90              | 80              |
| 112M-4                | 4                      | 8,2               | 6,5               | 1435                                          | 84         | 0,84         | 2,7                            | 6,8                            | 26,5         | 46                           | M 32       | 0,0133                   | 69                   | 220                                                    | 210             | 180             | 160             |
| 132S-4                | 5,5                    | 11                | 8,8               | 1440                                          | 85         | 0,85         | 2,5                            | 6,2                            | 36,5         | 86                           | M 60       | 0,0263                   | 118                  | 100                                                    | 95              | 75              | 65              |
| 132M-4                | 7,5                    | 14,5              | 11,6              | 1440                                          | 87         | 0,86         | 2,7                            | 6,5                            | 50           | 86                           | M 60       | 0,0348                   | 128                  | 100                                                    | 90              | 75              | 65              |
| ns = 1000 rpm, 2p = 6 |                        |                   |                   | Efficiency according to manufacturer standard |            |              |                                |                                |              |                              |            |                          |                      |                                                        |                 |                 |                 |
| 80M1-6                | 0,37                   | 1,12              | 0,9               | 925                                           | 67         | 0,71         | 2,5                            | 4,1                            | 3,8          | 10                           | M 8        | 0,0024                   | 26                   | 1120                                                   | 950             | 725             | 590             |
| 80M2-6                | 0,55                   | 1,6               | 1,28              | 925                                           | 69         | 0,72         | 2,4                            | 4                              | 5,7          | 10                           | M 8        | 0,003                    | 27                   | 1145                                                   | 980             | 765             | 620             |
| 90S-6                 | 0,75                   | 2,2               | 1,75              | 910                                           | 66         | 0,75         | 1,8                            | 3,4                            | 7,8          | 20                           | M 16       | 0,00445                  | 38                   | 675                                                    | 605             | 500             | 425             |
| 90L-6                 | 1,1                    | 3,1               | 2,5               | 920                                           | 70         | 0,73         | 2                              | 3,7                            | 11,4         | 20                           | M 16       | 0,00573                  | 42                   | 125                                                    | 115             | 100             | 85              |
| 100L-6                | 1,5                    | 3,8               | 3,05              | 945                                           | 76         | 0,75         | 2,5                            | 4,9                            | 15,2         | 46                           | M 32       | 0,0113                   | 54                   | 240                                                    | 215             | 175             | 145             |
| 112M-6                | 2,2                    | 5,47              | 4,3               | 950                                           | 80         | 0,74         | 2,7                            | 5,6                            | 22,1         | 46                           | M 32       | 0,0198                   | 69                   | 595                                                    | 530             | 425             | 355             |
| 132S-6                | 3                      | 6,7               | 5,4               | 965                                           | 83         | 0,78         | 2,7                            | 6,3                            | 29,8         | 86                           | M 60       | 0,0347                   | 118                  | 390                                                    | 350             | 290             | 250             |
| 132M1-6               | 4                      | 8,8               | 7                 | 960                                           | 83,5       | 0,79         | 2,6                            | 6                              | 40           | 86                           | M 60       | 0,0415                   | 124                  | 215                                                    | 195             | 160             | 140             |
| 132M2-6               | 5,5                    | 11,6              | 9,3               | 960                                           | 84,5       | 0,81         | 2,6                            | 6,4                            | 55           | 86                           | M 60       | 0,0498                   | 133                  | 125                                                    | 110             | 95              | 80              |
| ns = 750 rpm, 2p = 8  |                        |                   |                   | Efficiency according to manufacturer standard |            |              |                                |                                |              |                              |            |                          |                      |                                                        |                 |                 |                 |
| 80M1-8                | 0,18                   | 0,66              | 0,52              | 690                                           | 61         | 0,65         | 2,2                            | 3,2                            | 2,5          | 10                           | M 8        | 0,0023                   | 26                   | 1125                                                   | 940             | 710             | 580             |
| 80M2-8                | 0,25                   | 0,91              | 0,73              | 690                                           | 62         | 0,64         | 2,2                            | 3,2                            | 3,5          | 10                           | M 8        | 0,0029                   | 27                   | 1125                                                   | 940             | 710             | 580             |
| 90S-8                 | 0,37                   | 1,3               | 1,04              | 690                                           | 63         | 0,65         | 1,8                            | 3                              | 5,1          | 20                           | M 16       | 0,0039                   | 38                   | 1285                                                   | 1090            | 920             | 780             |
| 90L-8                 | 0,55                   | 1,92              | 1,54              | 690                                           | 64,5       | 0,64         | 1,8                            | 3,1                            | 7,6          | 20                           | M 16       | 0,0052                   | 42                   | 1160                                                   | 980             | 830             | 690             |
| 100L1-8               | 0,75                   | 2,35              | 1,87              | 710                                           | 70         | 0,66         | 2,4                            | 4                              | 10,2         | 46                           | M 32       | 0,0094                   | 51                   | 970                                                    | 820             | 690             | 570             |
| 100L2-8               | 1,1                    | 3,1               | 2,5               | 695                                           | 70         | 0,73         | 2                              | 3,8                            | 15,1         | 46                           | M 32       | 0,0109                   | 54                   | 880                                                    | 750             | 630             | 520             |
| 112M-8                | 1,5                    | 4,2               | 3,35              | 710                                           | 77         | 0,67         | 2,2                            | 4,6                            | 20,5         | 46                           | M 32       | 0,0198                   | 69                   | 680                                                    | 560             | 480             | 406             |
| 132S-8                | 2,2                    | 5                 | 4                 | 695                                           | 80         | 0,79         | 2                              | 4,1                            | 30           | 86                           | M 60       | 0,0331                   | 113                  | 650                                                    | 550             | 460             | 380             |
| 132M-8                | 3                      | 7                 | 5,6               | 705                                           | 80,5       | 0,77         | 2,4                            | 4,6                            | 41           | 86                           | M 60       | 0,0401                   | 122                  | 630                                                    | 520             | 450             | 360             |

### Notes:

1) Efficiency according to manufacturer standard

2) Construction type B3 with terminal box of type EAR

## Temperature class T4

2p = 8/4, 8/2

| Frame size                  | Out-put                | Rated current at  |                   | Speed      | Effi-<br>ciency | Power factor | Starting tor-<br>que           | Starting current               | Motor tor-<br>que | Braking Tor-<br>que <sup>1)</sup> | Brake Type | Moment of Inertia        | Weight <sup>2)</sup> | Permissible switching operations for operating mode S4 15, 20, 40 oder 60% ED |               |               |               |
|-----------------------------|------------------------|-------------------|-------------------|------------|-----------------|--------------|--------------------------------|--------------------------------|-------------------|-----------------------------------|------------|--------------------------|----------------------|-------------------------------------------------------------------------------|---------------|---------------|---------------|
| BD...B                      | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | 500 V<br>I<br>[A] | n<br>[rpm] | η<br>[%]        | cos φ        | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M<br>[Nm]         | M <sub>B</sub><br>[Nm]            |            | J<br>[kgm <sup>2</sup> ] | m<br>[kg]            | FL=1,5<br>[S/h]                                                               | FL=2<br>[S/h] | FL=3<br>[S/h] | FL=4<br>[S/h] |
| ns = 750/1500 rpm, 2p = 8/4 |                        |                   |                   |            |                 |              |                                |                                |                   |                                   |            |                          |                      |                                                                               |               |               |               |
| 90S-8/4                     | 0,4                    | 1,62              | 1,3               | 695        | 57,5            | 0,62         | 1,6                            | 2,9                            | 5,5               | 20                                | M 16       | 0,0049                   | 38                   | on request                                                                    |               |               |               |
|                             | 0,6                    | 1,46              | 1,17              | 1395       | 69              | 0,86         | 1,6                            | 4,2                            | 4,1               |                                   |            |                          |                      |                                                                               |               |               |               |
| 90L-8/4                     | 0,55                   | 2,1               | 1,68              | 700        | 60              | 0,63         | 1,6                            | 3,3                            | 7,5               | 20                                | M 16       | 0,0069                   | 42                   |                                                                               |               |               |               |
|                             | 0,8                    | 1,84              | 1,47              | 1410       | 72              | 0,87         | 1,8                            | 4,6                            | 5,4               |                                   |            |                          |                      |                                                                               |               |               |               |
| 100L1-8/4                   | 0,9                    | 3,05              | 2,45              | 690        | 60              | 0,71         | 1,6                            | 3,2                            | 12,5              | 46                                | M 32       | 0,0098                   | 51                   | on request                                                                    |               |               |               |
|                             | 1,3                    | 3                 | 2,45              | 1385       | 69,5            | 0,89         | 1,5                            | 4,2                            | 9                 |                                   |            |                          |                      |                                                                               |               |               |               |
| 100L2-8/4                   | 1                      | 3,1               | 2,5               | 700        | 65              | 0,71         | 1,7                            | 3,7                            | 13,6              | 46                                | M 32       | 0,0138                   | 54                   |                                                                               |               |               |               |
|                             | 1,6                    | 3,6               | 2,9               | 1395       | 71              | 0,9          | 1,6                            | 4,5                            | 11                |                                   |            |                          |                      |                                                                               |               |               |               |
| 112M-8/4                    | 1,5                    | 4,6               | 3,7               | 710        | 72,5            | 0,65         | 2                              | 4,4                            | 20,2              | 46                                | M 32       | 0,0218                   | 69                   | on request                                                                    |               |               |               |
|                             | 2,5                    | 5,1               | 4,1               | 1410       | 78              | 0,9          | 1,9                            | 5,2                            | 16,9              |                                   |            |                          |                      |                                                                               |               |               |               |
| 132S-8/4                    | 2,3                    | 6,8               | 5,4               | 720        | 75              | 0,65         | 1,8                            | 4,4                            | 30,5              | 86                                | M 60       | 0,0353                   | 127                  | on request                                                                    |               |               |               |
|                             | 3,6                    | 7,2               | 5,8               | 1440       | 81              | 0,89         | 1,8                            | 5,8                            | 23,8              |                                   |            |                          |                      |                                                                               |               |               |               |
| 132M-8/4                    | 3                      | 8,5               | 6,7               | 720        | 78              | 0,66         | 2                              | 4,6                            | 40                | 86                                | M 60       | 0,0498                   | 138                  |                                                                               |               |               |               |
|                             | 5                      | 9,7               | 7,8               | 1440       | 82,5            | 0,9          | 1,9                            | 5,8                            | 33                |                                   |            |                          |                      |                                                                               |               |               |               |
| ns = 750/3000 rpm, 2p = 8/2 |                        |                   |                   |            |                 |              |                                |                                |                   |                                   |            |                          |                      |                                                                               |               |               |               |
| 80M1-8/2                    | 0,1                    | 0,5               | 0,4               | 685        | 46,5            | 0,62         | 1,5                            | 2,3                            | 1,39              | 10                                | M 8        | 0,0015                   | 26                   | on request                                                                    |               |               |               |
|                             | 0,4                    | 1,07              | 0,86              | 2870       | 62,5            | 0,86         | 2,3                            | 5,5                            | 1,33              |                                   |            |                          |                      |                                                                               |               |               |               |
| 80M2-8/2                    | 0,14                   | 0,69              | 0,55              | 685        | 47              | 0,62         | 1,4                            | 2,5                            | 1,95              | 10                                | M 8        | 0,0019                   | 27                   |                                                                               |               |               |               |
|                             | 0,56                   | 1,51              | 1,21              | 2870       | 63              | 0,85         | 2                              | 6                              | 1,86              |                                   |            |                          |                      |                                                                               |               |               |               |
| 90S-8/2                     | 0,2                    | 0,95              | 0,76              | 710        | 49              | 0,62         | 1,9                            | 2,3                            | 2,7               | 20                                | M 16       | 0,0035                   | 38                   | on request                                                                    |               |               |               |
|                             | 0,8                    | 2                 | 1,61              | 2885       | 63              | 0,91         | 2,3                            | 5,5                            | 2,65              |                                   |            |                          |                      |                                                                               |               |               |               |
| 90L-8/2                     | 0,3                    | 1,37              | 1,1               | 710        | 51              | 0,62         | 1,7                            | 2,8                            | 4                 | 20                                | M 16       | 0,0058                   | 42                   |                                                                               |               |               |               |
|                             | 1,1                    | 2,55              | 2,05              | 2885       | 68              | 0,91         | 2,1                            | 6,2                            | 3,6               |                                   |            |                          |                      |                                                                               |               |               |               |
| 100L1-8/2                   | 0,33                   | 1,42              | 1,14              | 715        | 54              | 0,62         | 1,9                            | 3                              | 4,4               | 46                                | M32        | 0,0069                   | 51                   | on request                                                                    |               |               |               |
|                             | 1,3                    | 2,85              | 2,25              | 2885       | 72              | 0,92         | 1,8                            | 6                              | 4,3               |                                   |            |                          |                      |                                                                               |               |               |               |
| 100L2-8/2                   | 0,4                    | 1,68              | 1,34              | 715        | 55,5            | 0,62         | 1,9                            | 3,3                            | 5,3               | 46                                | M 32       | 0,007                    | 54                   |                                                                               |               |               |               |
|                             | 1,5                    | 3,2               | 2,55              | 2890       | 73,5            | 0,92         | 1,8                            | 6,1                            | 5                 |                                   |            |                          |                      |                                                                               |               |               |               |
| 112M-8/2                    | 0,55                   | 2,15              | 1,72              | 715        | 59,5            | 0,62         | 1,6                            | 3,2                            | 7,3               | 46                                | M 32       | 0,011                    | 69                   | on request                                                                    |               |               |               |
|                             | 2,2                    | 4,9               | 3,95              | 2920       | 78,5            | 0,92         | 2,5                            | 7,2                            | 7,2               |                                   |            |                          |                      |                                                                               |               |               |               |
| 132S-8/2                    | 0,8                    | 2,95              | 2,35              | 720        | 60              | 0,65         | 1,7                            | 3,2                            | 10,6              | 86                                | M 60       | 0,0286                   | 127                  | on request                                                                    |               |               |               |
|                             | 3,2                    | 6,6               | 5,3               | 2925       | 76,5            | 0,92         | 2,5                            | 7,2                            | 10,4              |                                   |            |                          |                      |                                                                               |               |               |               |
| 132M-8/2                    | 1,1                    | 3,8               | 3,05              | 725        | 65              | 0,64         | 2,1                            | 3,5                            | 14,5              | 86                                | M 60       | 0,037                    | 138                  |                                                                               |               |               |               |
|                             | 4,2                    | 8,1               | 6,5               | 2935       | 80,5            | 0,93         | 2,6                            | 7,2                            | 13,7              |                                   |            |                          |                      |                                                                               |               |               |               |

## Notes:

1) Tolerance -20%/+40% at 1m/s friction speed

2) Construction type B3 with terminal box of type EAR

# External Brakes for Motors

## Mains Operation 50 Hz

Temperature class T4,  
Type ...S

90

| Frame size            | Out-put                | Motor tor-que | Braking tor-que        | Brake type | Moment of inertia                     | Weight                 |
|-----------------------|------------------------|---------------|------------------------|------------|---------------------------------------|------------------------|
| CD...S                | P <sub>2</sub><br>[kW] | M<br>[Nm]     | M <sub>B</sub><br>[Nm] |            | J <sub>B</sub><br>[kgm <sup>2</sup> ] | m <sub>B</sub><br>[kg] |
| ns = 3000 rpm, 2p = 2 |                        |               |                        |            |                                       |                        |
| 80M1-2                | 0,75                   | 2,57          | 10                     | 10         | 0,0025                                | 15                     |
| 80M2-2                | 1,1                    | 3,73          | 10                     | 10         | 0,0025                                | 15                     |
| 90S-2                 | 1,5                    | 5             | 20                     | 11         | 0,0025                                | 15                     |
| 90L-2                 | 2,2                    | 7,4           | 20                     | 11         | 0,0025                                | 15                     |
| 100L-2                | 3                      | 10,1          | 50                     | 13         | 0,0215                                | 29                     |
| 112M-2                | 4                      | 13,3          | 50                     | 13         | 0,0215                                | 29                     |
| 132S1-2               | 5,5                    | 18,2          | 50                     | 13         | 0,0215                                | 29                     |
| 132S2-2               | 7,5                    | 24,6          | 100                    | 16         | 0,0215                                | 29                     |
| 160M1-2               | 11                     | 36            | 150                    | 19         | 0,125                                 | 57                     |
| 160M2-2               | 15                     | 49            | 150                    | 19         | 0,125                                 | 57                     |
| 160L-2                | 18,5                   | 60            | 150                    | 19         | 0,125                                 | 57                     |
| 180M-2                | 22                     | 72            | 150                    | 19         | 0,125                                 | 57                     |
| 200L1-2               | 30                     | 97            | 270                    | 24         | 0,125                                 | 57                     |
| 200L2-2               | 37                     | 120           | 270                    | 24         | 0,125                                 | 57                     |

|                       |      |      |     |    |        |    |
|-----------------------|------|------|-----|----|--------|----|
| ns = 1500 rpm, 2p = 4 |      |      |     |    |        |    |
| 80M1-4                | 0,55 | 3,8  | 10  | 10 | 0,0025 | 15 |
| 80M2-4                | 0,75 | 5,1  | 10  | 10 | 0,0025 | 15 |
| 90S-4                 | 1,1  | 7,5  | 20  | 11 | 0,0025 | 15 |
| 90L-4                 | 1,5  | 10,2 | 20  | 11 | 0,0025 | 15 |
| 100L1-4               | 2,2  | 14,8 | 50  | 13 | 0,0215 | 29 |
| 100L2-4               | 3    | 20,2 | 50  | 13 | 0,0215 | 29 |
| 112M-4                | 4    | 26,6 | 50  | 13 | 0,0215 | 29 |
| 132S-4                | 5,5  | 36,5 | 50  | 13 | 0,0215 | 29 |
| 132M-4                | 7,5  | 50   | 100 | 16 | 0,0215 | 29 |
| 160M-4                | 11   | 72   | 150 | 19 | 0,125  | 57 |
| 160L-4                | 15   | 98   | 150 | 19 | 0,125  | 57 |
| 180M-4                | 18,5 | 121  | 150 | 19 | 0,125  | 57 |
| 180L-4                | 22   | 144  | 270 | 24 | 0,125  | 57 |
| 200L-4                | 30   | 196  | 270 | 24 | 0,125  | 57 |

| Frame size            | Out-put                | Motor tor-que | Braking mo-ment        | Brake type | Moment of inertia                     | Weight                 |
|-----------------------|------------------------|---------------|------------------------|------------|---------------------------------------|------------------------|
| CD...S                | P <sub>2</sub><br>[kW] | M<br>[Nm]     | M <sub>B</sub><br>[Nm] |            | J <sub>B</sub><br>[kgm <sup>2</sup> ] | m <sub>B</sub><br>[kg] |
| ns = 1000 rpm, 2p = 6 |                        |               |                        |            |                                       |                        |
| 80M1-6                | 0,37                   | 3,8           | 10                     | 10         | 0,0025                                | 15                     |
| 80M2-6                | 0,55                   | 5,7           | 10                     | 10         | 0,0025                                | 15                     |
| 90S-6                 | 0,75                   | 7,9           | 20                     | 11         | 0,0025                                | 15                     |
| 90L-6                 | 1,1                    | 11,4          | 20                     | 11         | 0,0025                                | 15                     |
| 100L-6                | 1,5                    | 15,2          | 50                     | 13         | 0,0215                                | 2                      |
| 112M-6                | 2,2                    | 22,1          | 50                     | 13         | 0,0215                                | 29                     |
| 132S1-6               | 3                      | 29,7          | 50                     | 13         | 0,0215                                | 29                     |
| 132M1-6               | 4                      | 39,6          | 50                     | 13         | 0,0215                                | 29                     |
| 132M2-6               | 5,5                    | 55            | 100                    | 16         | 0,0215                                | 29                     |
| 160M-6                | 7,5                    | 75            | 150                    | 19         | 0,125                                 | 57                     |
| 160L-6                | 11                     | 109           | 150                    | 19         | 0,125                                 | 57                     |
| 180L-6                | 15                     | 148           | 270                    | 24         | 0,125                                 | 57                     |
| 200L1-6               | 18,5                   | 181           | 270                    | 24         | 0,125                                 | 57                     |
| 200L2-6               | 22                     | 217           | 270                    | 24         | 0,125                                 | 57                     |

|                      |      |      |     |    |        |    |
|----------------------|------|------|-----|----|--------|----|
| ns = 750 rpm, 2p = 8 |      |      |     |    |        |    |
| 80M1-8               | 0,18 | 2,5  | 10  | 10 | 0,0025 | 15 |
| 80M2-8               | 0,25 | 3,5  | 10  | 10 | 0,0025 | 15 |
| 90S-8                | 1,1  | 5,1  | 20  | 11 | 0,0025 | 15 |
| 90L-8                | 1,5  | 7,6  | 20  | 11 | 0,0025 | 15 |
| 100L1-8              | 0,75 | 10,1 | 50  | 13 | 0,0215 | 29 |
| 100L2-8              | 1,1  | 15,1 | 50  | 13 | 0,0215 | 29 |
| 112M-8               | 1,5  | 20,2 | 50  | 13 | 0,0215 | 29 |
| 132S-8               | 2,2  | 30   | 50  | 13 | 0,0215 | 29 |
| 132M-8               | 3    | 41   | 50  | 13 | 0,0215 | 29 |
| 160M1-8              | 4    | 53   | 150 | 19 | 0,125  | 57 |
| 160M2-8              | 5,5  | 73   | 150 | 19 | 0,125  | 57 |
| 160L-8               | 7,5  | 99   | 150 | 19 | 0,125  | 57 |
| 180L-8               | 11   | 145  | 270 | 24 | 0,125  | 57 |
| 200L-8               | 15   | 196  | 270 | 24 | 0,125  | 57 |

Temperature class T4,  
Type ...SV and ...SVN

| Frame size            | Out-put                | Motor tor-que | Braking tor-que        | Brake type | Weight                 |
|-----------------------|------------------------|---------------|------------------------|------------|------------------------|
| CD...SV<br>CD...SVN   | P <sub>2</sub><br>[kW] | M<br>[Nm]     | M <sub>B</sub><br>[Nm] |            | m <sub>B</sub><br>[kg] |
| ns = 3000 rpm, 2p = 2 |                        |               |                        |            |                        |
| 63M1-2                | 0,18                   | 0,59          | 6                      | 63         | 15                     |
| 63M2-2                | 0,25                   | 0,83          | 6                      | 63         | 15                     |
| 71M1-2                | 0,37                   | 1,26          | 6                      | 71         | 16                     |
| 71M2-2                | 0,55                   | 1,87          | 6                      | 71         | 16                     |
| 80M1-2                | 0,75                   | 2,57          | 18                     | 80         | 32                     |
| 80M2-2                | 1,1                    | 3,73          | 18                     | 80         | 32                     |
| 90S-2                 | 1,5                    | 5             | 18                     | 90         | 34                     |
| 90L-2                 | 2,2                    | 7,4           | 18                     | 90         | 34                     |
| 100L-2                | 3                      | 10,1          | 30                     | 100        | 50                     |
| 112M-2                | 4                      | 13,3          | 40                     | 112        | 50                     |
| 132S1-2               | 5,5                    | 18,2          | 100                    | 132        | 78                     |
| 132S2-2               | 7,5                    | 24,6          | 100                    | 132        | 78                     |
| 160M1-2               | 11                     | 36            | 120                    | 160        | 82                     |
| 160M2-2               | 15                     | 49            | 120                    | 160        | 82                     |
| 160L-2                | 18,5                   | 60            | 120                    | 160        | 82                     |
| 180M-2*               | 22                     | 72            | 250                    | 180        | 135                    |
| 200L1-2*              | 30                     | 97            | 390                    | 200        | 150                    |
| 200L2-2*              | 37                     | 120           | 390                    | 200        | 150                    |

|                       |      |      |     |     |     |
|-----------------------|------|------|-----|-----|-----|
| ns = 1500 rpm, 2p = 4 |      |      |     |     |     |
| 63M1-4                | 0,12 | 0,79 | 6   | 63  | 15  |
| 63M2-4                | 0,18 | 1,21 | 6   | 63  | 15  |
| 71M1-4                | 0,25 | 1,74 | 6   | 71  | 16  |
| 71M2-4                | 37   | 2,56 | 6   | 71  | 16  |
| 80M1-4                | 0,55 | 3,8  | 18  | 80  | 32  |
| 80M2-4                | 0,75 | 5,1  | 18  | 80  | 32  |
| 90S-4                 | 1,1  | 7,5  | 18  | 90  | 34  |
| 90L-4                 | 1,5  | 10,2 | 18  | 90  | 34  |
| 100L1-4               | 2,2  | 14,8 | 30  | 100 | 50  |
| 100L2-4               | 3    | 20,2 | 30  | 100 | 50  |
| 112M-4                | 4    | 26,6 | 40  | 112 | 50  |
| 132S-4                | 5,5  | 36,5 | 100 | 132 | 78  |
| 132M-4                | 7,5  | 50   | 100 | 132 | 78  |
| 160M-4                | 11   | 72   | 120 | 160 | 82  |
| 160L-4                | 15   | 98   | 120 | 160 | 82  |
| 180M-4                | 18,5 | 121  | 250 | 180 | 135 |
| 180L-4                | 22   | 144  | 250 | 180 | 135 |
| 200L-4                | 30   | 196  | 390 | 200 | 150 |
| 225S-4                | 37   | 241  | 390 | 225 | 175 |
| 225M-4                | 45   | 292  | 390 | 225 | 175 |
| 250M-4                | 55   | 357  | 900 | 250 | 265 |

\* only S3 40%

**Note:**

CD... type SVN only available from frame size 80.

| Frame size            | Out-put                | Motor tor-que | Braking mo-ment        | Brake type | Weight                 |
|-----------------------|------------------------|---------------|------------------------|------------|------------------------|
| CD...S<br>CD...SVN    | P <sub>2</sub><br>[kW] | M<br>[Nm]     | M <sub>B</sub><br>[Nm] |            | m <sub>B</sub><br>[kg] |
| ns = 1000 rpm, 2p = 6 |                        |               |                        |            |                        |
| 71M-6                 | 0,25                   | 2,6           | 6                      | 71         | 16                     |
| 80M1-6                | 0,37                   | 3,8           | 18                     | 80         | 32                     |
| 80M2-6                | 0,55                   | 5,7           | 18                     | 80         | 32                     |
| 90S-6                 | 0,75                   | 7,9           | 18                     | 90         | 34                     |
| 90L-6                 | 1,1                    | 11,4          | 18                     | 90         | 34                     |
| 100L-6                | 1,5                    | 15,2          | 30                     | 100        | 50                     |
| 112M-6                | 2,2                    | 22,1          | 40                     | 112        | 50                     |
| 132S1-6               | 3                      | 29,7          | 100                    | 132        | 78                     |
| 132M1-6               | 4                      | 39,6          | 100                    | 132        | 78                     |
| 132M2-6               | 5,5                    | 55            | 100                    | 132        | 78                     |
| 160M-6                | 7,5                    | 75            | 120                    | 160        | 82                     |
| 160L-6                | 11                     | 109           | 120                    | 160        | 82                     |
| 180L-6                | 15                     | 148           | 250                    | 180        | 135                    |
| 200L1-6               | 18,5                   | 181           | 390                    | 200        | 150                    |
| 200L2-6               | 22                     | 217           | 390                    | 200        | 150                    |
| 225M-6                | 30                     | 294           | 390                    | 225        | 175                    |
| 250M-6                | 37                     | 361           | 900                    | 250        | 265                    |
| 280S-6                | 45                     | 436           | 1000                   | 280        | 265                    |
| 280M-6                | 55                     | 533           | 1000                   | 280        | 265                    |

|                      |      |      |      |     |     |
|----------------------|------|------|------|-----|-----|
| ns = 750 rpm, 2p = 8 |      |      |      |     |     |
| 80M1-8               | 0,18 | 2,5  | 18   | 80  | 32  |
| 80M2-8               | 0,25 | 3,5  | 18   | 80  | 32  |
| 90S-8                | 1,1  | 5,1  | 18   | 90  | 34  |
| 90L-8                | 1,5  | 7,6  | 18   | 90  | 34  |
| 100L1-8              | 0,75 | 10,1 | 30   | 100 | 50  |
| 100L2-8              | 1,1  | 15,1 | 30   | 100 | 50  |
| 112M-8               | 1,5  | 20,2 | 100  | 132 | 50  |
| 132S-8               | 2,2  | 30   | 100  | 132 | 78  |
| 132M-8               | 3    | 41   | 100  | 132 | 78  |
| 160M1-8              | 4    | 53   | 120  | 160 | 82  |
| 160M2-8              | 5,5  | 73   | 120  | 160 | 82  |
| 160L-8               | 7,5  | 99   | 120  | 180 | 82  |
| 180L-8               | 11   | 145  | 250  | 180 | 135 |
| 200L-8               | 15   | 196  | 390  | 200 | 150 |
| 225S-8               | 18,5 | 242  | 390  | 225 | 175 |
| 225M-8               | 22   | 288  | 390  | 225 | 175 |
| 250M-8               | 30   | 390  | 900  | 250 | 265 |
| 280S-8               | 37   | 481  | 1000 | 280 | 265 |
| 280M-8               | 45   | 585  | 1000 | 280 | 265 |

# Coil Data for Brakes

92

## Integral brakes, type ...B

| Frame size<br>Motor | Voltage<br>U =<br>[V] | Current<br>I =<br>[A] | Resistance<br>R <sub>min</sub><br>[Ω] | Voltage<br>U ~<br>[V] | Current<br>I ~<br>[A] |
|---------------------|-----------------------|-----------------------|---------------------------------------|-----------------------|-----------------------|
| 80                  | 24                    | 1,09                  | 22                                    | -                     | -                     |
|                     | 103                   | 0,29                  | 369                                   | 230                   | 0,46                  |
|                     | 130                   | 0,23                  | 567                                   | 290                   | 0,36                  |
|                     | 176                   | 0,19                  | 910                                   | 400                   | 0,3                   |
| 90                  | 24                    | 1,5                   | 16                                    | -                     | -                     |
|                     | 103                   | 0,36                  | 290                                   | 230                   | 0,57                  |
|                     | 130                   | 0,35                  | 376                                   | 290                   | 0,55                  |
|                     | 176                   | 0,26                  | 684                                   | 400                   | 0,41                  |
| 100 and 112         | 24                    | 1,85                  | 13                                    | -                     | -                     |
|                     | 103                   | 0,42                  | 244                                   | 230                   | 0,66                  |
|                     | 130                   | 0,35                  | 376                                   | 290                   | 0,55                  |
|                     | 176                   | 0,31                  | 575                                   | 400                   | 0,49                  |
| 132                 | 24                    | 2,93                  | 8,58                                  | -                     | -                     |
|                     | 130                   | 0,56                  | 232                                   | 290                   | 0,88                  |
|                     | 176                   | 0,49                  | 360                                   | 400                   | 0,77                  |

## External brakes, type ...S

| Frame size<br>Brake | Torque<br>M<br>[Nm] | Voltage<br>U =<br>[V] | Current<br>I =<br>[A] | Resistance<br>R <sub>min</sub><br>[Ω] | Voltage<br>U ~<br>[V] | Current<br>I ~<br>[A] |
|---------------------|---------------------|-----------------------|-----------------------|---------------------------------------|-----------------------|-----------------------|
| 10/11               | 10 or 20            | 24                    | 2,1                   | 11,6                                  | -                     | -                     |
|                     |                     | 98                    | 0,55                  | 177                                   | 110                   | 0,61                  |
|                     |                     | 205                   | 0,27                  | 770                                   | 230                   | 0,3                   |
|                     |                     | 215                   | 0,225                 | 954                                   | 240                   | 0,25                  |
|                     |                     | 258                   | 0,21                  | 1197                                  | 270                   | 0,23                  |
|                     |                     | 356                   | 0,14                  | 2571                                  | 400                   | 0,16                  |
| 13/16               | 50 or 100           | 24                    | 2,93                  | 8,2                                   | -                     | -                     |
|                     |                     | 98                    | 0,8                   | 122,4                                 | 110                   | 0,89                  |
|                     |                     | 205                   | 0,39                  | 536                                   | 230                   | 0,44                  |
|                     |                     | 215                   | 0,346                 | 621                                   | 240                   | 0,38                  |
|                     |                     | 258                   | 0,31                  | 838                                   | 270                   | 0,34                  |
|                     |                     | 356                   | 0,2                   | 1685                                  | 400                   | 0,24                  |
| 19/24               | 150 or 270          | 24                    | 3,08                  | 7,8                                   | -                     | -                     |
|                     |                     | 98                    | 0,85                  | 116                                   | 110                   | 0,94                  |
|                     |                     | 205                   | 0,4                   | 516                                   | 230                   | 0,45                  |
|                     |                     | 215                   | 0,4                   | 538                                   | 240                   | 0,44                  |
|                     |                     | 356                   | 0,25                  | 1438                                  | 400                   | 0,28                  |

# Three-phase AC Asynchronous Motors with Integrated Frequency Inverter

Compact drive  
Temperature class T4,  
2p = 2, 4

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| Operation with        | Mains               | Inverter                     |                     |                              |                     |                              |                     |                              |                     |                              |                     | Inverter                      |                     |
|-----------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|-------------------------------|---------------------|
| Torque characteristic | -                   | decr. quadratic              |                     | constant                     |                     | constant                     |                     | constant                     |                     | constant                     |                     | decreasing                    |                     |
| Frequency             | 50 Hz               | 5-50 Hz                      |                     | 20-50 Hz                     |                     | 10-50 Hz                     |                     | 5-50 Hz                      |                     | 2-50 Hz                      |                     | 50-100 Hz                     |                     |
| Control range         | -                   | 1:10                         |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     | 1:25                         |                     |                               |                     |
| Speed range           | -                   | 300-3000 rpm                 |                     | 1200-3000 rpm                |                     | 600-3000 rpm                 |                     | 300-3000 rpm                 |                     | 120-3000 rpm                 |                     | 3000-6000 rpm                 |                     |
| Power/torque          | P <sub>2</sub> [kW] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>100 Hz | M <sub>u</sub> [Nm] |
| 80M1-2 I              | 0,75                | 0,75                         | 2,6                 | 0,7                          | 2,4                 | 0,6                          | 2                   | 0,5                          | 1,7                 | 0,47                         | 1,6                 | 0,75                          | 1,2                 |
| 80M2-2 I              | 1,1                 | 1,1                          | 3,7                 | 1                            | 3,4                 | 0,9                          | 3                   | 0,75                         | 2,5                 | 0,7                          | 2,35                | 1,1                           | 1,75                |
| 90S-2 I               | 1,5                 | 1,5                          | 5                   | 1,4                          | 4,7                 | 1,2                          | 4                   | 1                            | 3,3                 | 0,94                         | 3,3                 | 1,35                          | 2,2                 |
| 90L-2 I               | 2,2                 | 2,2                          | 7,4                 | 2                            | 6,7                 | 1,7                          | 5,7                 | 1,4                          | 4,7                 | 1,3                          | 4,4                 | 2                             | 3,2                 |
| 100L-2 I              | 3                   | 3                            | 10                  | 2,7                          | 8,9                 | 2,2                          | 7,2                 | 1,8                          | 5,9                 | 1,7                          | 5,5                 | 2,7                           | 4,5                 |
| 112M-2 I              | 4                   | 4                            | 13                  | 3,7                          | 12                  | 3,2                          | 11                  | 2,5                          | 8,2                 | 2,35                         | 7,7                 | 3,6                           | 5,8                 |
| 132S1-2 I             | 5,5                 | 5,5                          | 18                  | 5                            | 16                  | 4,5                          | 15                  | 3,7                          | 12                  | 3,3                          | 10,8                | 5,2                           | 8,3                 |
| 132S2-2 I             | 7,5                 | 7,5                          | 25                  | 7                            | 23                  | 6                            | 20                  | 5                            | 16                  | 4,5                          | 14,4                | 6,5                           | 10,3                |
| 160M1-2 I             | 11                  | 11                           | 36                  | 10                           | 32                  | 9                            | 29                  | 7,5                          | 24                  | 6,6                          | 21,5                | 8,4                           | 13,4                |

V

| Operation with        | Mains               | Inverter                     |                     |                              |                     |                              |                     |                              |                     |                              |                     | Inverter                      |                     |
|-----------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------|---------------------|-------------------------------|---------------------|
| Torque characteristic | -                   | decr. quadratic              |                     | constant                     |                     | constant                     |                     | constant                     |                     | constant                     |                     | decreasing                    |                     |
| Frequency             | 50 Hz               | 5-50 Hz                      |                     | 20-50 Hz                     |                     | 10-50 Hz                     |                     | 5-50 Hz                      |                     | 2-50 Hz                      |                     | 50-100 Hz                     |                     |
| Control range         | -                   | 1:10                         |                     | 1:2,5                        |                     | 1:5                          |                     | 1:10                         |                     | 1:25                         |                     |                               |                     |
| Speed range           | -                   | 150-1500 rpm                 |                     | 600-1500 rpm                 |                     | 300-1500 rpm                 |                     | 150-1500 rpm                 |                     | 60-1500 rpm                  |                     | 1500-3000 rpm                 |                     |
| Power/torque          | P <sub>2</sub> [kW] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>50 Hz | M <sub>u</sub> [Nm] | P <sub>u</sub> [kW]<br>100 Hz | M <sub>u</sub> [Nm] |
| 80M1-4 I              | 0,55                | 0,55                         | 3,8                 | 0,52                         | 3,5                 | 0,45                         | 3                   | 0,33                         | 2,2                 | 0,31                         | 2,05                | 0,49                          | 1,5                 |
| 80M2-4 I              | 0,75                | 0,75                         | 5,2                 | 0,7                          | 4,8                 | 0,6                          | 4                   | 0,5                          | 3,3                 | 0,47                         | 3,1                 | 0,69                          | 2,2                 |
| 90S-4 I               | 1,1                 | 1,1                          | 7,5                 | 1                            | 6,7                 | 0,9                          | 6                   | 0,75                         | 5                   | 0,7                          | 4,7                 | 1                             | 3,1                 |
| 90L-4 I               | 1,5                 | 1,5                          | 10                  | 1,4                          | 9,5                 | 1,2                          | 8                   | 1                            | 6,7                 | 0,94                         | 6,3                 | 1,35                          | 4,3                 |
| 100L1-4 I             | 2,2                 | 2,2                          | 15                  | 2                            | 13                  | 1,7                          | 11                  | 1,4                          | 9,3                 | 1,3                          | 8,7                 | 2                             | 6,4                 |
| 100L2-4 I             | 3                   | 3                            | 20                  | 2,8                          | 19                  | 2,2                          | 15                  | 1,8                          | 12                  | 1,7                          | 11,3                | 2,7                           | 8,6                 |
| 112M-4 I              | 4                   | 4                            | 27                  | 3,6                          | 24                  | 3                            | 20                  | 2,5                          | 16                  | 2,35                         | 15                  | 3,6                           | 11,4                |
| 132S-4 I              | 5,5                 | 5,5                          | 37                  | 5                            | 33                  | 4,4                          | 29                  | 3,7                          | 24                  | 3,3                          | 21,6                | 5,2                           | 16,5                |
| 132M-4 I              | 7,5                 | 7,5                          | 50                  | 7                            | 46                  | 6                            | 39                  | 5                            | 33                  | 4,5                          | 29,7                | 6,5                           | 20,7                |
| 160M-4 I              | 11                  | 11                           | 72                  | 10                           | 65                  | 9                            | 58                  | 7,5                          | 49                  | 6,6                          | 44                  | 8,4                           | 26,7                |

# Noise Class 4, Water-Cooled Motors Mains Operation 50 Hz

Temperature class T4,  
2p = 2, 4

| Frame size                                    | Out-put                | Current at        | Nominal speed | Efficiency | Power factor | Starting torque                | Starting current               | Weight <sup>2)</sup> | Cooling water quantity | Noise levels              |                           |
|-----------------------------------------------|------------------------|-------------------|---------------|------------|--------------|--------------------------------|--------------------------------|----------------------|------------------------|---------------------------|---------------------------|
| CD...W                                        | P <sub>2</sub><br>[kW] | 400 V<br>I<br>[A] | n<br>[rpm]    | η<br>[%]   | cos φ        | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | m<br>[kg]            | [l/min]<br>30 °C       | L <sub>p</sub><br>[dB(A)] | L <sub>w</sub><br>[dB(A)] |
| ns = 3000 rpm, 2p = 2                         |                        |                   |               |            |              |                                |                                |                      |                        |                           |                           |
| Efficiency according to manufacturer standard |                        |                   |               |            |              |                                |                                |                      |                        |                           |                           |
| 160M1-2                                       | 15                     | 28,5              | 2915          | 87,5       | 0,87         | 2,5                            | 6,5                            | 125                  | 6                      | 51                        | 64                        |
| 160M2-2                                       | 18,5                   | 33,5              | 2915          | 89         | 0,89         | 2,5                            | 6,5                            | 140                  | 6                      | 51                        | 64                        |
| 160L-2                                        | 22                     | 39,5              | 2915          | 89,5       | 0,9          | 2,7                            | 6,8                            | 150                  | 6                      | 51                        | 64                        |
| 180M-2                                        | 30                     | 54                | 2915          | 90         | 0,89         | 2,6                            | 6,9                            | 170                  | 7                      | 51                        | 64                        |
| 200L1-2                                       | 37                     | 69                | 2950          | 91,5       | 0,85         | 3                              | 7,2                            | 270                  | 9                      | 52                        | 66                        |
| 200L2-2                                       | 45                     | 79                | 2950          | 92         | 0,85         | 3                              | 7,2                            | 290                  | 9                      | 52                        | 66                        |
| 225M-2                                        | 55                     | 101               | 2965          | 92,5       | 0,85         | 2,8                            | 7,1                            | 455                  | 5                      | 54                        | 68                        |
| 250M-2                                        | 75                     | 139               | 2970          | 92,5       | 0,84         | 2,7                            | 6,9                            | 564                  | 10                     | 57                        | 71                        |
| 280S-2                                        | 90                     | 155               | 2970          | 93         | 0,9          | 2                              | 6,5                            | 665                  | 11                     | 59                        | 73                        |
| 280M-2                                        | 110                    | 192               | 2970          | 93         | 0,89         | 2,1                            | 6,8                            | 776                  | 11                     | 59                        | 73                        |
| 315S-2                                        | 132                    | 225               | 2975          | 94,5       | 0,89         | 1,9                            | 6,3                            | 1010                 | 12                     | 60                        | 75                        |
| 315M-2                                        | 160                    | 270               | 2975          | 95,5       | 0,89         | 1,8                            | 6,7                            | 1100                 | 12                     | 60                        | 75                        |
| 315L1-2                                       | 200                    | 340               | 2975          | 95,5       | 0,89         | 2                              | 6,9                            | 1200                 | 15                     | 60                        | 75                        |
| 315L2-2                                       | 250                    | 420 <sup>1)</sup> | 2980          | 96         | 0,9          | 1,7                            | 6,9                            | 1300                 | 17                     | 60                        | 75                        |
| 315L3-2                                       | 315                    | 515 <sup>1)</sup> | 2980          | 96         | 0,92         | 1,5                            | 6,8                            | 1450                 | 17                     | 60                        | 76                        |
| 355L1-2                                       | 355                    | 575 <sup>1)</sup> | 2985          | 96,5       | 0,92         | 1,5                            | 6,8                            | 2100                 | 18                     | 60                        | 76                        |
| 355L2-2                                       | 400                    | 650 <sup>1)</sup> | 2985          | 96,8       | 0,92         | 1,5                            | 6,8                            | 2300                 | 20                     | 60                        | 76                        |
| ns = 1500 rpm, 2p = 4                         |                        |                   |               |            |              |                                |                                |                      |                        |                           |                           |
| Efficiency according to manufacturer standard |                        |                   |               |            |              |                                |                                |                      |                        |                           |                           |
| 160M-4                                        | 13,5                   | 29                | 1450          | 86,5       | 0,78         | 2,6                            | 6,1                            | 130                  | 6                      | 51                        | 64                        |
| 160L-4                                        | 18,5                   | 36                | 1450          | 89         | 0,84         | 2,5                            | 6,2                            | 150                  | 6                      | 51                        | 64                        |
| 180M-4                                        | 22                     | 43,5              | 1460          | 90         | 0,81         | 3,1                            | 6,7                            | 170                  | 7                      | 51                        | 64                        |
| 180L-4                                        | 27                     | 53                | 1455          | 90         | 0,81         | 3                              | 6,5                            | 190                  | 7                      | 51                        | 64                        |
| 200L-4                                        | 37                     | 67                | 1460          | 91         | 0,87         | 2,7                            | 6,8                            | 295                  | 7                      | 51                        | 65                        |
| 225S-4                                        | 45                     | 81                | 1465          | 92         | 0,87         | 2,6                            | 6,3                            | 441                  | 9                      | 52                        | 66                        |
| 225M-4                                        | 55                     | 100               | 1470          | 92,5       | 0,86         | 2,6                            | 6,5                            | 480                  | 9                      | 52                        | 66                        |
| 250M-4                                        | 70                     | 127               | 1475          | 92,5       | 0,86         | 2,9                            | 7,1                            | 590                  | 10                     | 56                        | 70                        |
| 280S-4                                        | 90                     | 163               | 1480          | 93,5       | 0,85         | 2,7                            | 6,7                            | 745                  | 11                     | 58                        | 72                        |
| 280M-4                                        | 110                    | 199               | 1480          | 94         | 0,85         | 2,9                            | 6,9                            | 850                  | 11                     | 58                        | 72                        |
| 315S-4                                        | 132                    | 235               | 1485          | 95         | 0,86         | 2,2                            | 6,6                            | 1050                 | 12                     | 57                        | 72                        |
| 315M-4                                        | 160                    | 290               | 1485          | 95,5       | 0,84         | 2,8                            | 6,8                            | 1115                 | 12                     | 57                        | 72                        |
| 315L1-4                                       | 200                    | 350               | 1485          | 95,5       | 0,86         | 2,5                            | 6,8                            | 1200                 | 15                     | 57                        | 72                        |
| 315L2-4                                       | 250                    | 435 <sup>1)</sup> | 1490          | 96         | 0,86         | 2                              | 6,9                            | 1300                 | 17                     | 57                        | 72                        |
| 315L3-4                                       | 315                    | 545 <sup>1)</sup> | 1490          | 96         | 0,87         | 1,5                            | 6,8                            | 1600                 | 17                     | 58                        | 74                        |
| 355L1-4                                       | 355                    | 590 <sup>1)</sup> | 1490          | 96,5       | 0,9          | 1,5                            | 6,8                            | 2250                 | 18                     | 58                        | 74                        |
| 355L2-4                                       | 400                    | 665 <sup>1)</sup> | 1490          | 96,7       | 0,9          | 1,5                            | 6,8                            | 2450                 | 20                     | 58                        | 74                        |

## Notes:

- 1) Two parallel cables are required in each case
- 2) Construction type B3 with terminal box of type EAR

# High-Voltage Motors

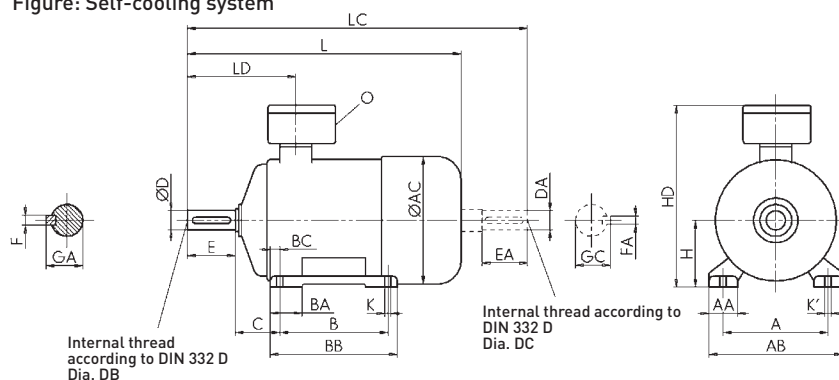
## Mains Operation 50 Hz

Temperature class T4,  
2p = 2, 4, 6, 8

95

| Frame size            | Out-put             | Rated current for 6000 V | Speed   | Efficiency | Power factor | Torque | Starting torque                | Starting current               | Stall- ing torque              | Moment of inertia     | Weight | Noise levels with radial-flow fan |                        |
|-----------------------|---------------------|--------------------------|---------|------------|--------------|--------|--------------------------------|--------------------------------|--------------------------------|-----------------------|--------|-----------------------------------|------------------------|
| CD...H                | P <sub>2</sub> [kW] | I [A]                    | n [rpm] | η [%]      | cos φ        | M [Nm] | M <sub>A</sub> /M <sub>N</sub> | I <sub>A</sub> /I <sub>N</sub> | M <sub>K</sub> /M <sub>N</sub> | J [kgm <sup>2</sup> ] | m [kg] | L <sub>p</sub> [dB(A)]            | L <sub>w</sub> [dB(A)] |
| ns = 3000 rpm, 2p = 2 |                     |                          |         |            |              |        |                                |                                |                                |                       |        |                                   |                        |
| 355M-2                | 160                 | 18,1                     | 2981    | 94,5       | 0,9          | 513    | 1,1                            | 6,5                            | 2,5                            | 2,6                   | 1825   | 82                                | 98                     |
| 355L1-2               | 200                 | 22,5                     | 2981    | 94,8       | 0,9          | 641    | 1,1                            | 6,6                            | 2,5                            | 3,1                   | 2008   | 82                                | 98                     |
| 355L2-2               | 250                 | 28                       | 2982    | 95         | 0,91         | 801    | 1,1                            | 6,6                            | 2,6                            | 3,4                   | 2100   | 82                                | 98                     |
| 400M-2                | 280                 | 31                       | 2982    | 95,3       | 0,91         | 897    | 1                              | 6,4                            | 2,6                            | 7,7                   | 2389   | 82                                | 98                     |
| 400L-2                | 315                 | 35                       | 2982    | 95,5       | 0,91         | 1009   | 1                              | 6,5                            | 2,6                            | 10,1                  | 2800   | 82                                | 98                     |
| 450M1-2               | 355                 | 39,5                     | 2985    | 95,8       | 0,9          | 1136   | 0,9                            | 6,6                            | 2,7                            | 9,4                   | 3268   | 85                                | 101                    |
| 450M2-2               | 400                 | 44,5                     | 2987    | 96         | 0,9          | 1279   | 0,9                            | 6,6                            | 2,7                            | 10,6                  | 3437   | 85                                | 101                    |
| 450L1-2               | 450                 | 49,5                     | 2987    | 96,2       | 0,91         | 1439   | 0,9                            | 6,5                            | 2,6                            | 12,6                  | 3699   | 85                                | 101                    |
| 450L2-2               | 500                 | 55                       | 2988    | 96,4       | 0,91         | 1598   | 0,9                            | 6,6                            | 2,7                            | 14,6                  | 3962   | 85                                | 101                    |
| 450L3-2               | 560                 | 61                       | 2988    | 96,5       | 0,91         | 1790   | 0,9                            | 6,5                            | 2,6                            | 16,8                  | 4262   | 85                                | 101                    |
| ns = 1500 rpm, 2p = 4 |                     |                          |         |            |              |        |                                |                                |                                |                       |        |                                   |                        |
| 355M1-4               | 160                 | 19,3                     | 1488    | 94,8       | 0,84         | 1027   | 1,2                            | 6,6                            | 2,4                            | 4,2                   | 1800   | 73                                | 89                     |
| 355M2-4               | 220                 | 26,5                     | 1488    | 95,2       | 0,84         | 1412   | 1,2                            | 6,6                            | 2,4                            | 5                     | 1950   | 73                                | 89                     |
| 355L-4                | 280                 | 33,5                     | 1488    | 95,4       | 0,84         | 1797   | 1,2                            | 6,6                            | 2,4                            | 5,9                   | 2213   | 73                                | 89                     |
| 400M-4                | 315                 | 37                       | 1490    | 95,6       | 0,86         | 2019   | 1,1                            | 6,6                            | 2,5                            | 12,9                  | 3460   | 79                                | 95                     |
| 400L1-4               | 355                 | 41,5                     | 1490    | 95,8       | 0,86         | 2275   | 1,1                            | 6,5                            | 2,4                            | 14,5                  | 3665   | 79                                | 95                     |
| 400L2-4               | 400                 | 46,5                     | 1490    | 96         | 0,86         | 2564   | 1,1                            | 6,6                            | 2,5                            | 16,4                  | 3900   | 79                                | 95                     |
| 450M1-4               | 450                 | 53                       | 1491    | 96         | 0,85         | 2882   | 1                              | 6,5                            | 2,5                            | 18,5                  | 3887   | 80                                | 96                     |
| 450M2-4               | 500                 | 59                       | 1491    | 96,1       | 0,85         | 3203   | 1                              | 6,6                            | 2,5                            | 20,7                  | 4112   | 80                                | 96                     |
| 450L1-4               | 560                 | 66                       | 1492    | 96,2       | 0,85         | 3584   | 1                              | 6,7                            | 2,6                            | 23,3                  | 4375   | 80                                | 96                     |
| 450L2-4               | 630                 | 73                       | 1492    | 96,3       | 0,86         | 4033   | 0,9                            | 6,5                            | 2,4                            | 26,2                  | 4675   | 80                                | 96                     |
| 450L3-4               | 710                 | 82                       | 1492    | 96,5       | 0,86         | 4545   | 1                              | 6,5                            | 2,5                            | 29,5                  | 5012   | 80                                | 96                     |
| ns = 1000 rpm, 2p = 6 |                     |                          |         |            |              |        |                                |                                |                                |                       |        |                                   |                        |
| 355M-6                | 160                 | 21                       | 990     | 94,2       | 0,78         | 1543   | 1,2                            | 6                              | 2,2                            | 5                     | 1950   | 75                                | 91                     |
| 355L-6                | 200                 | 26                       | 990     | 94,3       | 0,79         | 1929   | 1,2                            | 5,9                            | 2,1                            | 5,9                   | 2179   | 75                                | 91                     |
| 400M-6                | 250                 | 31                       | 991     | 95,2       | 0,81         | 2409   | 1,2                            | 6,4                            | 2,3                            | 12,9                  | 3460   | 78                                | 94                     |
| 400L1-6               | 280                 | 35                       | 991     | 95,4       | 0,81         | 2698   | 1,2                            | 6,5                            | 2,3                            | 14,5                  | 3665   | 78                                | 94                     |
| 400L2-6               | 315                 | 39                       | 991     | 95,6       | 0,81         | 3036   | 1,2                            | 6,5                            | 2,3                            | 16,4                  | 3900   | 78                                | 94                     |
| 450M1-6               | 355                 | 42,5                     | 991     | 95,6       | 0,84         | 3421   | 1                              | 6,3                            | 2,4                            | 29,1                  | 4112   | 78                                | 94                     |
| 450M2-6               | 400                 | 47,5                     | 991     | 95,7       | 0,85         | 3855   | 1                              | 6,3                            | 2,4                            | 32,7                  | 4375   | 78                                | 94                     |
| 450L1-6               | 450                 | 53                       | 991     | 95,7       | 0,86         | 4337   | 1                              | 6,3                            | 2,4                            | 36,8                  | 4675   | 78                                | 94                     |
| 450L2-6               | 500                 | 58                       | 992     | 95,8       | 0,86         | 4814   | 1                              | 6,4                            | 2,4                            | 41,5                  | 5012   | 78                                | 94                     |
| ns = 750 rpm, 2p = 8  |                     |                          |         |            |              |        |                                |                                |                                |                       |        |                                   |                        |
| 400M-8                | 160                 | 21,5                     | 742     | 94,2       | 0,76         | 2059   | 1,1                            | 5,3                            | 2                              | 12,9                  | 3460   | 74                                | 90                     |
| 400L1-8               | 200                 | 27                       | 742     | 94,5       | 0,76         | 2574   | 1,1                            | 5,5                            | 2                              | 14,5                  | 3665   | 74                                | 90                     |
| 400L2-8               | 240                 | 32                       | 742     | 94,6       | 0,76         | 3089   | 1,1                            | 5,5                            | 2                              | 16,4                  | 3900   | 74                                | 90                     |
| 450M1-8               | 280                 | 37                       | 743     | 94,6       | 0,77         | 3599   | 1,1                            | 5,8                            | 2,3                            | 29,1                  | 4112   | 74                                | 90                     |
| 450M2-8               | 315                 | 41                       | 743     | 94,7       | 0,78         | 4049   | 1                              | 5,7                            | 2,3                            | 32,7                  | 4375   | 74                                | 90                     |
| 450L1-8               | 355                 | 47                       | 743     | 94,8       | 0,77         | 4563   | 1                              | 5,9                            | 2,4                            | 36,8                  | 4675   | 74                                | 90                     |
| 450L2-8               | 400                 | 52                       | 744     | 94,9       | 0,78         | 5134   | 1                              | 6                              | 2,4                            | 41,5                  | 5012   | 74                                | 90                     |

Figure: Self-cooling system



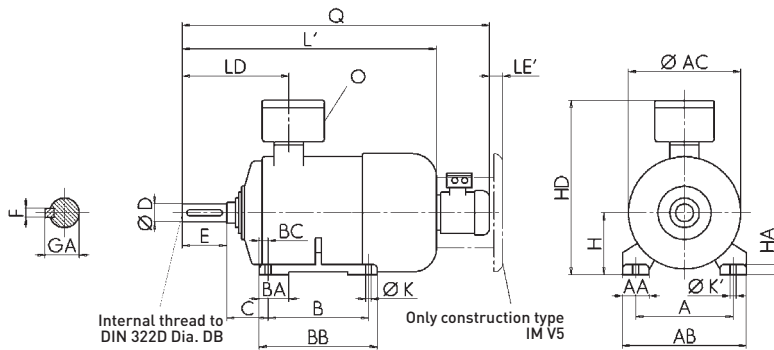
Frame size 63 in T4, unventilated  
Carrying lugs from frame size 90.  
Measure AC measured from screw head  
Measure HD relates to terminal box Ex e.  
The box can be rotated by 4x90°.  
This also applies to the BD... series.

**Note:**

1) Construction type IM V5 with protective canopy, see page 101

| Type<br>CD... | A   | AA  | AB  | AC  | B   | BA  | BB   | BC   | C   | H -0,5  | HA | HD   | K H17 | K' H17 | L<br>Number of poles |      |      |      |
|---------------|-----|-----|-----|-----|-----|-----|------|------|-----|---------|----|------|-------|--------|----------------------|------|------|------|
|               |     |     |     |     |     |     |      |      |     |         |    |      |       |        | 2                    | 4    | 6    | 8    |
| 63M           | 100 | 20  | 120 | 134 | 80  | 25  | 100  | 10   | 40  | 63      | 6  | 227  | Ø 7   | -      | 239                  | 239  | 239  | 239  |
| 71M           | 112 | 30  | 139 | 145 | 90  | 25  | 110  | 10   | 45  | 71      | 10 | 235  | Ø 7   | -      | 278                  | 278  | 278  | 278  |
| 80M           | 125 | 35  | 160 | 163 | 100 | 35  | 130  | 15   | 50  | 80      | 12 | 260  | Ø 10  | -      | 313                  | 313  | 313  | 313  |
| 90S           | 140 | 40  | 180 | 183 | 100 | 40  | 130  | 15   | 56  | 90      | 12 | 275  | Ø 10  | -      | 364                  | 364  | 364  | 364  |
| 90L           | 140 | 40  | 180 | 183 | 125 | 40  | 155  | 15   | 56  | 90      | 12 | 275  | Ø 10  | -      | 364                  | 364  | 364  | 364  |
| 100L          | 160 | 45  | 200 | 201 | 140 | 45  | 175  | 17,5 | 63  | 100     | 15 | 305  | Ø 12  | -      | 415                  | 415  | 415  | 415  |
| 112M          | 190 | 50  | 235 | 225 | 140 | 50  | 175  | 17,5 | 70  | 112     | 17 | 317  | Ø 12  | -      | 425                  | 425  | 425  | 425  |
| 132S          | 216 | 60  | 266 | 265 | 140 | 60  | 187  | 23,5 | 89  | 132     | 20 | 411  | Ø 12  | -      | 529                  | 529  | 529  | 529  |
| 132M          | 216 | 60  | 266 | 265 | 178 | 60  | 225  | 23,5 | 89  | 132     | 20 | 411  | Ø 12  | -      | 529                  | 529  | 529  | 529  |
| 160M          | 254 | 65  | 310 | 318 | 210 | 100 | 300  | 23   | 108 | 160     | 25 | 477  | 15    | 20     | 713                  | 676  | 676  | 676  |
| 160L          | 254 | 65  | 310 | 318 | 254 | 100 | 300  | 23   | 108 | 160     | 25 | 477  | 15    | 20     | 713                  | 676  | 676  | 676  |
| 180M          | 279 | 75  | 350 | 353 | 241 | 100 | 340  | 30   | 121 | 180     | 25 | 545  | 15    | 20     | 726                  | 726  | -    | -    |
| 180L          | 279 | 75  | 350 | 353 | 279 | 100 | 340  | 30   | 121 | 180     | 25 | 545  | 15    | 20     | -                    | 726  | 726  | 726  |
| 200L          | 318 | 80  | 390 | 393 | 305 | 90  | 365  | 30   | 133 | 200     | 30 | 581  | 20    | 26     | 789                  | 789  | 789  | 789  |
| Type<br>CD... | A   | AA  | AB  | AC  | B   | BA  | BB   | BC   | C   | H       | HA | HD   | K H17 | K' H17 | L<br>Number of poles |      |      |      |
|               |     |     |     |     |     |     |      |      |     |         |    |      |       |        | 2                    | 4    | 6    | 8    |
| 225S          | 356 | 85  | 450 | 455 | 286 | 90  | 370  | 29,5 | 149 | 225-0,5 | 35 | 634  | 20    | 26     | -                    | 937  | -    | 888  |
| 225M          | 356 | 85  | 450 | 455 | 311 | 90  | 370  | 29,5 | 149 | 225-0,5 | 35 | 634  | 20    | 26     | 907                  | 937  | 888  | 888  |
| 250M          | 406 | 105 | 510 | 493 | 349 | 110 | 420  | 35,5 | 168 | 250-0,5 | 40 | 721  | 26    | 35     | 1000                 | 1000 | 934  | 934  |
| 280S          | 457 | 110 | 570 | 548 | 368 | 120 | 500  | 40,5 | 190 | 280-1   | 45 | 791  | 26    | 35     | 1109                 | 1109 | 1109 | 1109 |
| 280M          | 457 | 110 | 570 | 548 | 419 | 120 | 500  | 40,5 | 190 | 280-1   | 45 | 791  | 26    | 35     | 1109                 | 1109 | 1109 | 1109 |
| 315S          | 508 | 150 | 630 | 635 | 406 | 210 | 615  | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     | 1268                 | 1298 | 1218 | 1218 |
| 315M          | 508 | 150 | 630 | 635 | 457 | 210 | 615  | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     | 1268                 | 1298 | 1218 | 1218 |
| 315L1         | 508 | 150 | 630 | 635 | 508 | 210 | 615  | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     | 1268                 | 1298 | 1218 | 1298 |
| 315L2         | 508 | 150 | 630 | 635 | 508 | 210 | 615  | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     | 1468                 | 1498 | 1418 | 1498 |
| 315L3         | 508 | 150 | 630 | 635 | 508 | 210 | 615  | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     | 1468                 | 1498 | 1416 | 1498 |
| 355M          | 610 | 180 | 720 | 725 | 560 | 220 | 720  | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     | -                    | -    | 1597 | 1597 |
| 355L1         | 610 | 180 | 720 | 725 | 630 | 220 | 720  | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     | 1667                 | 1697 | 1597 | 1597 |
| 355L2         | 610 | 180 | 720 | 725 | 630 | 220 | 720  | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     | 1667                 | 1667 | 1597 | 1597 |
| 355L3         | 610 | 180 | 720 | 725 | 630 | 220 | 720  | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     | 1747                 | 1777 | -    | -    |
| 400S          | 686 | 130 | 800 | 810 | 560 | 150 | 870  | 80   | 280 | 400-1   | 34 | 1146 | 35    | 35     | -                    | 1907 | 1907 | 1907 |
| 400M          | 686 | 130 | 800 | 810 | 630 | 150 | 870  | 80   | 280 | 400-1   | 34 | 1146 | 35    | 35     | 1837                 | 1907 | 1907 | 1907 |
| 400L          | 686 | 130 | 800 | 810 | 710 | 150 | 870  | 80   | 280 | 400-1   | 34 | 1146 | 35    | 35     | 1837                 | 1907 | 1907 | 1907 |
| 450S          | 760 | 150 | 900 | 910 | 630 | 180 | 1000 | 80   | 280 | 450-1   | 35 | 1264 | 35    | 35     | 1838                 | 1908 | 1908 | 1908 |
| 450M          | 760 | 150 | 900 | 910 | 710 | 180 | 1000 | 80   | 280 | 450-1   | 35 | 1264 | 35    | 35     | 1838                 | 1908 | 1908 | 1908 |
| 450L1         | 760 | 150 | 900 | 910 | 840 | 180 | 1000 | 80   | 280 | 450-1   | 35 | 1264 | 35    | 35     | 1838                 | 1908 | 1908 | 1908 |
| 450L2         | 760 | 150 | 900 | 910 | 840 | 180 | 1000 | 80   | 280 | 450-1   | 35 | 1264 | 35    | 35     | 1983                 | 2053 | 2053 | 2053 |

## External cooling system



## Note:

1) For types 250 to 400-4, 6, 8 with measures DA, EA, GC, FA, and DC, the 2-pole specifications apply. For types 450-6, 8 DA, EA, GC, FA, DC, the 4-pole specifications apply.

| Type CD... | LC  | Number of poles |     |   | LD  | O          | Shaft end |       |        |       |        | Fan motor   | Type CD...F | L'  | Number of poles |      | Q     | LE' |
|------------|-----|-----------------|-----|---|-----|------------|-----------|-------|--------|-------|--------|-------------|-------------|-----|-----------------|------|-------|-----|
|            | 2   | 4               | 6   | 8 |     |            | D, DA     | E, EA | GA, GC | F, FA | DB, DC | Type CD ... |             | 2   | 4,6,8           | 2    | 4,6,8 |     |
| 63M        | 274 | 274             | 274 |   | 104 | 2x M25x1,5 | 11j6      | 23    | 12,5   | 4     | M4     | -           | -           | -   | -               | -    | -     | -   |
| 71M        | 334 | 334             | 334 |   | 111 | 2x M25x1,5 | 14j6      | 30    | 16     | 5     | M5     | -           | -           | -   | -               | -    | -     | -   |
| 80M        | 387 | 387             | 387 |   | 116 | 2x M25x1,5 | 19j6      | 40    | 21,5   | 6     | M6     | -           | -           | -   | -               | -    | -     | -   |
| 90S        | 445 | 445             | 445 |   | 137 | 2x M25x1,5 | 24j6      | 50    | 27     | 8     | M6     | -           | -           | -   | -               | -    | -     | -   |
| 90L        | 445 | 445             | 445 |   | 137 | 2x M25x1,5 | 24j6      | 50    | 27     | 8     | M8     | -           | -           | -   | -               | -    | -     | -   |
| 100L       | 510 | 510             | 510 |   | 149 | 2x M32x1,5 | 28j6      | 60    | 31     | 8     | M10    | -           | -           | -   | -               | -    | -     | -   |
| 112M       | 526 | 526             | 526 |   | 154 | 2x M32x1,5 | 28j6      | 60    | 31     | 8     | M10    | 63M1-4      | 515         | 515 | 731             | 731  | 30    |     |
| 132S       | 645 | 645             | 645 |   | 226 | 2x M32x1,5 | 38k6      | 80    | 41     | 10    | M12    | 63M1-4      | 606         | 606 | 822             | 822  | 36    |     |
| 132M       | 645 | 645             | 645 |   | 226 | 2x M32x1,5 | 38k6      | 80    | 41     | 10    | M12    | 63M1-4      | 606         | 606 | 822             | 822  | 36    |     |
| 160M       | 864 | 864             | 864 |   | 261 | 2x M40x1,5 | 42k6      | 110   | 45     | 12    | M16    | 63M1-4      | 757         | 757 | 972             | 972  | 38    |     |
| 160L       | 864 | 864             | 864 |   | 261 | 2x M40x1,5 | 42k6      | 110   | 45     | 12    | M16    | 63M1-4      | 757         | 757 | 972             | 972  | 38    |     |
| 180M       | 909 | 909             | -   |   | 369 | 2x M40x1,5 | 48k6      | 110   | 51,5   | 14    | M16    | 63M1-4      | 746         | 746 | 960             | 960  | 38    |     |
| 180L       | -   | 909             | 909 |   | 369 | 2x M40x1,5 | 48k6      | 110   | 51,5   | 14    | M16    | 63M1-4      | 746         | 746 | 960             | 960  | 38    |     |
| 200L       | 983 | 983             | 983 |   | 390 | 2x M50x1,5 | 55m6      | 110   | 59     | 16    | M20    | 63M1-4      | 803         | 803 | 1018            | 1018 | 38    |     |

| Type CD... | LC   | Number of poles |      |     | LD  | No. of poles | O  | Shaft end                                        |                     |                      |                     |                      |             |             |    |       |     | Fan motor | Type CD...F | L' Q |      | LE'  |      |    |
|------------|------|-----------------|------|-----|-----|--------------|----|--------------------------------------------------|---------------------|----------------------|---------------------|----------------------|-------------|-------------|----|-------|-----|-----------|-------------|------|------|------|------|----|
|            | 2    | 4               | 6    | 8   | 2   | 4,6,8        |    | D <sub>m6</sub> , DA <sub>m6</sub> <sup>1)</sup> | E, EA <sup>1)</sup> | GA, GC <sup>1)</sup> | F, FA <sup>1)</sup> | DB, DC <sup>1)</sup> | Type CD ... | Type CD ... | 2  | 4,6,8 | 2   | 4,6,8     |             |      |      |      |      |    |
| 225S       | -    | 1175            | 1175 | -   | 377 | 2x M50x1,5   | -  | 60                                               | 60                  | -                    | 140                 | -                    | 64          | 64          | -  | 18    | -   | M20       | 63M1-4      | -    | 938  | -    | 1153 | 38 |
| 225M       | 1145 | 1145            | 1145 | 347 | 377 | 2x M50x1,5   | 55 | 60                                               | 60                  | 110                  | 140                 | 59                   | 64          | 64          | 16 | 18    | M20 | M20       | 63M1-4      | 908  | 938  | 1123 | 1153 | 38 |
| 250M       | 1250 | 1250            | 1250 | 482 | 482 | 2x M63x1,5   | 60 | 65                                               | 65                  | 140                  | 140                 | 64                   | 69          | 69          | 18 | 18    | M20 | M20       | 63M1-4      | 1019 | 1019 | 1234 | 1234 | 38 |
| 280S       | 1375 | 1375            | 1375 | 483 | 483 | 2x M63x1,5   | 65 | 75                                               | 75                  | 140                  | 140                 | 69                   | 79,5        | 79,5        | 18 | 20    | M20 | M20       | 71M2-4      | 1140 | 1140 | 1387 | 1387 | 41 |
| 280M       | 1375 | 1375            | 1375 | 483 | 483 | 2x M63x1,5   | 65 | 75                                               | 75                  | 140                  | 140                 | 69                   | 79,5        | 79,5        | 18 | 20    | M20 | M20       | 71M2-4      | 1140 | 1140 | 1387 | 1387 | 41 |
| 315S       | 1543 | 1573            | 1573 | 496 | 526 | 2x M63x1,5   | 65 | 80                                               | 80                  | 140                  | 170                 | 69                   | 85          | 85          | 18 | 22    | M20 | M20       | 71M2-4      | 1283 | 1313 | 1529 | 1559 | 42 |
| 315M       | 1543 | 1573            | 1573 | 496 | 526 | 2x M63x1,5   | 65 | 80                                               | 80                  | 140                  | 170                 | 69                   | 85          | 85          | 18 | 22    | M20 | M20       | 71M2-4      | 1283 | 1313 | 1529 | 1559 | 42 |
| 315L1      | 1543 | 1573            | 1573 | 496 | 526 | 2x M63x1,5   | 65 | 80                                               | 80                  | 140                  | 170                 | 69                   | 85          | 85          | 18 | 22    | M20 | M20       | 71M2-4      | 1283 | 1313 | 1529 | 1559 | 42 |
| 315L2      | 1743 | 1773            | 1773 | 496 | 526 | 2x M63x1,5   | 65 | 80                                               | 80                  | 140                  | 170                 | 69                   | 85          | 85          | 18 | 22    | M20 | M20       | 71M2-4      | 1483 | 1513 | 1729 | 1759 | 42 |
| 315L3      | 1743 | 1773            | 1773 | 496 | 526 | 2x M63x1,5   | 65 | 80                                               | 80                  | 140                  | 170                 | 69                   | 85          | 85          | 18 | 22    | M20 | M20       | 71M2-4      | 1483 | 1513 | 1729 | 1759 | 42 |
| 355M       | -    | -               | 1980 | 672 | 702 | 2x M80x2     | 75 | 90                                               | 90                  | 140                  | 170                 | 79,5                 | 95          | 95          | 20 | 25    | M20 | M24       | -           | -    | -    | -    | -    | -  |
| 355L1      | 1925 | 1980            | 1980 | 672 | 702 | 2x M80x2     | 75 | 90                                               | 90                  | 140                  | 170                 | 79,5                 | 95          | 95          | 20 | 25    | M20 | M24       | 80M1-4      | 1812 | 1842 | 2083 | 2113 | 40 |
| 355L2      | 1950 | 1980            | 1980 | 672 | 702 | 2x M80x2     | 75 | 90                                               | 90                  | 140                  | 170                 | 79,5                 | 95          | 95          | 20 | 25    | M20 | M24       | 80M1-4      | 1812 | 1842 | 2083 | 2113 | 40 |
| 355L3      | 2030 | 2060            | -    | 672 | 702 | 2x M80x2     | 75 | 90                                               | 90                  | 140                  | 170                 | 79,5                 | 95          | 95          | 20 | 25    | M20 | M24       | 80M1-4      | 1892 | 1922 | 2163 | 2193 | 40 |
| 400S       | -    | 2190            | 2190 | 718 | 788 | 2x M95x2     | 75 | 100                                              | 100                 | 140                  | 210                 | 79,5                 | 106         | 106         | 20 | 28    | M20 | M24       | 80M2-4      | -    | 1907 | -    | 2178 | 40 |
| 400M       | 2120 | 2190            | 2190 | 718 | 788 | 2x M95x2     | 75 | 100                                              | 100                 | 140                  | 210                 | 79,5                 | 106         | 106         | 20 | 28    | M20 | M24       | 80M2-4      | 1837 | 1907 | 2108 | 2178 | 40 |
| 400L       | 2120 | 2190            | 2190 | 718 | 788 | 2x M95x2     | 75 | 100                                              | 100                 | 140                  | 210                 | 79,5                 | 106         | 106         | 20 | 28    | M20 | M24       | 80M2-4      | 1837 | 1907 | 2108 | 2178 | 40 |
| 450S       | 2140 | 2280            | 2280 | 756 | 826 | 2x M95x2     | 75 | 100                                              | 110                 | 140                  | 210                 | 79,5                 | 106         | 116         | 20 | 28    | M20 | M24       | 90S-4       | 1880 | 1950 | 2192 | 2262 | 40 |
| 450M       | 2140 | 2280            | 2280 | 756 | 826 | 2x M95x2     | 75 | 100                                              | 110                 | 140                  | 210                 | 79,5                 | 106         | 116         | 20 | 28    | M20 | M24       | 90S-4       | 1880 | 1950 | 2192 | 2262 | 40 |
| 450L1      | 2140 | 2280            | 2280 | 756 | 826 | 2x M95x2     | 75 | 100                                              | 110                 | 140                  | 210                 | 79,5                 | 106         | 116         | 20 | 28    | M20 | M24       | 90S-4       | 1880 | 1950 | 2192 | 2262 | 40 |
| 450L2      | -    | 2425            | 2425 | 756 | 826 | 2x M95x2     | 75 | 100                                              | 110                 | 140                  | 210                 | 79,5                 | 106         | 116         | 20 | 28    | M20 | M24       | 90S-4       | 2025 | 2095 | 2337 | 2407 | 40 |

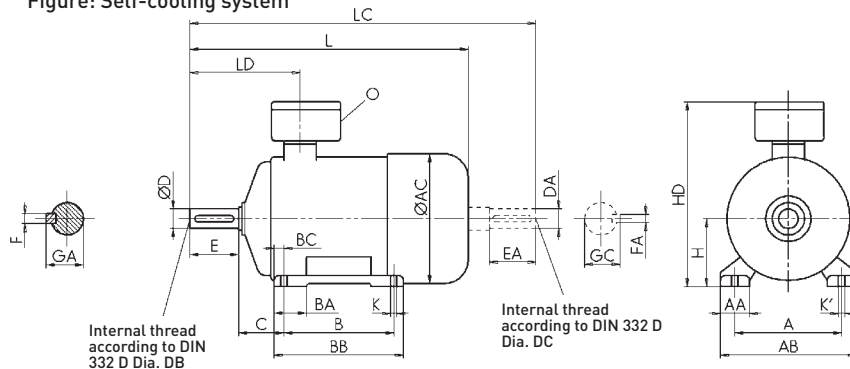
# IE2 / IE3 / MEPS

## Surface-Cooled Low-Voltage Motors, Self-Cooling by Radial-Flow Fans External Cooling by Axial-Flow Fan

98

Construction type IM B3, IM B6, IM B7, IM B8, IM V5 <sup>1)</sup>, IM V6

Figure: Self-cooling system



Carrying lugs from frame size 90.  
Measure AC measured from screw head  
Measure HD relates to terminal box Ex e.  
The box can be rotated by 4x90°.

### Note:

1) Construction type IM V5 with protective canopy; for LE measure, see page 101.

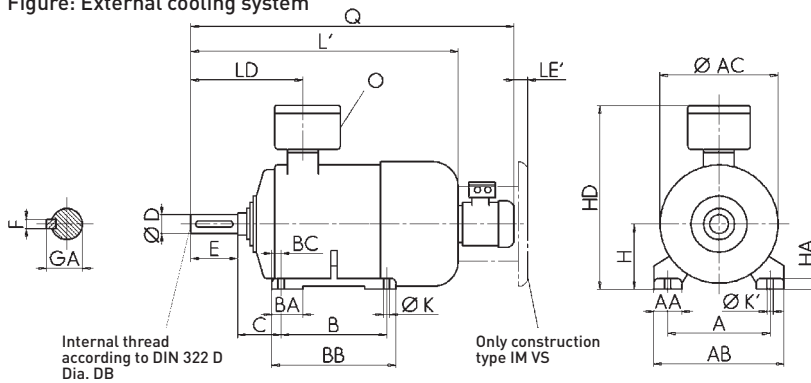
| Type<br>CD...Y2/Y3/Y | A   | AA | AB  | AC  | B   | BA  | BB  | BC   | C   | H -0,5 | HA | HD  | K H17 | K' H17 | L<br>Number of poles<br>2 4 6 8 |
|----------------------|-----|----|-----|-----|-----|-----|-----|------|-----|--------|----|-----|-------|--------|---------------------------------|
| 80M                  | 125 | 35 | 160 | 158 | 100 | 37  | 130 | 15   | 50  | 80     | 12 | 271 | Ø 10  | -      | 343 343 343 343                 |
| 90S                  | 140 | 38 | 180 | 178 | 100 | 44  | 130 | 15   | 56  | 90     | 12 | 295 | Ø 10  | -      | 398 398 398 398                 |
| 90L                  | 140 | 38 | 180 | 178 | 125 | 44  | 155 | 15   | 56  | 90     | 12 | 295 | Ø 10  | -      | 398 398 398 398                 |
| 100L                 | 160 | 42 | 200 | 198 | 140 | 46  | 175 | 17,5 | 63  | 100    | 15 | 311 | Ø 12  | -      | 419 419 419 419                 |
| 112M                 | 190 | 45 | 235 | 218 | 140 | 46  | 175 | 17,5 | 70  | 112    | 17 | 337 | Ø 12  | -      | 517 517 517 517                 |
| 132S                 | 216 | 60 | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132    | 20 | 411 | Ø 12  | -      | 529 529 529 529                 |
| 132S1                | 216 | 60 | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132    | 20 | 411 | Ø 12  | -      | - - - -                         |
| 132S2                | 216 | 60 | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132    | 20 | 411 | Ø 12  | -      | - - - -                         |
| 132M                 | 216 | 60 | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132    | 20 | 411 | Ø 12  | -      | 579 - 597                       |
| 132M1                | 216 | 60 | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132    | 20 | 411 | Ø 12  | -      | - 529 -                         |
| 132M2                | 216 | 60 | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132    | 20 | 411 | Ø 12  | -      | - 579 -                         |
| 160M                 | 254 | 65 | 310 | 318 | 210 | 100 | 300 | 23   | 108 | 160    | 25 | 477 | 15    | 20     | 713 676 676 676                 |
| 160L Y2              | 254 | 65 | 310 | 318 | 254 | 100 | 300 | 23   | 108 | 160    | 25 | 477 | 15    | 20     | 713 676 676 676                 |
| 160L Y3,Y            | 254 | 65 | 310 | 318 | 254 | 100 | 300 | 23   | 108 | 160    | 25 | 477 | 15    | 20     | 713 711 711 676                 |
| 180M                 | 279 | 75 | 350 | 353 | 241 | 100 | 340 | 30   | 121 | 180    | 25 | 545 | 15    | 20     | 726 726 - -                     |
| 180L Y2              | 279 | 75 | 350 | 353 | 279 | 100 | 340 | 30   | 121 | 180    | 25 | 545 | 15    | 20     | - 726 726 726                   |
| 180L Y3,Y            | 279 | 75 | 350 | 353 | 279 | 100 | 340 | 30   | 121 | 180    | 25 | 545 | 15    | 20     | - 776 726 726                   |
| 200L                 | 318 | 80 | 390 | 393 | 305 | 90  | 365 | 30   | 133 | 200    | 30 | 581 | 20    | 26     | 789 789 789 -                   |

| Type<br>CD...Y2/Y3/Y | A   | AA  | AB  | AC  | B   | BA  | BB  | BC   | C   | H        | HA | HD   | K H17 | K' H17 | L<br>Number of poles<br>2 4 6 8 |
|----------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|----------|----|------|-------|--------|---------------------------------|
| 225S                 | 356 | 85  | 450 | 455 | 286 | 90  | 370 | 29,5 | 149 | 225 -0,5 | 35 | 634  | 20    | 26     | - 937 - 888                     |
| 225M                 | 356 | 85  | 450 | 455 | 311 | 90  | 370 | 29,5 | 149 | 225 -0,5 | 35 | 634  | 20    | 26     | 907 937 888 888                 |
| 250M                 | 406 | 105 | 510 | 493 | 349 | 110 | 420 | 35,5 | 168 | 250 -0,5 | 40 | 721  | 26    | 35     | 1000 1000 934 934               |
| 280S                 | 457 | 110 | 570 | 548 | 368 | 120 | 500 | 40,5 | 190 | 280 -1   | 45 | 792  | 26    | 35     | 1109 1109 1109 1109             |
| 280M                 | 457 | 110 | 570 | 548 | 419 | 120 | 500 | 40,5 | 190 | 280 -1   | 45 | 792  | 26    | 35     | 1109 1109 1109 1109             |
| 315S                 | 508 | 150 | 630 | 635 | 406 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     | 1268 1298 1218 1218             |
| 315M                 | 508 | 150 | 630 | 635 | 457 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     | 1268 1298 1218 1218             |
| 315L1                | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     | 1268 1298 1218 1298             |
| 315L2                | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     | 1468 1498 1418 1498             |
| 315L3                | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     | 1468 1498 1418 1498             |
| 355M                 | 610 | 180 | 720 | 725 | 560 | 220 | 720 | 45   | 254 | 355 -1   | 50 | 1084 | 30    | 39     | - - - 1697                      |

| Type<br>CD...XY<br>**** | A   | AA  | AB  | AC  | B   | BA  | BB  | BC   | C   | H        | HA | HD  | K H17 | K' H17 | L<br>Number of poles<br>2 4 6 8 |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|----------|----|-----|-------|--------|---------------------------------|
| 250S                    | 406 | 115 | 510 | 493 | 311 | 130 | 420 | 35,5 | 168 | 250 -0,5 | 35 | 721 | 22    | 22     | 1000 1000 934 934               |
| 250M                    | 406 | 105 | 510 | 548 | 349 | -   | 420 | 30   | 168 | 250 -0,5 | 45 | 762 | 26    | 26     | 1109 1109 1109 1109             |
| 280S                    | 457 | 110 | 570 | 548 | 368 | 120 | 500 | 40,5 | 190 | 280 -1   | 45 | 792 | 26    | 35     | 1109 1109 1109 1109             |
| 280M                    | 457 | 110 | 560 | 635 | 419 | -   | 570 | 40   | 190 | 280 -1   | 48 | 862 | 26    | 26     | 1268 1268 1268 1268             |
| 315S                    | 508 | 150 | 630 | 635 | 406 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897 | 39    | 30     | 1268 1298 1298 1298             |
| 315M                    | 508 | 150 | 630 | 635 | 457 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897 | 39    | 30     | 1268 1298 1298 1298             |
| 315L1                   | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897 | 39    | 30     | 1468 1498 1298 1298             |
| 315L2                   | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897 | 39    | 30     | - - 1498 1498                   |

\*\*\*\* British Allocation

Figure: External cooling system

**Note:**

2) For types 250 to 315-4, 6, 8 with measures DA, EA, GC, FA, and DC, the 2-pole specifications apply.

| Type<br>CD...Y2/Y3/Y    | LC<br>Number of poles<br>2 4 6 8  |      |      |     | LD                              | 0  | Shaft end<br>D,DA E,EA GA,GC F,FA DB,DC                  |       |       |      |       | Fan<br>motor<br>Type CD... | Type CD...Y2F/Y3F/YF<br>L'<br>Number of poles<br>2 4 6 8 |                      |                            |                                                             |     |        |      |      | Q<br>2 4 6 8 | LE'  |    |               |     |
|-------------------------|-----------------------------------|------|------|-----|---------------------------------|----|----------------------------------------------------------|-------|-------|------|-------|----------------------------|----------------------------------------------------------|----------------------|----------------------------|-------------------------------------------------------------|-----|--------|------|------|--------------|------|----|---------------|-----|
| 80M                     | 417                               | 417  | 417  | 417 | 127                             | 2x | M25x1,5                                                  | 19 j6 | 40    | 21,5 | 6     | M6                         | -                                                        | -                    | -                          | -                                                           | -   | -      | -    | -    | -            | -    | -  |               |     |
| 90S                     | 479                               | 479  | 479  | 479 | 139                             | 2x | M25x1,5                                                  | 24 j6 | 50    | 27   | 8     | M8                         | -                                                        | -                    | -                          | -                                                           | -   | -      | -    | -    | -            | -    | -  |               |     |
| 90L                     | 479                               | 479  | 479  | 479 | 139                             | 2x | M25x1,5                                                  | 24 j6 | 50    | 27   | 8     | M8                         | -                                                        | -                    | -                          | -                                                           | -   | -      | -    | -    | -            | -    | -  |               |     |
| 100L                    | 515                               | 515  | 515  | 515 | 154                             | 2x | M32x1,5                                                  | 28 j6 | 60    | 31   | 8     | M10                        | -                                                        | -                    | -                          | -                                                           | -   | -      | -    | -    | -            | -    | -  |               |     |
| 112M                    | 608                               | 608  | 608  | 608 | 189                             | 2x | M32x1,5                                                  | 28 j6 | 60    | 31   | 8     | M10                        | 63M1-4                                                   | 515                  | 515                        | 515                                                         | 515 | 731    | 731  | 731  | 731          | 30   | -  |               |     |
| 132S                    | -                                 | 645  | 645  | 645 | 226                             | 2x | M32x1,5                                                  | 38 k6 | 80    | 41   | 10    | M12                        | 63M1-4                                                   | -                    | 606                        | 606                                                         | 606 | -      | 822  | 822  | 822          | 822  | 36 | -             |     |
| 132S1                   | 645                               | -    | -    | -   | 226                             | 2x | M32x1,5                                                  | 38 k6 | 80    | 41   | 10    | M12                        | 63M1-4                                                   | 606                  | -                          | -                                                           | -   | 822    | 822  | 822  | 822          | 36   | -  |               |     |
| 132S2                   | 652                               | -    | -    | -   | 226                             | 2x | M32x1,5                                                  | 38 k6 | 80    | 41   | 10    | M12                        | 63M1-4                                                   | 656                  | -                          | -                                                           | -   | 872    | -    | -    | -            | 36   | -  |               |     |
| 132M                    | -                                 | 652  | 645  | 645 | 226                             | 2x | M32x1,5                                                  | 38 k6 | 80    | 41   | 10    | M12                        | 63M1-4                                                   | -                    | 656                        | -                                                           | 606 | -      | 872  | -    | 822          | 36   | -  |               |     |
| 132M1                   | -                                 | -    | 645  | 645 | 226                             | 2x | M32x1,5                                                  | 38 k6 | 80    | 41   | 10    | M12                        | 63M1-4                                                   | -                    | -                          | 606                                                         | -   | -      | 822  | -    | 36           | -    | -  |               |     |
| 132M2                   | -                                 | -    | 652  | 652 | 226                             | 2x | M32x1,5                                                  | 38 k6 | 80    | 41   | 10    | M12                        | 63M1-4                                                   | -                    | -                          | 656                                                         | -   | -      | 872  | -    | 36           | -    | -  |               |     |
| 160M                    | 881                               | 849  | 849  | 849 | 261                             | 2x | M40x1,5                                                  | 42 k6 | 110   | 45   | 12    | M16                        | 63M1-4                                                   | 757                  | 757                        | 757                                                         | 757 | 972    | 972  | 972  | 972          | 38   | -  |               |     |
| 160L Y2                 | 881                               | 849  | 849  | 849 | 261                             | 2x | M40x1,5                                                  | 42 k6 | 110   | 45   | 12    | M16                        | 63M1-4                                                   | 757                  | 757                        | 757                                                         | 757 | 972    | 972  | 972  | 972          | 38   | -  |               |     |
| 160L Y3/Y               | 881                               | 884  | 884  | 849 | 261                             | 2x | M40x1,5                                                  | 42 k6 | 110   | 45   | 12    | M16                        | 63M1-4                                                   | 757                  | 792                        | 792                                                         | 757 | 972    | 1007 | 1007 | 972          | 38   | -  |               |     |
| 180M                    | 909                               | 909  | -    | -   | 369                             | 2x | M40x1,5                                                  | 48 k6 | 110   | 51,5 | 14    | M16                        | 63M1-4                                                   | 746                  | 746                        | -                                                           | -   | 960    | 960  | -    | -            | 38   | -  |               |     |
| 180L Y2                 | -                                 | 909  | 909  | 909 | 369                             | 2x | M40x1,5                                                  | 48 k6 | 110   | 51,5 | 14    | M16                        | 63M1-4                                                   | -                    | 746                        | 746                                                         | 746 | -      | 960  | 960  | 960          | 38   | -  |               |     |
| 180L Y3/Y               | -                                 | 959  | 909  | 909 | 369                             | 2x | M40x1,5                                                  | 48 k6 | 110   | 51,5 | 14    | M16                        | 63M1-4                                                   | -                    | 756                        | 746                                                         | 746 | -      | 1010 | 960  | 960          | 38   | -  |               |     |
| 200L                    | 983                               | 909  | 909  | 909 | 390                             | 2x | M50x1,5                                                  | 55 m6 | 110   | 59   | 16    | M20                        | 63M1-4                                                   | 803                  | 803                        | 803                                                         | -   | 1018   | 1018 | 1018 | -            | 38   | -  |               |     |
| Type<br>CD...Y2/Y3/Y    | LC<br>Number of poles<br>2 4 6 8  |      |      |     | LD<br>N. of. poles<br>2 4, 6, 8 | 0  | Shaft end<br>Dm6, DAm6 <sup>2)</sup> E, EA <sup>2)</sup> |       |       |      |       | GA, GC <sup>2)</sup>       | F, FA <sup>2)</sup>                                      | DB, DC <sup>2)</sup> | Fan<br>motor<br>Type CD... | Type CD...Y2F/Y3F/YF<br>L'<br>Number of poles<br>2 4 6, 8 2 |     |        |      |      |              |      |    | Q<br>2 4 6, 8 | LE' |
| 225S                    | -                                 | 1175 | 1175 | -   | 377                             | 2x | M50x1,5                                                  | -     | 60    | -    | 140   | -                          | 64                                                       | -                    | 18                         | -                                                           | M20 | 63M1-4 | -    | 938  | -            | 1153 | 38 | -             |     |
| 225M                    | 1112                              | 1175 | 1175 | 347 | 377                             | 2x | M50x1,5                                                  | 55    | 60    | 110  | 140   | 59                         | 64                                                       | 16                   | 18                         | M20                                                         | M20 | 63M1-4 | 908  | 938  | 1123         | 1153 | 38 | -             |     |
| 250M                    | 1250                              | 1250 | 1184 | 482 | 482                             | 2x | M63x1,5                                                  | 60    | 65    | 140  | 140   | 64                         | 69                                                       | 18                   | 18                         | M20                                                         | M20 | 63M1-4 | 1019 | 1019 | 1234         | 1234 | 38 | -             |     |
| 280S                    | 1375                              | 1375 | 1375 | 483 | 483                             | 2x | M63x1,5                                                  | 65    | 75    | 140  | 140   | 69                         | 79,5                                                     | 18                   | 20                         | M20                                                         | M20 | 71M2-4 | 1140 | 1140 | 1387         | 1387 | 41 | -             |     |
| 280M                    | 1375                              | 1375 | 1375 | 483 | 483                             | 2x | M63x1,5                                                  | 65    | 75    | 140  | 140   | 69                         | 79,5                                                     | 18                   | 20                         | M20                                                         | M20 | 71M2-4 | 1140 | 1140 | 1387         | 1387 | 41 | -             |     |
| 315S                    | 1543                              | 1573 | 1573 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80    | 140  | 170   | 69                         | 85                                                       | 18                   | 22                         | M20                                                         | M20 | 71M2-4 | 1283 | 1313 | 1529         | 1559 | 42 | -             |     |
| 315M                    | 1543                              | 1573 | 1573 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80    | 140  | 170   | 69                         | 85                                                       | 18                   | 22                         | M20                                                         | M20 | 71M2-4 | 1283 | 1313 | 1529         | 1559 | 42 | -             |     |
| 315L1                   | 1543                              | 1573 | 1573 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80    | 140  | 170   | 69                         | 85                                                       | 18                   | 22                         | M20                                                         | M20 | 71M2-4 | 1283 | 1313 | 1529         | 1559 | 42 | -             |     |
| 315L2                   | 1743                              | 1773 | 1773 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80    | 140  | 170   | 69                         | 85                                                       | 18                   | 22                         | M20                                                         | M20 | 71M2-4 | 1483 | 1513 | 1729         | 1759 | 42 | -             |     |
| 315L3                   | 1743                              | 1773 | 1773 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80    | 140  | 170   | 69                         | 85                                                       | 18                   | 22                         | M20                                                         | M20 | 71M2-4 | 1483 | 1513 | 1729         | 1759 | 42 | -             |     |
| 355M                    | -                                 | -    | 1980 | -   | 702                             | 2x | M80x2                                                    | 75    | 90    | 140  | 170   | 79,5                       | 95                                                       | 20                   | 25                         | M20                                                         | M24 | -      | -    | -    | -            | -    | -  | -             |     |
| Type<br>CD...XY<br>**** | LC<br>Number of poles<br>2 4 6, 8 |      |      |     | LD<br>N. of. poles<br>2 4, 6, 8 | 0  | Shaft end<br>Dm6, DAm6 <sup>2)</sup> E, EA <sup>2)</sup> |       |       |      |       | GA, GC <sup>2)</sup>       | F, FA <sup>2)</sup>                                      | DB, DC <sup>2)</sup> | Fan<br>motor<br>Type CD... | Type CD...Y2F/Y3F/YF<br>L'<br>Number of poles<br>2 4 6, 8 2 |     |        |      |      |              |      |    | Q<br>2 4 6, 8 | LE' |
| 250S                    | 1250                              | 1250 | 1184 | 482 | 482                             | 2x | M63x1,5                                                  | 60    | 65*   | 140  | 140   | 64                         | 69*                                                      | 18                   | 18*                        | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 250M                    | 1375                              | 1375 | 1375 | 483 | 483                             | 2x | M63x1,5                                                  | 60    | 65*   | 140  | 140   | 64                         | 69*                                                      | 18                   | 18*                        | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 280S                    | 1375                              | 1375 | 1375 | 483 | 483                             | 2x | M63x1,5                                                  | 65    | 75**  | 140  | 140** | 69                         | 79,5**                                                   | 18                   | 20**                       | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 280M                    | 1543                              | 1543 | 1543 | 496 | 496                             | 2x | M63x1,5                                                  | 65    | 75**  | 140  | 140** | 69                         | 79,5**                                                   | 18                   | 20**                       | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 315S                    | 1543                              | 1573 | 1573 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80*** | 140  | 170   | 69                         | 85***                                                    | 18                   | 22                         | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 315M                    | 1543                              | 1573 | 1573 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80*** | 140  | 170   | 69                         | 85***                                                    | 18                   | 22                         | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 315L1                   | 1743                              | 1773 | 1573 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80*** | 140  | 170   | 69                         | 85***                                                    | 18                   | 22                         | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |
| 315L2                   | -                                 | -    | 1773 | 496 | 526                             | 2x | M63x1,5                                                  | 65    | 80*** | 140  | 170   | 69                         | 85***                                                    | 18                   | 22                         | M20                                                         | M20 | -      | -    | -    | -            | -    | -  | -             |     |

\* Diameter 70 for British Allocation on request - please Notes: Measure GA becomes 74,5 and measure F becomes 20

\*\* Diameter 80 for British Allocation on request - please Notes: Measures L, LC, LD and E become 30mm longer, measure GA becomes 85 and measure F becomes 22

\*\*\* Diameter 85 for British Allocation on request - please Notes: Measure GA becomes 90 and measure F corresponds to the catalog.

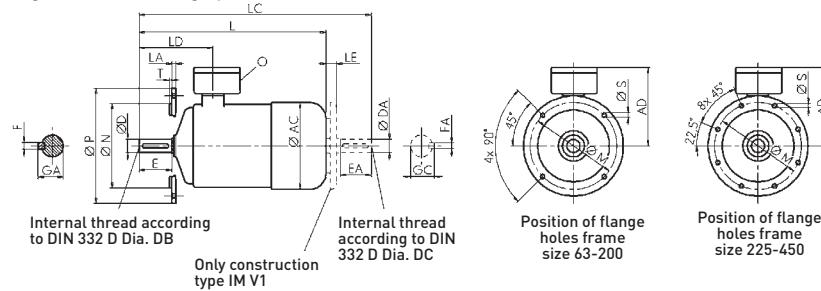
\*\*\*\* British Allocation

# Surface-Cooled Low-Voltage Motors

## Self-Cooling by Radial-Flow Fans

## External Cooling by Axial-Flow Fan

Figure: Self-cooling system



Frame size 63 in T4, unventilated  
Mounting flange according to EN 50347, type FF.  
Carrying lugs from frame size 90.  
Measure AC measured from screw heads  
Measure AD relates to terminal box Ex e.  
The box can be rotated by 4x90°.  
This also applies to the BD... series.  
Frame sizes 400 to 450 only available in construction type V1.

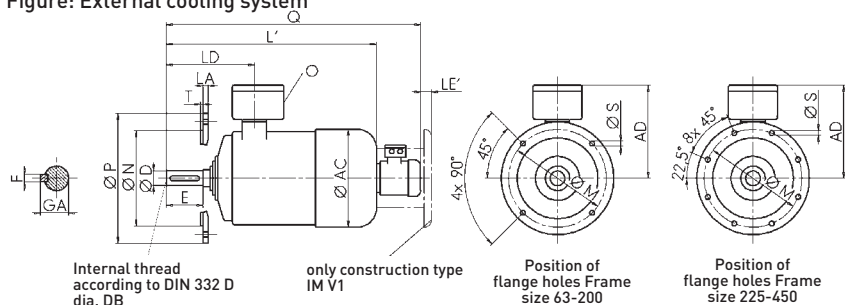
**Note:**

1) Construction type IM V1 requires protective canopy, see LE measure on page 101; LC measure includes LE.

| Type<br>CD... | Mounting flange |     |       | P   | S    | H17 | T   | AC  | AD  | L               |     |     |     | LC              |     |     |     |
|---------------|-----------------|-----|-------|-----|------|-----|-----|-----|-----|-----------------|-----|-----|-----|-----------------|-----|-----|-----|
|               | LA              | M   | N     |     |      |     |     |     |     | Number of poles |     |     |     | Number of poles |     |     |     |
|               |                 |     |       |     |      |     |     |     |     | 2               | 4   | 6   | 8   | 2               | 4   | 6   | 8   |
| 63M           | 9               | 115 | 95j6  | 140 | 10   | 3   | 3   | 134 | 164 | 239             | 239 | 239 | 239 | 274             | 274 | 274 | 274 |
| 71M           | 9               | 130 | 110j6 | 160 | 10   | 3,5 | 3,5 | 145 | 164 | 278             | 278 | 278 | 278 | 334             | 334 | 334 | 334 |
| 80M           | 12              | 165 | 130j6 | 200 | 12   | 3,5 | 3,5 | 163 | 180 | 313             | 313 | 313 | 313 | 387             | 387 | 387 | 387 |
| 90S           | 12              | 165 | 130j6 | 200 | 12   | 3,5 | 3,5 | 183 | 185 | 313             | 313 | 313 | 313 | 445             | 445 | 445 | 445 |
| 90L           | 12              | 165 | 130j6 | 200 | 12   | 3,5 | 3,5 | 183 | 185 | 364             | 364 | 364 | 364 | 445             | 445 | 445 | 445 |
| 100L          | 16              | 215 | 180j6 | 250 | 14,5 | 4   | 4   | 201 | 205 | 415             | 415 | 415 | 415 | 510             | 510 | 510 | 510 |
| 112M          | 16              | 215 | 180j6 | 250 | 14,5 | 4   | 4   | 225 | 205 | 424             | 425 | 425 | 425 | 526             | 526 | 526 | 526 |
| 132S+M        | 16              | 265 | 230j6 | 300 | 14,5 | 4   | 4   | 265 | 279 | 529             | 529 | 529 | 529 | 645             | 645 | 645 | 645 |
| 160M+L        | 20              | 300 | 250j6 | 350 | 18,5 | 5   | 5   | 318 | 317 | 713             | 676 | 676 | 676 | 864             | 864 | 864 | 831 |
| 180M          | 20              | 300 | 250j6 | 350 | 18,5 | 5   | 5   | 353 | 365 | 726             | 726 | -   | -   | 909             | 909 | -   | -   |
| 180L          | 20              | 300 | 250j6 | 350 | 18,5 | 5   | 5   | 353 | 365 | -               | 726 | 726 | 726 | -               | 909 | 909 | 909 |
| 200L          | 20              | 350 | 300h6 | 400 | 18,5 | 5   | 5   | 393 | 381 | 789             | 789 | 789 | 789 | 983             | -   | -   | 983 |

| Type<br>CD... | Mounting flange |     |      | P    | S    | H17 | T | AC  | AD  | L               |      |      |      | LC              |      |      |      |
|---------------|-----------------|-----|------|------|------|-----|---|-----|-----|-----------------|------|------|------|-----------------|------|------|------|
|               | LA              | M   | N h6 |      |      |     |   |     |     | Number of poles |      |      |      | Number of poles |      |      |      |
|               |                 |     |      |      |      |     |   |     |     | 2               | 4    | 6    | 8    | 2               | 4    | 6    | 8    |
| 225S          | 22              | 400 | 350  | 450  | 18,5 | 5   | 5 | 455 | 409 | -               | 936  | -    | -    | -               | 1175 | 1175 | -    |
| 225M          | 22              | 400 | 350  | 450  | 18,5 | 5   | 5 | 455 | 409 | 907             | 937  | 888  | 888  | 1111            | 1175 | 1175 | 1175 |
| 250M          | 18              | 500 | 450  | 550  | 18,5 | 5   | 5 | 493 | 471 | 1000            | 1000 | 934  | 934  | 1145            | 1145 | 1145 | 1145 |
| 280S          | 18              | 500 | 450  | 550  | 18,5 | 5   | 5 | 548 | 511 | 1109            | 1109 | 1109 | 1109 | 1251            | 1251 | 1185 | 1185 |
| 280M          | 18              | 500 | 450  | 550  | 18,5 | 5   | 5 | 548 | 511 | 1109            | 1109 | 1109 | 1109 | 1375            | 1375 | 1375 | 1375 |
| 315S          | 22              | 600 | 550  | 660  | 24   | 6   | 6 | 635 | 581 | 1268            | 1298 | 1218 | 1218 | 1543            | 1573 | 1573 | 1573 |
| 315M          | 22              | 600 | 550  | 660  | 24   | 6   | 6 | 635 | 581 | 1268            | 1298 | 1218 | 1218 | 1543            | 1573 | 1573 | 1573 |
| 315L1         | 22              | 600 | 550  | 660  | 24   | 6   | 6 | 635 | 581 | 1268            | 1298 | 1218 | 1298 | 1543            | 1573 | 1573 | 1573 |
| 315L2         | 22              | 600 | 550  | 660  | 24   | 6   | 6 | 635 | 581 | 1468            | 1498 | 1418 | 1498 | 1543            | 1573 | 1773 | 1773 |
| 315L3         | 22              | 600 | 550  | 660  | 24   | 6   | 6 | 635 | 581 | 1468            | 1498 | 1416 | 1498 | 1543            | 1573 | 1573 | 1573 |
| 355M          | 25              | 740 | 680  | 800  | 24   | 6   | 6 | 725 | 729 | -               | -    | 1597 | 1597 | -               | -    | 1980 | 1980 |
| 355L1         | 25              | 740 | 680  | 800  | 24   | 6   | 6 | 725 | 729 | 1667            | 1697 | 1597 | 1597 | 1825            | 1980 | 1980 | 1980 |
| 355L2         | 25              | 740 | 680  | 800  | 24   | 6   | 6 | 725 | 729 | 1667            | 1697 | 1597 | 1597 | 1950            | 1980 | 1980 | 1980 |
| 355L3         | 25              | 740 | 680  | 800  | 24   | 6   | 6 | 725 | 729 | 1747            | 1777 | -    | -    | 2030            | 2060 | -    | -    |
| 400S          | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 810 | 746 | -               | 1907 | 1907 | 1907 | -               | 2190 | 2190 | 2190 |
| 400M          | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 810 | 746 | 1837            | 1907 | 1907 | 1907 | 2120            | 2190 | 2190 | 2190 |
| 400L          | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 810 | 746 | 1837            | 1907 | 1907 | 1907 | 2120            | 2190 | 2190 | 2190 |
| 450S          | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 910 | 814 | 1838            | 1908 | 1908 | 1908 | 2140            | 2280 | 2180 | 2280 |
| 450M          | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 910 | 814 | 1838            | 1908 | 1908 | 1908 | 2140            | 2280 | 2180 | 2280 |
| 450L1         | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 910 | 814 | 1838            | 1908 | 1908 | 1908 | 2140            | 2280 | 2180 | 2280 |
| 450L2         | 28              | 940 | 880  | 1000 | 28   | 6   | 6 | 910 | 814 | -               | 2053 | 2053 | 2053 | -               | 2280 | 2180 | 2280 |

Figure: External cooling system



1) For types 250 to 400-4, 6, 8 with measures DA, EA, GC, FA and DC, the 2-pole specifications apply.  
For type 450-6, 8 with measures DA, EA, GC, FA and DC, the 4-pole specifications apply

| Type CD... | LD  | LE | Number of poles | 0  | Shaft end | D, DA      | E, EA | GA, GC | F, FA | DB, DC | Fan motor  | Type CD...F     | L'      | Q   | LE'     |
|------------|-----|----|-----------------|----|-----------|------------|-------|--------|-------|--------|------------|-----------------|---------|-----|---------|
|            |     |    | 2               | 4  | 6, 8      |            |       |        |       |        | Type CD... | Number of poles |         |     |         |
|            |     |    | 2               | 4  | 6, 8      |            |       |        |       |        |            | 2               | 4, 6, 8 | 2   | 4, 6, 8 |
| 63M        | 104 | -  | -               | -  | -         | 2x M25x1,5 | 11j6  | 23     | 12,5  | 4      | M4         | -               | -       | -   | -       |
| 71M        | 111 | 25 | 25              | 25 | 25        | 2x M25x1,5 | 14j6  | 30     | 16    | 5      | M5         | -               | -       | -   | -       |
| 80M        | 116 | 25 | 25              | 25 | 25        | 2x M25x1,5 | 19j6  | 40     | 21,5  | 6      | M6         | -               | -       | -   | -       |
| 90S        | 137 | 25 | 25              | 25 | 25        | 2x M25x1,5 | 24j6  | 50     | 27    | 8      | M8         | -               | -       | -   | -       |
| 90L        | 137 | 25 | 25              | 25 | 25        | 2x M25x1,5 | 24j6  | 50     | 27    | 8      | M8         | -               | -       | -   | -       |
| 100L       | 149 | 30 | 30              | 30 | 30        | 2x M32x1,5 | 28j6  | 60     | 31    | 8      | M10        | -               | -       | -   | -       |
| 112M       | 154 | 30 | 30              | 30 | 30        | 2x M32x1,5 | 28j6  | 60     | 31    | 8      | M10        | 63M1-4          | 515     | 515 | 731     |
| 132S+M     | 226 | 30 | 30              | 30 | 30        | 2x M32x1,5 | 38k6  | 80     | 41    | 10     | M12        | 63M1-4          | 606     | 606 | 822     |
| 160M+L     | 261 | 35 | 35              | 35 | 35        | 2x M40x1,5 | 42k6  | 110    | 45    | 12     | M16        | 63M1-4          | 757     | 757 | 972     |
| 180M       | 369 | 63 | 63              | -  | -         | 2x M40x1,5 | 48k6  | 110    | 51,5  | 14     | M16        | 63M1-4          | 746     | 746 | 960     |
| 180L       | 369 | -  | 63              | 63 | 63        | 2x M40x1,5 | 48k6  | 110    | 51,5  | 14     | M16        | 63M1-4          | 746     | 746 | 960     |
| 200L       | 390 | 74 | 74              | 74 | 74        | 2x M50x1,5 | 55m6  | 110    | 59    | 16     | M20        | 63M1-4          | 803     | 803 | 1018    |

| Type<br>CD... | LD  | LE           |     |      | 0   | Shaft end              |    |      |     |         |     |                     |      |                    |         |                     |         | Fan<br>motor<br>Type CD... | Type CD...F |         |      |         | LE   |    |
|---------------|-----|--------------|-----|------|-----|------------------------|----|------|-----|---------|-----|---------------------|------|--------------------|---------|---------------------|---------|----------------------------|-------------|---------|------|---------|------|----|
|               |     | No. of poles |     |      |     | Dm6,DAM6 <sup>1)</sup> |    |      |     | E,EA    |     | GA,GC <sup>1)</sup> |      | F,FA <sup>1)</sup> |         | DB,DC <sup>1)</sup> |         |                            | L' Q        |         |      |         |      |    |
|               |     | 2            | 4   | 6, 8 |     | 2                      | 4  | 6, 8 | 2   | 4, 6, 8 | 2   | 4                   | 6+8  | 2                  | 4, 6, 8 | 2                   | 4, 6, 8 |                            | 2           | 4, 6, 8 | 2    | 4, 6, 8 |      | 2  |
| 225S          | -   | 377          | -   | 85   | 85  | 2x M50x1,5             | -  | 60   | 60  | -       | 140 | -                   | 64   | 64                 | -       | 18                  | -       | M20                        | 63M1-4      | -       | 938  | -       | 1153 | 38 |
| 225M          | 347 | 377          | 85  | 85   | 85  | 2x M50x1,5             | 55 | 60   | 60  | 110     | 140 | 59                  | 64   | 64                 | 16      | 18                  | M20     | M20                        | 63M1-4      | 908     | 938  | 1123    | 1153 | 38 |
| 250M          | 482 | 482          | 94  | 94   | 94  | 2x M63x1,5             | 60 | 65   | 65  | 140     | 140 | 64                  | 69   | 69                 | 18      | 18                  | M20     | M20                        | 63M1-4      | 1019    | 1019 | 1234    | 1234 | 38 |
| 280S          | 483 | 483          | 110 | 110  | 110 | 2x M63x1,5             | 65 | 75   | 75  | 140     | 140 | 69                  | 79,5 | 79,5               | 18      | 20                  | M20     | M20                        | 71M2-4      | 1140    | 1140 | 1387    | 1387 | 41 |
| 280M          | 483 | 483          | 110 | 110  | 110 | 2x M63x1,5             | 65 | 75   | 75  | 140     | 140 | 69                  | 79,5 | 79,5               | 18      | 20                  | M20     | M20                        | 71M2-4      | 1140    | 1140 | 1387    | 1387 | 41 |
| 315S          | 496 | 526          | 115 | 115  | 115 | 2x M63x1,5             | 65 | 80   | 80  | 140     | 170 | 69                  | 85   | 85                 | 18      | 22                  | M20     | M20                        | 71M2-4      | 1283    | 1313 | 1529    | 1559 | 42 |
| 315M          | 496 | 526          | 115 | 115  | 115 | 2x M63x1,5             | 65 | 80   | 80  | 140     | 170 | 69                  | 85   | 85                 | 18      | 22                  | M20     | M20                        | 71M2-4      | 1283    | 1313 | 1529    | 1559 | 42 |
| 315L1         | 496 | 526          | 115 | 115  | 115 | 2x M63x1,5             | 65 | 80   | 80  | 140     | 170 | 69                  | 85   | 85                 | 18      | 22                  | M20     | M20                        | 71M2-4      | 1283    | 1313 | 1529    | 1559 | 42 |
| 315L2         | 496 | 526          | 115 | 115  | 115 | 2x M63x1,5             | 65 | 80   | 80  | 140     | 170 | 69                  | 85   | 85                 | 18      | 22                  | M20     | M20                        | 71M2-4      | 1283    | 1313 | 1529    | 1559 | 42 |
| 315L3         | 496 | 526          | 115 | 115  | 115 | 2x M63x1,5             | 65 | 80   | 80  | 140     | 170 | 69                  | 85   | 85                 | 18      | 22                  | M20     | M20                        | 71M2-4      | 1283    | 1313 | 1529    | 1559 | 42 |
| 355M          | 672 | 702          | 130 | 130  | 130 | 2x M80x2               | 75 | 90   | 90  | 140     | 170 | 79,5                | 95   | 95                 | 20      | 25                  | M20     | M24                        | -           | -       | -    | -       | -    | -  |
| 355L1         | 672 | 702          | 130 | 130  | 130 | 2x M80x2               | 75 | 90   | 90  | 140     | 170 | 79,5                | 95   | 95                 | 20      | 25                  | M20     | M24                        | 80M1-4      | 1812    | 1842 | 2083    | 2113 | 40 |
| 355L2         | 672 | 702          | 130 | 130  | 130 | 2x M80x2               | 75 | 90   | 90  | 140     | 170 | 79,5                | 95   | 95                 | 20      | 25                  | M20     | M24                        | 80M1-4      | 1812    | 1842 | 2083    | 2113 | 40 |
| 355L3         | 672 | 702          | 130 | 130  | 130 | 2x M80x2               | 75 | 90   | 90  | 140     | 170 | 79,5                | 95   | 95                 | 20      | 25                  | M20     | M24                        | 80M1-4      | 1892    | 1922 | 2163    | 2193 | 40 |
| 400S          | 716 | 786          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 100 | 140     | 210 | 79,5                | 106  | 106                | 20      | 28                  | M20     | M24                        | 80M2-4      | -       | 1907 | -       | 2178 | -  |
| 400M          | 716 | 786          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 100 | 140     | 210 | 79,5                | 106  | 106                | 20      | 28                  | M20     | M24                        | 80M2-4      | 1837    | 1907 | 2108    | 2178 | 40 |
| 400L          | 716 | 786          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 100 | 140     | 210 | 79,5                | 106  | 106                | 20      | 28                  | M20     | M24                        | 80M2-4      | 1837    | 1907 | 2108    | 2178 | 40 |
| 450S          | 704 | 774          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 110 | 140     | 210 | 79,5                | 106  | 116                | 20      | 28                  | M20     | M24                        | 90S-4       | 1880    | 1950 | 2192    | 2262 | 40 |
| 450M          | 704 | 774          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 110 | 140     | 210 | 79,5                | 106  | 116                | 20      | 28                  | M20     | M24                        | 90S-4       | 1880    | 1950 | 2192    | 2262 | 40 |
| 450L1         | 704 | 774          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 110 | 140     | 210 | 79,5                | 106  | 116                | 20      | 28                  | M20     | M24                        | 90S-4       | 1880    | 1950 | 2192    | 2262 | 40 |
| 450L2         | 704 | 774          | 130 | 130  | 130 | 2x M95x2               | 75 | 100  | 110 | 140     | 210 | 79,5                | 106  | 116                | 20      | 28                  | M20     | M24                        | 90S-4       | 2025    | 2095 | 2337    | 2407 | 40 |

# IE2 / IE3 / MEPS

## Surface-Cooled Low-Voltage Motors

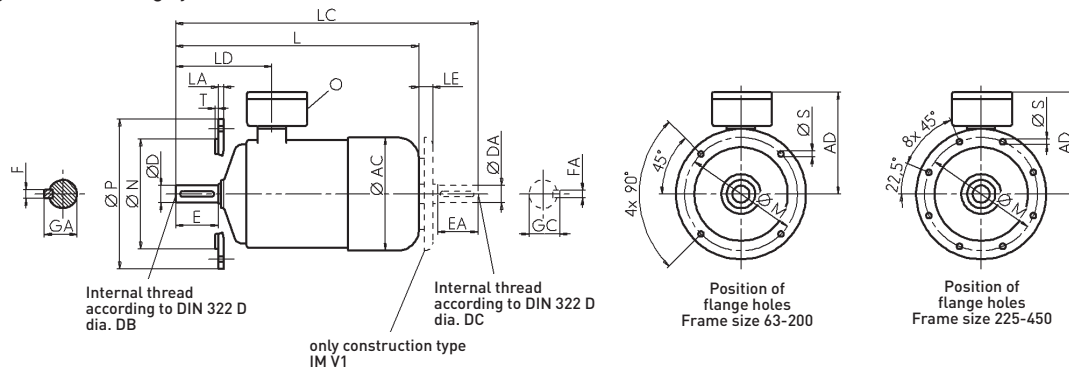
### Self-Cooling by Radial-Flow Fans

### External Cooling by Axial-Flow Fan

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Construction type IM B5, IM V1<sup>1)</sup>, IM V3

Figure: Self-cooling system



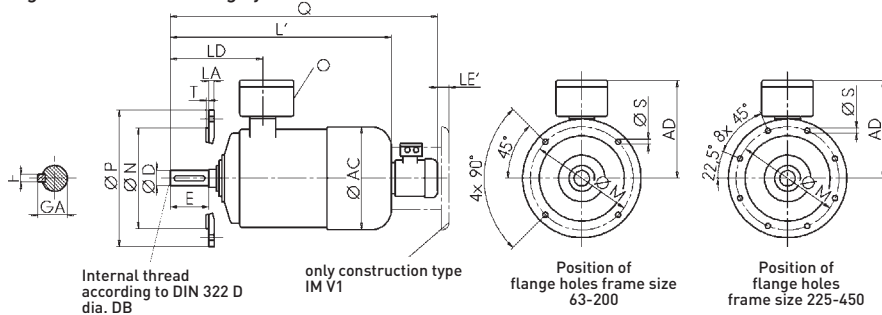
|              | Mounting flange |     |        |     |       |     |     |     | L               |     |     |     | LC              |     |     |     |
|--------------|-----------------|-----|--------|-----|-------|-----|-----|-----|-----------------|-----|-----|-----|-----------------|-----|-----|-----|
| Type         | LA              | M   | N      | P   | S H17 | T   | AC  | AD  | Number of poles |     |     |     | Number of poles |     |     |     |
| CD...Y2/Y3/Y |                 |     |        |     |       |     |     |     | 2               | 4   | 6   | 8   | 2               | 4   | 6   | 8   |
| 80M          | 12              | 165 | 130 j6 | 200 | 12    | 3,5 | 158 | 180 | 343             | 343 | 343 | 343 | 417             | 417 | 417 | 417 |
| 90S+L        | 12              | 165 | 130 j6 | 200 | 12    | 3,5 | 178 | 185 | 398             | 398 | 398 | 398 | 479             | 479 | 479 | 479 |
| 100L         | 16              | 215 | 180 j6 | 250 | 14,5  | 4   | 198 | 205 | 419             | 419 | 419 | 419 | 515             | 515 | 515 | 515 |
| 112M         | 16              | 215 | 180 j6 | 250 | 14,5  | 4   | 218 | 225 | 517             | 517 | 517 | 517 | 608             | 608 | 608 | 608 |
| 132S         | 16              | 265 | 230 j6 | 300 | 14,5  | 4   | 265 | 279 | –               | 529 | 529 | 529 | –               | 645 | 645 | 645 |
| 132S1        | 16              | 265 | 230 j6 | 300 | 14,5  | 4   | 265 | 279 | 529             | –   | –   | –   | 645             | –   | –   | –   |
| 132S2        | 16              | 265 | 230 j6 | 300 | 14,5  | 4   | 265 | 279 | 579             | –   | –   | –   | 652             | –   | –   | –   |
| 132M         | 16              | 265 | 230 j6 | 300 | 14,5  | 4   | 265 | 279 | –               | 579 | –   | 529 | –               | 652 | –   | –   |
| 132M1        | 16              | 265 | 230 j6 | 300 | 14,5  | 4   | 265 | 279 | –               | –   | 529 | –   | –               | –   | 645 | 645 |
| 132M2        | 16              | 265 | 230 j6 | 300 | 14,5  | 4   | 265 | 279 | –               | –   | 579 | –   | –               | –   | 652 | 652 |
| 160M         | 20              | 300 | 250 j6 | 350 | 18,5  | 5   | 318 | 317 | 713             | 676 | 676 | 676 | 881             | 849 | 849 | 849 |
| 160L Y2      | 20              | 300 | 250 j6 | 350 | 18,5  | 5   | 318 | 317 | 713             | 676 | 676 | 676 | 881             | 849 | 849 | 849 |
| 160L Y3/Y    | 20              | 300 | 250 j6 | 350 | 18,5  | 5   | 318 | 317 | 713             | 711 | 711 | 676 | 811             | 884 | 884 | 849 |
| 180M         | 20              | 300 | 250 j6 | 350 | 18,5  | 5   | 353 | 365 | 726             | 726 | –   | –   | 909             | 909 | –   | –   |
| 180L Y2      | 20              | 300 | 250 j6 | 350 | 18,5  | 5   | 353 | 365 | –               | 726 | 726 | 726 | –               | 909 | 909 | 909 |
| 180L Y3/Y    | 20              | 300 | 250 j6 | 350 | 18,5  | 5   | 353 | 365 | –               | 776 | 726 | 726 | –               | 959 | 909 | 909 |
| 200L         | 20              | 350 | 300 h6 | 400 | 18,5  | 5   | 393 | 381 | 789             | 726 | 726 | 726 | 983             | 909 | 909 | 909 |

|              | Mounting flange |     |      |     |       |   |     |     | L               |      |      |      | LC              |      |      |      |
|--------------|-----------------|-----|------|-----|-------|---|-----|-----|-----------------|------|------|------|-----------------|------|------|------|
| Type         | LA              | M   | N h6 | P   | S H17 | T | AC  | AD  | Number of poles |      |      |      | Number of poles |      |      |      |
| CD...Y2/Y3/Y |                 |     |      |     |       |   |     |     | 2               | 4    | 6    | 8    | 2               | 4    | 6    | 8    |
| 225S         | 22              | 400 | 350  | 450 | 18,5  | 5 | 455 | 409 | –               | 937  | –    | 888  | –               | 1175 | 1175 | 1175 |
| 225M         | 22              | 400 | 350  | 450 | 18,5  | 5 | 455 | 409 | 907             | 937  | 888  | 888  | 1112            | 1175 | 1175 | 1175 |
| 250M         | 18              | 500 | 450  | 550 | 18,5  | 5 | 493 | 471 | 1000            | 1000 | 934  | 934  | 1250            | 1250 | 1184 | 1184 |
| 280S         | 18              | 500 | 450  | 550 | 18,5  | 5 | 548 | 512 | 1109            | 1109 | 1109 | 1109 | 1375            | 1375 | 1375 | 1375 |
| 280M         | 18              | 500 | 450  | 550 | 18,5  | 5 | 548 | 512 | 1109            | 1109 | 1109 | 1109 | 1375            | 1375 | 1375 | 1375 |
| 315S         | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 582 | 1268            | 1298 | 1218 | 1218 | 1543            | 1573 | 1573 | 1573 |
| 315M         | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 582 | 1268            | 1298 | 1218 | 1218 | 1543            | 1573 | 1573 | 1573 |
| 315L         | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 582 | 1268            | 1298 | 1218 | 1298 | 1543            | 1573 | 1573 | 1573 |
| 315L2        | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 582 | 1468            | 1498 | 1418 | 1498 | 1743            | 1773 | 1773 | 1773 |
| 315L3        | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 582 | 1468            | 1498 | 1418 | 1498 | 1743            | 1773 | 1773 | 1773 |
| 355M         | 25              | 740 | 680  | 800 | 24    | 6 | 725 | 729 | –               | –    | –    | 1697 | –               | –    | –    | 1980 |

| Type    | Mounting flange |     |      |     |       |   |     |     | L               |      |      |      | LC              |      |      |      |
|---------|-----------------|-----|------|-----|-------|---|-----|-----|-----------------|------|------|------|-----------------|------|------|------|
| CD...XY | LA              | M   | N h6 | P   | S H17 | T | AC  | AD  | Number of poles |      |      |      | Number of poles |      |      |      |
| ****    |                 |     |      |     |       |   |     |     | 2               | 4    | 6    | 8    | 2               | 4    | 6    | 8    |
| 250S    | 18              | 500 | 450  | 550 | 18,5  | 5 | 493 | 471 | 1000            | 1000 | 934  | 934  | 1250            | 1250 | 1184 | 1184 |
| 250M    | 18              | 500 | 450  | 550 | 18,5  | 5 | 548 | 512 | 1109            | 1109 | 1109 | 1109 | 1375            | 1375 | 1375 | 1375 |
| 280S    | 18              | 500 | 450  | 550 | 18,5  | 5 | 548 | 512 | 1109            | 1109 | 1109 | 1109 | 1375            | 1375 | 1375 | 1375 |
| 280M    | 22              | 600 | 550  | 550 | 18,5  | 5 | 635 | 582 | 1268            | 1268 | 1268 | 1268 | 1543            | 1543 | 1543 | 1543 |
| 315S    | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 581 | 1268            | 1298 | 1298 | 1298 | 1543            | 1573 | 1573 | 1573 |
| 315M    | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 581 | 1268            | 1298 | 1298 | 1298 | 1543            | 1573 | 1573 | 1573 |
| 315L1   | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 581 | 1468            | 1498 | 1298 | 1298 | 1743            | 1773 | 1573 | 1573 |
| 315L2   | 22              | 600 | 550  | 660 | 24    | 6 | 635 | 581 | –               | –    | 1498 | 1498 | –               | –    | 1773 | 1773 |

\*\*\*\* British Allocation

Figure: External cooling system



Mounting flange according to EN 50347, type FF. Carrying lugs from frame size 90. Measure AC measured from screw head. Measure AD refers to terminal box Ex e. The box can be rotated 4x90°.

**Note:**

- 1) Construction type IM V1 requires fan canopy, see LE measure; LC measure includes LE.
- 2) For types 250 to 315-4,6,8 with measures DA, EA, GC, FA and DC, the 2-pole specifications apply.

| Type         | LD  | LE |    |    |    | O          | Shaft end |       |       |      |       | Fan motor | Type CD...Y2F/Y3F/YF |     |     |     | Q    |      |      |     | LE' |
|--------------|-----|----|----|----|----|------------|-----------|-------|-------|------|-------|-----------|----------------------|-----|-----|-----|------|------|------|-----|-----|
| CD...Y2/Y3/Y |     | 2  | 4  | 6  | 8  |            | D,DA      | E, EA | GA,GC | F,FA | DB,DC |           | 2                    | 4   | 6   | 8   | 2    | 4    | 6    | 8   |     |
| 80M          | 127 | 25 | 25 | 25 | 25 | 2x M25x1,5 | 19 j6     | 40    | 21,5  | 6    | M6    | -         | -                    | -   | -   | -   | -    | -    | -    | -   | -   |
| 90S+L        | 139 | 25 | 25 | 25 | 25 | 2x M25x1,5 | 24 j6     | 50    | 27    | 8    | M8    | -         | -                    | -   | -   | -   | -    | -    | -    | -   | -   |
| 100L         | 154 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 28 j6     | 60    | 31    | 8    | M10   | -         | -                    | -   | -   | -   | -    | -    | -    | -   | -   |
| 112M         | 189 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 28 j6     | 60    | 31    | 8    | M10   | 63M1-4    | 515                  | 515 | 515 | 515 | 731  | 731  | 731  | 731 | 30  |
| 132S         | 226 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 38 k6     | 80    | 41    | 10   | M12   | 63M1-4    | -                    | 606 | 606 | 606 | -    | 822  | 822  | 822 | 36  |
| 132S1        | 226 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 38 k6     | 80    | 41    | 10   | M12   | 63M1-4    | 606                  | -   | -   | -   | 822  | 822  | 822  | 822 | 36  |
| 132S2        | 226 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 38 k6     | 80    | 41    | 10   | M12   | 63M1-4    | 656                  | -   | -   | -   | 872  | -    | -    | -   | 38  |
| 132M         | 226 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 38 k6     | 80    | 41    | 10   | M12   | 63M1-4    | -                    | 656 | -   | 606 | -    | 872  | -    | 822 | 38  |
| 132M1        | 226 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 38 k6     | 80    | 41    | 10   | M12   | 63M1-4    | -                    | -   | 606 | -   | -    | -    | 822  | -   | 38  |
| 132M2        | 226 | 30 | 30 | 30 | 30 | 2x M32x1,5 | 38 k6     | 80    | 41    | 10   | M12   | 63M1-4    | -                    | -   | 656 | -   | -    | -    | 872  | -   | 38  |
| 160M         | 261 | 35 | 35 | 35 | 35 | 2x M40x1,5 | 42 k6     | 110   | 45    | 12   | M16   | 63M1-4    | 757                  | 757 | 757 | 757 | 972  | 972  | 972  | 972 | 38  |
| 160L Y2      | 261 | 35 | 35 | 35 | 35 | 2x M40x1,5 | 42 k6     | 110   | 45    | 12   | M16   | 63M1-4    | 757                  | 757 | 757 | 757 | 972  | 972  | 972  | 972 | 38  |
| 160L Y3/Y    | 261 | 35 | 35 | 35 | 35 | 2x M40x1,5 | 42 k6     | 110   | 45    | 12   | M16   | 63M1-4    | 757                  | 792 | 792 | 757 | 972  | 1007 | 1007 | 972 | 38  |
| 180M         | 369 | 63 | 63 | -  | -  | 2x M40x1,5 | 48 k6     | 110   | 51,5  | 14   | M16   | 63M1-4    | 746                  | 746 | -   | -   | 960  | 960  | -    | -   | 38  |
| 180L Y2      | 369 | -  | 63 | 63 | 63 | 2x M40x1,5 | 48 k6     | 110   | 51,5  | 14   | M16   | 63M1-4    | -                    | 746 | 746 | -   | 960  | 960  | 960  | 960 | 38  |
| 180L Y3/Y    | 369 | -  | 63 | 63 | 63 | 2x M40x1,5 | 48 k6     | 110   | 51,5  | 14   | M16   | 63M1-4    | -                    | 756 | 746 | 746 | -    | 1010 | 960  | 960 | 38  |
| 200L         | 390 | 74 | 74 | 74 | 74 | 2x M50x1,5 | 55 m6     | 110   | 59    | 16   | M20   | 63M1-4    | 803                  | 803 | 803 | -   | 1018 | 1018 | 1018 | -   | 38  |

| Type  | LD              |      | LE              |     |     | O         | Shaft end               |    |                     |     |                      |      |                     |    | Fan motor | Type CD...Y2F/Y3F/YF |        |                 |         | LE'  |      |         |
|-------|-----------------|------|-----------------|-----|-----|-----------|-------------------------|----|---------------------|-----|----------------------|------|---------------------|----|-----------|----------------------|--------|-----------------|---------|------|------|---------|
|       | Number of poles |      | Number of poles |     |     |           | Dm6, DAm6 <sup>21</sup> |    | E, EA <sup>21</sup> |     | GA, GC <sup>21</sup> |      | F, FA <sup>21</sup> |    |           | DB, DC <sup>21</sup> |        | Number of poles | L' Q    |      |      |         |
|       |                 |      |                 |     |     |           | 2                       | 4  | 6, 8                | 2   | 4, 6, 8              | 2    | 4, 6, 8             | 2  |           | 4, 6, 8              | 2      |                 | 4, 6, 8 |      | 2    | 4, 6, 8 |
| 225S  | –               | 1175 | 1175            | –   | 377 | 2xM50x1,5 | –                       | 60 | –                   | 140 | –                    | 64   | –                   | 18 | –         | M20                  | 63M1-4 | –               | 938     | –    | 1153 | 38      |
| 225M  | 1112            | 1175 | 1175            | 347 | 377 | 2xM50x1,5 | 55                      | 60 | 110                 | 140 | 59                   | 64   | 16                  | 18 | M20       | M20                  | 63M1-4 | 908             | 938     | 1123 | 1153 | 38      |
| 250M  | 1250            | 1250 | 1184            | 482 | 482 | 2xM63x1,5 | 60                      | 65 | 140                 | 140 | 64                   | 69   | 18                  | 18 | M20       | M20                  | 63M1-4 | 1019            | 1019    | 1234 | 1234 | 38      |
| 280S  | 1375            | 1375 | 1375            | 483 | 483 | 2xM63x1,5 | 65                      | 75 | 140                 | 140 | 69                   | 79,5 | 18                  | 20 | M20       | M20                  | 71M2-4 | 1140            | 1140    | 1387 | 1387 | 41      |
| 280M  | 1375            | 1375 | 1375            | 483 | 483 | 2xM63x1,5 | 65                      | 75 | 140                 | 140 | 69                   | 79,5 | 18                  | 20 | M20       | M20                  | 71M2-4 | 1140            | 1140    | 1387 | 1387 | 41      |
| 315S  | 1543            | 1573 | 1573            | 496 | 526 | 2xM63x1,5 | 65                      | 80 | 140                 | 170 | 69                   | 85   | 18                  | 22 | M20       | M20                  | 71M2-4 | 1283            | 1313    | 1529 | 1559 | 42      |
| 315M  | 1543            | 1573 | 1573            | 496 | 526 | 2xM63x1,5 | 65                      | 80 | 140                 | 170 | 69                   | 85   | 18                  | 22 | M20       | M20                  | 71M2-4 | 1283            | 1313    | 1529 | 1559 | 42      |
| 315L1 | 1543            | 1573 | 1573            | 496 | 526 | 2xM63x1,5 | 65                      | 80 | 140                 | 170 | 69                   | 85   | 18                  | 22 | M20       | M20                  | 71M2-4 | 1283            | 1313    | 1529 | 1559 | 42      |
| 315L2 | 1743            | 1773 | 1573            | 496 | 526 | 2xM63x1,5 | 65                      | 80 | 140                 | 170 | 69                   | 85   | 18                  | 22 | M20       | M20                  | 71M2-4 | 1483            | 1513    | 1729 | 1759 | 42      |
| 315L3 | 1743            | 1773 | 1773            | 496 | 526 | 2xM63x1,5 | 65                      | 80 | 140                 | 170 | 69                   | 85   | 18                  | 22 | M20       | M20                  | 71M2-4 | 1483            | 1513    | 1729 | 1759 | 42      |
| 355M  | –               | –    | 1980            | –   | 702 | 2x M80x2  | 75                      | 90 | 140                 | 170 | 79,5                 | 95   | 20                  | 25 | M20       | M24                  | –      | –               | –       | –    | –    | –       |

| Type<br>CD...XY<br>**** | LD              |       | LE              |     |     | O         | Shaft end               |       |                     |       |                      |       |                     |       |                      |       |
|-------------------------|-----------------|-------|-----------------|-----|-----|-----------|-------------------------|-------|---------------------|-------|----------------------|-------|---------------------|-------|----------------------|-------|
|                         | Number of poles |       | Number of poles |     |     |           | Dm6, DAm6 <sup>21</sup> |       | E, EA <sup>21</sup> |       | GA, GC <sup>21</sup> |       | F, FA <sup>21</sup> |       | DB, DC <sup>21</sup> |       |
|                         | 2               | 4,6,8 | 2               | 4   | 6,8 |           | 2                       | 4,6,8 | 2                   | 4,6,8 | 2                    | 4,6,8 | 2                   | 4,6,8 | 2                    | 4,6,8 |
| 250S                    | 482             | 482   | 94              | 94  | 94  | 2xM63x1,5 | 60                      | 65*   | 140                 | 140   | 64                   | 69    | 18                  | 18    | M20                  | M20   |
| 250M                    | 483             | 483   | 110             | 110 | 110 | 2xM63x1,5 | 60                      | 65*   | 140                 | 140   | 69                   | 79,5  | 18                  | 20    | M20                  | M20   |
| 280S                    | 483             | 483   | 110             | 110 | 110 | 2xM63x1,5 | 65                      | 75**  | 140                 | 140   | 69                   | 79,5  | 18                  | 20    | M20                  | M20   |
| 280M                    | 496             | 526   | 115             | 115 | 115 | 2xM63x1,5 | 65                      | 75**  | 140                 | 140   | 69                   | 85    | 18                  | 22    | M20                  | M20   |
| 315S                    | 496             | 526   | 115             | 115 | 115 | 2xM63x1,5 | 65                      | 80*** | 140                 | 170   | 69                   | 85    | 18                  | 22    | M20                  | M20   |
| 315M                    | 496             | 526   | 115             | 115 | 115 | 2xM63x1,5 | 65                      | 80*** | 140                 | 170   | 69                   | 85    | 18                  | 22    | M20                  | M20   |
| 315L1                   | 496             | 526   | 115             | 115 | 115 | 2xM63x1,5 | 65                      | 80*** | 140                 | 170   | 69                   | 85    | 18                  | 22    | M20                  | M20   |
| 315L2                   | 496             | 526   | 115             | 115 | 115 | 2xM63x1,5 | 65                      | 80*** | 140                 | 170   | 69                   | 85    | 18                  | 22    | M20                  | M20   |

\* Diameter 70 for British Allocation on request - please note: Measure GA becomes 74.5 and measure F becomes 20.

\*\* Diameter 80 for British Allocation on request - please note: Measures L, LC, LD and E become 30mm longer, measure GA becomes 85 and measure F becomes 22

\*\*\* Diameter 85 for British Allocation on request - please note: Measure GA becomes 90 and measure F corresponds to the catalog.

\*\*\*\* British Allocation

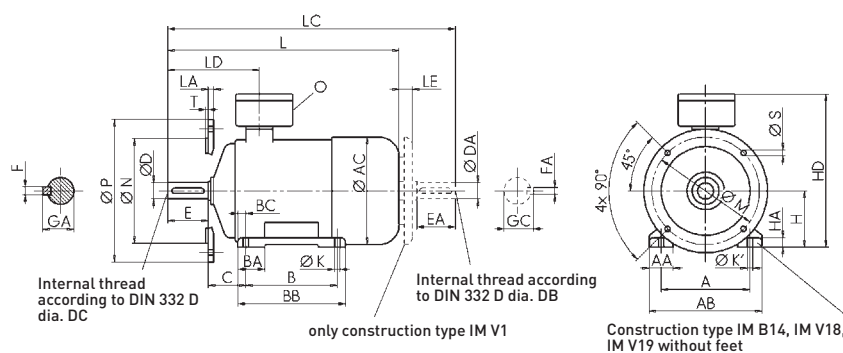
# IE1

## Surface-Cooled Low-Voltage Motors

### Self-Cooling by Radial-Flow Fans

104

Construction type IM B14, IM B34, IM V17<sup>1)</sup>, IM V18<sup>1)</sup>, IM V19, IM V37



Frame size 63 in T4, unventilated  
Mounting flange according to EN 50347,  
type FF.  
Carrying lugs from frame size 90.  
Measure AC measured from screw heads  
Measure HD refers to terminal box Ex e.  
The box can be rotated by 4x90°.  
This also applies to the BD... series.

**Note:**  
1) For construction type IM V17 and IM V18  
fan canopy required

| Type<br>CD... | A   | AA | AB  | AC  | B   | BA | BB  | BC   | C  | H -0,5 | HA | HD  | K H17 | K' H17 |
|---------------|-----|----|-----|-----|-----|----|-----|------|----|--------|----|-----|-------|--------|
| 63M           | 100 | 20 | 120 | 134 | 80  | 25 | 100 | 10   | 40 | 63     | 6  | 227 | Ø 7   | -      |
| 71M           | 112 | 30 | 139 | 145 | 90  | 25 | 110 | 10   | 45 | 71     | 10 | 235 | Ø 7   | -      |
| 80M           | 125 | 35 | 160 | 163 | 100 | 35 | 130 | 15   | 50 | 80     | 12 | 260 | Ø 10  | -      |
| 90S           | 140 | 40 | 180 | 183 | 100 | 40 | 130 | 15   | 56 | 90     | 12 | 275 | Ø 10  | -      |
| 90L           | 140 | 40 | 180 | 183 | 125 | 40 | 155 | 15   | 56 | 90     | 12 | 275 | Ø 10  | -      |
| 100L          | 160 | 45 | 200 | 201 | 140 | 45 | 175 | 17,5 | 63 | 100    | 15 | 305 | Ø 12  | -      |
| 112M          | 190 | 50 | 235 | 225 | 140 | 50 | 175 | 17,5 | 70 | 112    | 17 | 317 | Ø 12  | -      |
| 132S          | 216 | 60 | 266 | 265 | 140 | 60 | 187 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |
| 132M          | 216 | 60 | 266 | 265 | 178 | 60 | 225 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |

| Type<br>CD... | L   | LC  | LE | LD  | O          | Shaft end<br>D, DA | E, EA | GA, GC | F, FA | DB, DC |
|---------------|-----|-----|----|-----|------------|--------------------|-------|--------|-------|--------|
| 63M           | 239 | 274 | -  | 104 | 2x M25x1,5 | 11j6               | 23    | 12,5   | 4     | M4     |
| 71M           | 278 | 334 | 25 | 111 | 2x M25x1,5 | 14j6               | 30    | 16     | 5     | M5     |
| 80M           | 313 | 387 | 25 | 116 | 2x M25x1,5 | 19j6               | 40    | 21,5   | 6     | M6     |
| 90S+L         | 364 | 445 | 25 | 137 | 2x M25x1,5 | 24j6               | 50    | 27     | 8     | M8     |
| 100L          | 415 | 510 | 30 | 149 | 2x M32x1,5 | 28j6               | 60    | 31     | 8     | M10    |
| 112M          | 425 | 526 | 30 | 154 | 2x M25x1,5 | 28j6               | 60    | 31     | 8     | M10    |
| 132S+M        | 529 | 645 | 30 | 226 | 2x M25x1,5 | 38k6               | 80    | 41     | 10    | M12    |

| Type<br>CD... | Mounting flange<br>LA | M   | N j6 | P   | S   | T   |
|---------------|-----------------------|-----|------|-----|-----|-----|
| 63M           | 8                     | 75  | 60   | 90  | M5  | 2,5 |
| 71M           | 8                     | 85  | 70   | 105 | M6  | 2,5 |
| 80M           | 10                    | 100 | 80   | 120 | M6  | 3   |
| 90S+L         | 10                    | 115 | 95   | 140 | M8  | 3   |
| 100L          | 12                    | 130 | 110  | 160 | M8  | 3,5 |
| 112M          | 12                    | 130 | 110  | 160 | M8  | 3,5 |
| 132S+M        | 12                    | 165 | 130  | 200 | M10 | 3,5 |

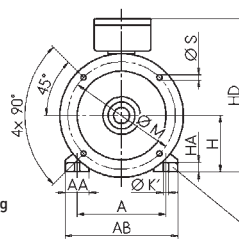
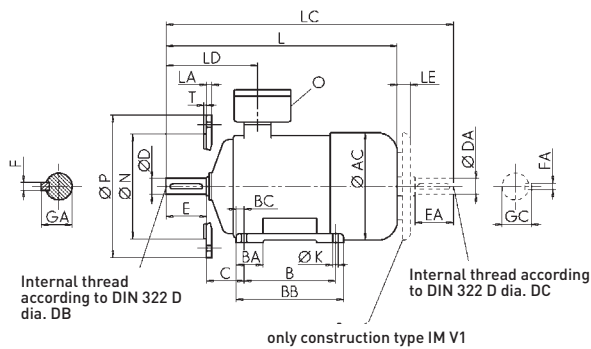
# IE2 / IE3 / MEPS

## Surface-Cooled Low-Voltage Motors

### Self-Cooling by Radial-Flow Fans

Construction type IM B14, IM B34, IM V17<sup>1)</sup>, IM V18<sup>1)</sup>, IM V19, IM V37

105



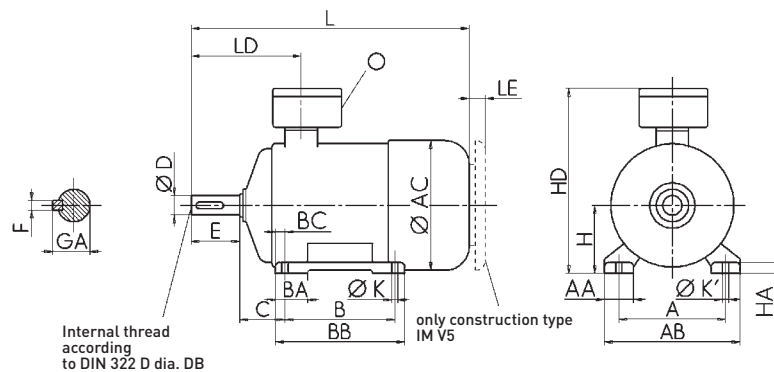
Mounting flange according to EN 50347, type FF.  
Carrying lugs from frame size 90. Measure AC measured from screw head.  
Measure HD refers to terminal box Ex e.  
The box can be rotated by 4x90°.

| Type         | A   | AA | AB  | AC  | B   | BA | BB  | BC   | C  | H -0,5 | HA | HD  | K H17 | K' H17 |
|--------------|-----|----|-----|-----|-----|----|-----|------|----|--------|----|-----|-------|--------|
| CD...Y2/Y3/Y |     |    |     |     |     |    |     |      |    |        |    |     |       |        |
| 80M          | 125 | 35 | 160 | 158 | 100 | 37 | 130 | 15   | 50 | 80     | 12 | 271 | Ø 10  | -      |
| 90S          | 140 | 38 | 180 | 178 | 100 | 44 | 130 | 15   | 56 | 90     | 12 | 295 | Ø 10  | -      |
| 90L          | 140 | 38 | 180 | 178 | 125 | 44 | 155 | 15   | 56 | 90     | 12 | 295 | Ø 10  | -      |
| 100L         | 160 | 42 | 200 | 198 | 140 | 46 | 175 | 17,5 | 63 | 100    | 15 | 311 | Ø 12  | -      |
| 112M         | 190 | 45 | 235 | 218 | 140 | 46 | 175 | 17,5 | 70 | 112    | 17 | 337 | Ø 12  | -      |
| 132S         | 216 | 60 | 266 | 265 | 140 | 60 | 187 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |
| 132S1        | 216 | 60 | 266 | 265 | 140 | 60 | 187 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |
| 132S2        | 216 | 60 | 266 | 265 | 140 | 60 | 187 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |
| 132M         | 216 | 60 | 266 | 265 | 178 | 60 | 225 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |
| 132M1        | 216 | 60 | 266 | 265 | 178 | 60 | 225 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |
| 132M2        | 216 | 60 | 266 | 265 | 178 | 60 | 225 | 23,5 | 89 | 132    | 20 | 411 | Ø 12  | -      |

| Type         | L               |     |     |     | LC              |     |     |     | LE | LD  | O          |
|--------------|-----------------|-----|-----|-----|-----------------|-----|-----|-----|----|-----|------------|
|              | Number of poles |     |     |     | Number of poles |     |     |     |    |     |            |
| CD...Y2/Y3/Y | 2               | 4   | 6   | 8   | 2               | 4   | 6   | 8   |    |     |            |
| 80M          | 343             | 343 | 343 | 343 | 417             | 417 | 417 | 417 | 25 | 127 | 2x M25x1,5 |
| 90S+L        | 398             | 398 | 398 | 398 | 479             | 479 | 479 | 479 | 25 | 139 | 2x M25x1,5 |
| 100L         | 419             | 419 | 419 | 419 | 515             | 515 | 515 | 515 | 30 | 154 | 2x M32x1,5 |
| 112M         | 517             | 517 | 517 | 517 | 608             | 608 | 608 | 608 | 30 | 189 | 2x M32x1,5 |
| 132S         | –               | 529 | 529 | 529 | –               | 645 | 645 | 645 | 30 | 226 | 2x M32x1,5 |
| 132S1        | 529             | –   | –   | –   | 645             | –   | –   | –   | 30 | 226 | 2x M32x1,5 |
| 132S2        | 579             | –   | –   | –   | 652             | –   | –   | –   | 30 | 226 | 2x M32x1,5 |
| 132M         | –               | 579 | –   | 529 | –               | 652 | 645 | 645 | 30 | 226 | 2x M32x1,5 |
| 132M1        | –               | –   | 529 | –   | –               | –   | 645 | 645 | 30 | 226 | 2x M32x1,5 |
| 132M2        | –               | –   | 579 | –   | –               | –   | 652 | 652 | 30 | 226 | 2x M32x1,5 |

| Type         | Shaft end |      |       |      |       | Mounting flange |     |      |     |     |     |
|--------------|-----------|------|-------|------|-------|-----------------|-----|------|-----|-----|-----|
|              | D,DA      | E,EA | GA,GC | F,FA | DA,DC | LA              | M   | N j6 | P   | S   | T   |
| CD...Y2/Y3/Y |           |      |       |      |       |                 |     |      |     |     |     |
| 80M          | 19 j6     | 40   | 21,5  | 6    | M6    | 10              | 100 | 80   | 120 | M6  | 3   |
| 90S+L        | 24 j6     | 50   | 27    | 8    | M8    | 10              | 115 | 95   | 140 | M8  | 3   |
| 100L         | 28 j6     | 60   | 31    | 8    | M10   | 12              | 130 | 110  | 160 | M8  | 3,5 |
| 112M         | 28 j6     | 60   | 31    | 8    | M10   | 12              | 130 | 110  | 160 | M8  | 3,5 |
| 132S+M       | 38 k6     | 80   | 41    | 10   | M12   | 12              | 165 | 130  | 200 | M10 | 3,5 |

Noise classes 2 and 3

Construction type IM B3, IM B6, IM B7, IM B8, IM V5<sup>1)</sup>, IM V6

All motors have carrying lugs.  
Measure AC measured from screw heads  
Measure HD refers to "terminal box Ex e".  
The box can be rotated by 4x90°.  
This also applies to the BD... series.

**Note:**

1) Construction type IM V5 requires fan canopy, see LE measure on page 101.

| Type<br>CD...A<br>CD...AR | A   | AA | AB  | AC  | B   | BA  | BB  | BC   | C   | H-0,5 | HA | HD  | K H17 | K' H17 |
|---------------------------|-----|----|-----|-----|-----|-----|-----|------|-----|-------|----|-----|-------|--------|
| 132S                      | 216 | 60 | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132   | 20 | 411 | Ø 12  | –      |
| 132M                      | 216 | 60 | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132   | 20 | 411 | Ø 12  | –      |
| 160M                      | 254 | 65 | 310 | 318 | 210 | 100 | 300 | 23   | 108 | 160   | 25 | 477 | 15    | 20     |
| 160L                      | 254 | 65 | 310 | 318 | 254 | 100 | 300 | 23   | 108 | 160   | 25 | 477 | 15    | 20     |
| 180M                      | 279 | 75 | 350 | 353 | 241 | 100 | 340 | 30   | 121 | 180   | 25 | 545 | 15    | 20     |
| 180L                      | 279 | 75 | 350 | 353 | 279 | 100 | 340 | 30   | 121 | 180   | 25 | 545 | 15    | 20     |
| 200L                      | 318 | 80 | 390 | 393 | 305 | 90  | 365 | 30   | 133 | 200   | 30 | 581 | 20    | 26     |

| Type<br>CD...A<br>CD...AR | A   | AA  | AB  | AC  | B   | BA  | BB  | BC   | C   | H       | HA | HD   | K H17 | K' H17 |
|---------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|---------|----|------|-------|--------|
| 225S                      | 356 | 85  | 450 | 455 | 286 | 90  | 370 | 29,5 | 149 | 225-0,5 | 35 | 634  | 20    | 26     |
| 225M                      | 356 | 85  | 450 | 455 | 311 | 90  | 370 | 29,5 | 149 | 225-0,5 | 35 | 634  | 20    | 26     |
| 250M                      | 406 | 105 | 510 | 493 | 349 | 110 | 420 | 35,5 | 168 | 250-0,5 | 40 | 721  | 26    | 35     |
| 280S                      | 457 | 110 | 570 | 548 | 368 | 120 | 500 | 40,5 | 190 | 280-1   | 45 | 791  | 26    | 35     |
| 280M                      | 457 | 110 | 570 | 548 | 419 | 120 | 500 | 40,5 | 190 | 280-1   | 45 | 791  | 26    | 35     |
| 315S                      | 508 | 150 | 630 | 635 | 406 | 210 | 615 | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     |
| 315M                      | 508 | 150 | 630 | 635 | 457 | 210 | 615 | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     |
| 315L1                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     |
| 315L2                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     |
| 315L3                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315-1   | 40 | 896  | 39    | 30     |
| 355M                      | 610 | 180 | 720 | 725 | 560 | 220 | 720 | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     |
| 355L1                     | 610 | 180 | 720 | 725 | 630 | 220 | 720 | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     |
| 355L2                     | 610 | 180 | 720 | 725 | 630 | 220 | 720 | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     |
| 355L3                     | 610 | 180 | 720 | 725 | 630 | 220 | 720 | 45   | 254 | 355-1   | 50 | 1084 | 30    | 39     |

| Type<br>CD...A<br>CD...AR | L<br>Number of poles<br>2 4 | LD  | O          | Shaft end<br>D | E   | GA   | F  | DB  |
|---------------------------|-----------------------------|-----|------------|----------------|-----|------|----|-----|
| 132S                      | 582 582                     | 226 | 2x M32x1,5 | 38k6           | 80  | 41   | 10 | M12 |
| 132M                      | 582 582                     | 226 | 2x M32x1,5 | 38k6           | 80  | 41   | 10 | M12 |
| 160M                      | 732 732                     | 261 | 2x M40x1,5 | 42k6           | 110 | 45   | 12 | M16 |
| 160L                      | 732 732                     | 261 | 2x M40x1,5 | 42k6           | 110 | 45   | 12 | M16 |
| 180M                      | 741 741                     | 369 | 2x M40x1,5 | 48k6           | 110 | 51,5 | 14 | M16 |
| 180L                      | - 754                       | 369 | 2x M40x1,5 | 48k6           | 110 | 51,5 | 14 | M16 |
| 200L                      | 795 815                     | 390 | 2x M50x1,5 | 55m6           | 110 | 59   | 16 | M20 |

| Type<br>CD...A<br>CD...AR | L<br>Number of poles<br>2 4 | LD<br>Number of poles<br>2 4 | O          | Shaft end<br>Dm6<br>2 4 | E<br>2 4 | GA<br>2 4 | F<br>2 4 | DB<br>2 4 |
|---------------------------|-----------------------------|------------------------------|------------|-------------------------|----------|-----------|----------|-----------|
| 225S                      | - 932                       | - 377                        | 2x M50x1,5 | - 60                    | - 140    | - 64      | - 18     | - M20     |
| 225M                      | 902 932                     | 347 377                      | 2x M50x1,5 | 55 60                   | 110 140  | 59 64     | 16 18    | M20 M20   |
| 250M                      | 1014 1014                   | 482 482                      | 2x M63x1,5 | 60 65                   | 140 140  | 64 69     | 18 18    | M20 M20   |
| 280S                      | 1123 1123                   | 483 483                      | 2x M63x1,5 | 65 75                   | 140 140  | 69 79,5   | 18 20    | M20 M20   |
| 280M                      | 1123 1123                   | 483 483                      | 2x M63x1,5 | 65 75                   | 140 140  | 69 79,5   | 18 20    | M20 M20   |
| 315S                      | 1232 1294                   | 496 526                      | 2x M63x1,5 | 65 80                   | 140 170  | 69 85     | 18 22    | M20 M20   |
| 315M                      | 1232 1294                   | 496 526                      | 2x M63x1,5 | 65 80                   | 140 170  | 69 85     | 18 22    | M20 M20   |
| 315L1                     | 1232 1294                   | 496 526                      | 2x M63x1,5 | 65 80                   | 140 170  | 69 85     | 18 22    | M20 M20   |
| 315L2                     | 1432 1494                   | 496 526                      | 2x M63x1,5 | 65 80                   | 140 170  | 69 85     | 18 22    | M20 M20   |
| 315L3                     | 1432 1494                   | 496 526                      | 2x M63x1,5 | 65 80                   | 140 170  | 69 85     | 18 22    | M20 M20   |
| 355M                      | 1682 1682                   | 672 702                      | 2x M80x2   | 75 90                   | 140 170  | 79,5 95   | 20 25    | M20 M24   |
| 355L1                     | 1682 1682                   | 672 702                      | 2x M80x2   | 75 90                   | 140 170  | 79,5 95   | 20 25    | M20 M24   |
| 355L2                     | 1682 1682                   | 672 702                      | 2x M80x2   | 75 90                   | 140 170  | 79,5 95   | 20 25    | M20 M24   |
| 355L3                     | 1762 1762                   | 672 702                      | 2x M80x2   | 75 90                   | 140 170  | 79,5 95   | 20 25    | M20 M24   |

# IE2/ IE3/ MEPS

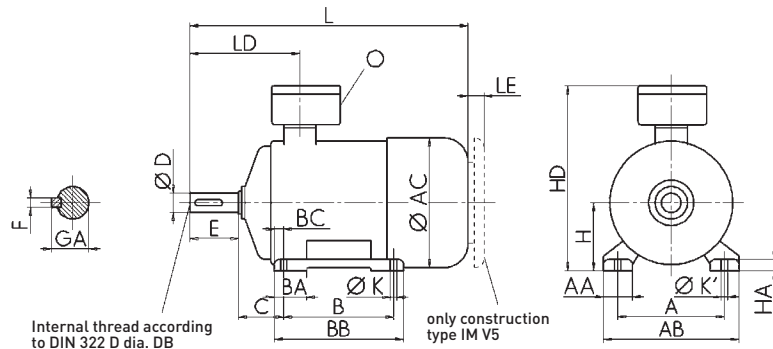
## Surface-Cooled Low-Voltage Motors

### Self-Cooling by Axial-Flow Fans

Noise classes 2 and 3

Construction type IM B3, IM B6, IM B7, IM B8, IM V5<sup>1)</sup>, IM V6

108



All motors have carrying lugs.  
Measure AC measured from screw head  
Measure HD refers to terminal box Ex e.  
The box can be rotated 4x90°.

**Note:**  
1) Construction type IM V5 with protective canopy, for measure LE see page 101.

| Type<br>CD...Y2/Y3/Y A<br>CD...Y2/Y3/Y AR | A   | AA  | AB  | AC  | B   | BA  | BB  | BC   | C   | H -0,5   | HA | HD   | K H17 | K' H17 |
|-------------------------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|----------|----|------|-------|--------|
| 132S                                      | 216 | 60  | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132      | 20 | 411  | Ø 12  | -      |
| 132S1                                     | 216 | 60  | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132      | 20 | 411  | Ø 12  | -      |
| 132S2                                     | 216 | 60  | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132      | 20 | 411  | Ø 12  | -      |
| 132M                                      | 216 | 60  | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132      | 20 | 411  | Ø 12  | -      |
| 132M1                                     | 216 | 60  | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132      | 20 | 411  | Ø 12  | -      |
| 132M2                                     | 216 | 60  | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132      | 20 | 411  | Ø 12  | -      |
| 160M                                      | 254 | 65  | 310 | 318 | 210 | 100 | 300 | 23   | 108 | 160      | 25 | 477  | 15    | 20     |
| 160L Y2                                   | 254 | 65  | 310 | 318 | 254 | 100 | 300 | 23   | 108 | 160      | 25 | 477  | 15    | 20     |
| 160L Y3/Y                                 | 254 | 65  | 310 | 318 | 254 | 100 | 300 | 23   | 108 | 160      | 25 | 477  | 15    | 20     |
| 180M                                      | 279 | 75  | 350 | 353 | 241 | 100 | 340 | 30   | 121 | 180      | 25 | 545  | 15    | 20     |
| 180L Y2                                   | 279 | 75  | 350 | 353 | 279 | 100 | 340 | 30   | 121 | 180      | 25 | 545  | 15    | 20     |
| 180L Y3/Y                                 | 279 | 75  | 350 | 353 | 279 | 100 | 340 | 30   | 121 | 180      | 25 | 545  | 15    | 20     |
| 200L                                      | 318 | 80  | 390 | 393 | 305 | 90  | 365 | 30   | 133 | 200      | 30 | 581  | 20    | 26     |
| Type<br>CD...Y2/Y3/Y A<br>CD...Y2/Y3/Y AR | A   | AA  | AB  | AC  | B   | BA  | BB  | BC   | C   | H        | HA | HD   | K H17 | K' H17 |
| 225S                                      | 356 | 85  | 450 | 455 | 286 | 90  | 370 | 29,5 | 149 | 225 -0,5 | 35 | 634  | 20    | 26     |
| 225M                                      | 356 | 85  | 450 | 455 | 311 | 90  | 370 | 29,5 | 149 | 225 -0,5 | 35 | 634  | 20    | 26     |
| 250M                                      | 406 | 105 | 510 | 493 | 349 | 110 | 420 | 35,5 | 168 | 250 -0,5 | 40 | 721  | 26    | 35     |
| 280S                                      | 457 | 110 | 570 | 548 | 368 | 120 | 500 | 40,5 | 190 | 280 -1   | 45 | 792  | 26    | 35     |
| 280M                                      | 457 | 110 | 570 | 548 | 419 | 120 | 500 | 40,5 | 190 | 280 -1   | 45 | 792  | 26    | 35     |
| 315S                                      | 508 | 150 | 630 | 635 | 406 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 315M                                      | 508 | 150 | 630 | 635 | 457 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 315L1                                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 315L2                                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 315L3                                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 355M                                      | 610 | 180 | 720 | 725 | 560 | 220 | 720 | 45   | 254 | 355 -1   | 50 | 1084 | 30    | 39     |
| Type<br>CD...XY A****<br>CD...XY AR****   | A   | AA  | AB  | AC  | B   | BA  | BB  | BC   | C   | H        | HA | HD   | K H17 | K' H17 |
| 250S                                      | 406 | 115 | 510 | 493 | 311 | 130 | 420 | 35,5 | 168 | 250 -0,5 | 35 | 721  | 22    | 22     |
| 250M                                      | 406 | 105 | 510 | 548 | 349 | -   | 420 | 30   | 168 | 250 -0,5 | 45 | 762  | 26    | 26     |
| 280S                                      | 457 | 110 | 570 | 548 | 368 | 120 | 500 | 40,5 | 190 | 280 -1   | 45 | 792  | 26    | 35     |
| 280M                                      | 457 | 110 | 560 | 635 | 419 | -   | 570 | 40   | 190 | 280 -1   | 48 | 862  | 26    | 26     |
| 315S                                      | 508 | 150 | 630 | 635 | 406 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 315M                                      | 508 | 150 | 630 | 635 | 457 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |
| 315L1                                     | 508 | 150 | 630 | 635 | 508 | 210 | 615 | 53   | 216 | 315 -1   | 40 | 897  | 39    | 30     |

\*\*\*\* British Allocation

**Note:**

2) For types 250 to 315-4 with measure DA, EA, GC, FA and DC, the 2-pole specifications apply.

| Type            | L               |     | LD  | O          | Shaft end | E,EA | GA,GC | F,FA | DB,DC |
|-----------------|-----------------|-----|-----|------------|-----------|------|-------|------|-------|
| CD...Y2/Y3/Y A  | Number of poles |     |     |            | D,DA      |      |       |      |       |
| CD...Y2/Y3/Y AR | 2               | 4   |     |            |           |      |       |      |       |
| 132S            | –               | 582 | 226 | 2x M32x1,5 | 38 k6     | 80   | 41    | 10   | M12   |
| 132S1           | 582             | –   | 226 | 2x M32x1,5 | 38 k6     | 80   | 41    | 10   | M12   |
| 132S2           | 632             | –   | 226 | 2x M32x1,5 | 38 k6     | 80   | 41    | 10   | M12   |
| 132M            | –               | 632 | 226 | 2x M32x1,5 | 38 k6     | 80   | 41    | 10   | M12   |
| 132M1           | –               | –   | 226 | 2x M32x1,5 | 38 k6     | 80   | 41    | 10   | M12   |
| 132M2           | –               | –   | 226 | 2x M32x1,5 | 38 k6     | 80   | 41    | 10   | M12   |
| 160M            | 732             | 732 | 261 | 2x M40x1,5 | 42 k6     | 110  | 45    | 12   | M16   |
| 160L Y2         | 732             | 732 | 261 | 2x M40x1,5 | 42 k6     | 110  | 45    | 12   | M16   |
| 160L Y3/Y       | 732             | 767 | 261 | 2x M40x1,5 | 42 k6     | 110  | 45    | 12   | M16   |
| 180M            | 741             | 741 | 369 | 2x M40x1,5 | 48 k6     | 110  | 51,5  | 14   | M16   |
| 180L Y2         | –               | 755 | 369 | 2x M40x1,5 | 48 k6     | 110  | 51,5  | 14   | M16   |
| 180L Y3/Y       | –               | 805 | 369 | 2x M40x1,5 | 48 k6     | 110  | 51,5  | 14   | M16   |
| 200L            | 795             | 815 | 390 | 2x M50x1,5 | 55 m6     | 110  | 59    | 16   | M20   |

| Type            | L               |      | LD              |     |           | Shaft end |                    |                     |     |                      |      |                    |    |                      |     |
|-----------------|-----------------|------|-----------------|-----|-----------|-----------|--------------------|---------------------|-----|----------------------|------|--------------------|----|----------------------|-----|
| CD...Y2/Y3/Y A  | Number of poles |      | Number of poles |     | 0         | Dm6,      | DAm6 <sup>2)</sup> | E, EA <sup>2)</sup> |     | GA, GC <sup>2)</sup> |      | F,FA <sup>2)</sup> |    | DB, DC <sup>2)</sup> |     |
| CD...Y2/Y3/Y AR | 2               | 4    | 2               | 4   |           | 2         | 4                  | 2                   | 4   | 2                    | 4    | 2                  | 4  | 2                    | 4   |
| 225S            | –               | 932  | –               | 377 | 2xM50x1,5 | –         | 60                 | –                   | 140 | –                    | 64   | –                  | 18 | –                    | M20 |
| 225M            | 902             | 932  | 347             | 377 | 2xM50x1,5 | 55        | 60                 | 110                 | 140 | 59                   | 64   | 16                 | 18 | M20                  | M20 |
| 250M            | 1015            | 1015 | 482             | 482 | 2xM63x1,5 | 60        | 65                 | 140                 | 140 | 64                   | 69   | 18                 | 18 | M20                  | M20 |
| 280S            | 1124            | 1124 | 483             | 483 | 2xM63x1,5 | 65        | 75                 | 140                 | 140 | 69                   | 79,5 | 18                 | 20 | M20                  | M20 |
| 280M            | 1124            | 1124 | 483             | 483 | 2xM63x1,5 | 65        | 75                 | 140                 | 140 | 69                   | 79,5 | 18                 | 20 | M20                  | M20 |
| 315S            | 1233            | 1295 | 496             | 526 | 2xM63x1,5 | 65        | 80                 | 140                 | 170 | 69                   | 85   | 18                 | 22 | M20                  | M20 |
| 315M            | 1233            | 1295 | 496             | 526 | 2xM63x1,5 | 65        | 80                 | 140                 | 170 | 69                   | 85   | 18                 | 22 | M20                  | M20 |
| 315L1           | 1233            | 1295 | 496             | 526 | 2xM63x1,5 | 65        | 80                 | 140                 | 170 | 69                   | 85   | 18                 | 22 | M20                  | M20 |
| 315L2           | 1433            | 1495 | 496             | 526 | 2xM63x1,5 | 65        | 80                 | 140                 | 170 | 69                   | 85   | 18                 | 22 | M20                  | M20 |
| 315L3           | 1433            | 1495 | 496             | 526 | 2xM63x1,5 | 65        | 80                 | 140                 | 170 | 69                   | 85   | 18                 | 22 | M20                  | M20 |
| 355M            | 1682            | 1682 | 672             | 702 | 2x M80x2  | 75        | 90                 | 140                 | 170 | 79,5                 | 95   | 20                 | 25 | M20                  | M24 |

| Type           | L               |      | LD              |     |           | Shaft end |                    |                     |       |                      |        |                    |      |                      |     |
|----------------|-----------------|------|-----------------|-----|-----------|-----------|--------------------|---------------------|-------|----------------------|--------|--------------------|------|----------------------|-----|
| CD...XY A****  | Number of poles |      | Number of poles |     | 0         | Dm6,      | DAm6 <sup>2)</sup> | E, EA <sup>2)</sup> |       | GA, GC <sup>2)</sup> |        | F,FA <sup>2)</sup> |      | DB, DC <sup>2)</sup> |     |
| CD...XY AR**** | 2               | 4    | 2               | 4   |           | 2         | 4                  | 2                   | 4     | 2                    | 4      | 2                  | 4    | 2                    | 4   |
| 250S           | 1015            | 1015 | 482             | 482 | 2xM63x1,5 | 60        | 65*                | 140                 | 140   | 64                   | 69*    | 18                 | 18*  | M20                  | M20 |
| 250M           | 1124            | 1124 | 483             | 483 | 2xM63x1,5 | 60        | 65*                | 140                 | 140   | 64                   | 69*    | 18                 | 18*  | M20                  | M20 |
| 280S           | 1124            | 1124 | 483             | 483 | 2xM63x1,5 | 65        | 75**               | 140                 | 140** | 69                   | 79,5** | 18                 | 20** | M20                  | M20 |
| 280M           | 1233            | 1295 | 496             | 496 | 2xM63x1,5 | 65        | 75**               | 140                 | 140** | 69                   | 79,5** | 18                 | 20** | M20                  | M20 |
| 315S           | 1268            | 1298 | 496             | 526 | 2xM63x1,5 | 65        | 80***              | 140                 | 170   | 69                   | 85***  | 18                 | 22   | M20                  | M20 |
| 315M           | 1268            | 1298 | 496             | 526 | 2xM63x1,5 | 65        | 80***              | 140                 | 170   | 69                   | 85***  | 18                 | 22   | M20                  | M20 |
| 315L1          | 1468            | 1498 | 496             | 526 | 2xM63x1,5 | 65        | 80***              | 140                 | 170   | 69                   | 85***  | 18                 | 22   | M20                  | M20 |

\* Diameter 70 for British Allocation on request - please note: Measure becomes 74.5 and measure F becomes 20

\*\* Diameter 80 for British Allocation on request - please note: Measures L, LC, LD and E become 30mm longer, measure GA becomes 85 and measure F becomes 22.

\*\*\* Diameter 85 for British Allocation on request - please note: Measure GA becomes 90 and measure F corresponds to the catalog

\*\*\*\* British Allocation

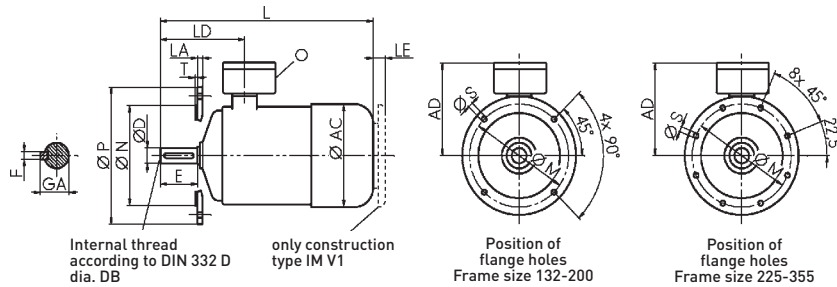
# IE1

## Surface-Cooled Low-Voltage Motors

### Self-Cooling with Axial-Flow Fan

Noise classes 2 and 3

Construction type IM B5, IM V1<sup>1)</sup>, IM V3



Mounting flange according to EN 50347, type FF.  
All motors have carrying lugs.  
Measure AC measured from screw heads  
Measure AD refers to terminal box Ex e.  
The box can be rotated by 4x90°.  
This also applies to the BD... series.

#### Note:

1) Construction type IM V1 requires fan canopy

| Type<br>CD...A<br>CD...AR | Mounting flange<br>LA | M   | N     | P   | SH17 | T | AC  | AD  | L<br>Number of poles<br>2 | 4   | LD  |
|---------------------------|-----------------------|-----|-------|-----|------|---|-----|-----|---------------------------|-----|-----|
| 132S                      | 16                    | 265 | 230j6 | 300 | 14,5 | 4 | 265 | 279 | 582                       | 582 | 226 |
| 132M                      | 16                    | 265 | 230j6 | 300 | 14,5 | 4 | 265 | 279 | 582                       | 582 | 226 |
| 160M                      | 20                    | 300 | 250j6 | 350 | 18,5 | 5 | 318 | 317 | 732                       | 732 | 261 |
| 160L                      | 20                    | 300 | 250j6 | 350 | 18,5 | 5 | 318 | 317 | 732                       | 732 | 261 |
| 180M                      | 20                    | 300 | 250j6 | 350 | 18,5 | 5 | 353 | 365 | 741                       | 741 | 369 |
| 180L                      | 20                    | 300 | 250j6 | 350 | 18,5 | 5 | 353 | 365 | -                         | 754 | 369 |
| 200L                      | 20                    | 350 | 300h6 | 400 | 18,5 | 5 | 393 | 381 | 798                       | 804 | 390 |

| Type<br>CD...A<br>CD...AR | Mounting flange<br>LA | M   | N h6 | P   | SH17 | T | AC  | AD  | L<br>Number of poles<br>2 | 4    | LD<br>Number of poles<br>2 | 4   |
|---------------------------|-----------------------|-----|------|-----|------|---|-----|-----|---------------------------|------|----------------------------|-----|
| 225S                      | 22                    | 400 | 350  | 450 | 18,5 | 5 | 455 | 409 | -                         | 932  | -                          | 377 |
| 225M                      | 22                    | 400 | 350  | 450 | 18,5 | 5 | 455 | 409 | 902                       | 932  | 347                        | 377 |
| 250M                      | 18                    | 500 | 450  | 550 | 18,5 | 5 | 493 | 471 | 1014                      | 1014 | 482                        | 482 |
| 280S                      | 18                    | 500 | 450  | 550 | 18,5 | 5 | 548 | 511 | 1123                      | 1123 | 483                        | 483 |
| 280M                      | 18                    | 500 | 450  | 550 | 18,5 | 5 | 548 | 511 | 1123                      | 1123 | 483                        | 483 |
| 315S                      | 22                    | 600 | 550  | 660 | 24   | 6 | 635 | 581 | 1232                      | 1294 | 496                        | 526 |
| 315M                      | 22                    | 600 | 550  | 660 | 24   | 6 | 635 | 581 | 1232                      | 1294 | 496                        | 526 |
| 315L1                     | 22                    | 600 | 550  | 660 | 24   | 6 | 635 | 581 | 1232                      | 1294 | 496                        | 526 |
| 315L2                     | 22                    | 600 | 550  | 660 | 24   | 6 | 635 | 581 | 1432                      | 1494 | 496                        | 526 |
| 315L3                     | 22                    | 600 | 550  | 660 | 24   | 6 | 635 | 581 | 1432                      | 1494 | 496                        | 526 |
| 355M                      | 25                    | 740 | 680  | 800 | 24   | 6 | 725 | 729 | 1682                      | 1682 | 672                        | 702 |
| 355L1                     | 25                    | 740 | 680  | 800 | 24   | 6 | 725 | 729 | 1682                      | 1682 | 672                        | 702 |
| 355L2                     | 25                    | 740 | 680  | 800 | 24   | 6 | 725 | 729 | 1682                      | 1682 | 672                        | 702 |
| 355L3                     | 25                    | 740 | 680  | 800 | 24   | 6 | 725 | 729 | 1762                      | 1762 | 672                        | 702 |

| Type<br>CD...A<br>CD...AR | LE | O          | Shaft end<br>D | E   | GA   | F  | DB  |
|---------------------------|----|------------|----------------|-----|------|----|-----|
| 132S                      | 30 | 2x M32x1,5 | 38k6           | 80  | 41   | 10 | M12 |
| 132M                      | 30 | 2x M32x1,5 | 38k6           | 80  | 41   | 10 | M12 |
| 160M                      | 63 | 2x M40x1,5 | 42k6           | 110 | 45   | 12 | M16 |
| 160L                      | 63 | 2x M40x1,5 | 42k6           | 110 | 45   | 12 | M16 |
| 180M                      | 63 | 2x M40x1,5 | 48k6           | 110 | 51,5 | 14 | M16 |
| 180L                      | 63 | 2x M40x1,5 | 48k6           | 110 | 51,5 | 14 | M16 |
| 200L                      | 74 | 2x M50x1,5 | 55m6           | 110 | 59   | 16 | M20 |

| Type<br>CD...A<br>CD...AR | LE  | O          | Shaft end<br>D m6 |    | E   |     | GA   |      | F  |    | DB  |     |
|---------------------------|-----|------------|-------------------|----|-----|-----|------|------|----|----|-----|-----|
|                           |     |            | 2                 | 4  | 2   | 4   | 2    | 4    | 2  | 4  | 2   | 4   |
| 225S                      | 85  | 2x M50x1,5 | -                 | 60 | -   | 140 | -    | 64   | -  | 18 | -   | M20 |
| 225M                      | 85  | 2x M50x1,5 | 55                | 60 | 110 | 140 | 59   | 64   | 16 | 18 | M20 | M20 |
| 250M                      | 95  | 2x M63x1,5 | 60                | 65 | 140 | 140 | 64   | 69   | 18 | 18 | M20 | M20 |
| 280S                      | 110 | 2x M63x1,5 | 65                | 75 | 140 | 140 | 69   | 79,5 | 18 | 20 | M20 | M20 |
| 280M                      | 110 | 2x M63x1,5 | 65                | 75 | 140 | 140 | 69   | 79,5 | 18 | 20 | M20 | M20 |
| 315S                      | 125 | 2x M63x1,5 | 65                | 80 | 140 | 170 | 69   | 85   | 18 | 22 | M20 | M20 |
| 315M                      | 125 | 2x M63x1,5 | 65                | 80 | 140 | 170 | 69   | 85   | 18 | 22 | M20 | M20 |
| 315L1                     | 125 | 2x M63x1,5 | 65                | 80 | 140 | 170 | 69   | 85   | 18 | 22 | M20 | M20 |
| 315L2                     | 125 | 2x M63x1,5 | 65                | 80 | 140 | 170 | 69   | 85   | 18 | 22 | M20 | M20 |
| 315L3                     | 125 | 2x M63x1,5 | 65                | 80 | 140 | 170 | 69   | 85   | 18 | 22 | M20 | M20 |
| 355M                      | 130 | 2x M80x2   | 75                | 90 | 140 | 170 | 79,5 | 95   | 20 | 25 | M20 | M24 |
| 355L1                     | 130 | 2x M80x2   | 75                | 90 | 140 | 170 | 79,5 | 95   | 20 | 25 | M20 | M24 |
| 355L2                     | 130 | 2x M80x2   | 75                | 90 | 140 | 170 | 79,5 | 95   | 20 | 25 | M20 | M24 |
| 355L3                     | 130 | 2x M80x2   | 75                | 90 | 140 | 170 | 79,5 | 95   | 20 | 25 | M20 | M24 |

# IE2 / IE3 / MEPS

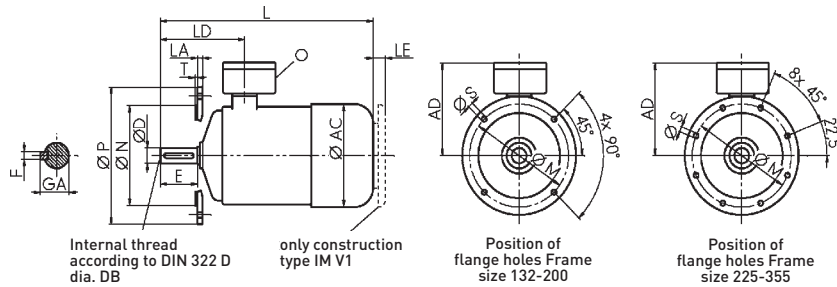
## Surface-Cooled Low-Voltage Motors

### Self-Cooling by Axial-Flow Fans

Noise classes 2 and 3

Construction type IM B5, IM V1<sup>1)</sup>, IM V3

112



All motors have carrying lugs.  
Measure AC measured from screw head.  
Measure HD refers to terminal box Ex e.  
The box can be rotated 4x90°.

#### Note:

1) Construction type IM V1 with fan canopy,  
for measure LE see page 101.

| Type<br>CD...Y2/Y3/Y A<br>CD...Y2/Y3/Y AR          | Mounting flange       |     | N     | P   | S H17 | T | AC  | AD  | L<br>Number of poles<br>2 | 4    | LD                         |     |
|----------------------------------------------------|-----------------------|-----|-------|-----|-------|---|-----|-----|---------------------------|------|----------------------------|-----|
| 132S                                               | 16                    | 265 | 230j6 | 300 | 14,5  | 4 | 265 | 279 | -                         | 582  | 226                        |     |
| 132S1                                              | 16                    | 265 | 230j6 | 300 | 14,5  | 4 | 265 | 279 | 582                       | -    | 226                        |     |
| 132S2                                              | 16                    | 265 | 230j6 | 300 | 14,5  | 4 | 265 | 279 | 632                       | -    | 226                        |     |
| 132M                                               | 16                    | 265 | 230j6 | 300 | 14,5  | 4 | 265 | 279 | -                         | 632  | 226                        |     |
| 132M1                                              | 16                    | 265 | 230j6 | 300 | 14,5  | 4 | 265 | 279 | -                         | -    | 226                        |     |
| 132M2                                              | 16                    | 265 | 230j6 | 300 | 14,5  | 4 | 265 | 279 | -                         | -    | 226                        |     |
| 160M                                               | 20                    | 300 | 250j6 | 350 | 18,5  | 5 | 318 | 317 | 732                       | 732  | 261                        |     |
| 160L Y2                                            | 20                    | 300 | 250j6 | 350 | 18,5  | 5 | 318 | 317 | 732                       | 732  | 261                        |     |
| 160L Y3/Y                                          | 20                    | 300 | 250j6 | 350 | 18,5  | 5 | 318 | 317 | 732                       | 767  | 261                        |     |
| 180M                                               | 20                    | 300 | 250j6 | 350 | 18,5  | 5 | 353 | 365 | 741                       | 741  | 369                        |     |
| 180L Y2                                            | 20                    | 300 | 250j6 | 350 | 18,5  | 5 | 353 | 365 | -                         | 755  | 369                        |     |
| 180L Y3/Y                                          | 20                    | 300 | 250j6 | 350 | 18,5  | 5 | 353 | 365 | -                         | 805  | 369                        |     |
| 200L                                               | 20                    | 350 | 300h6 | 400 | 18,5  | 5 | 393 | 381 | 795                       | 815  | 390                        |     |
| Type<br>CD...Y2/Y3/Y A<br>CD...Y2/Y3/Y AR          | Mounting flange<br>LA | M   | N h6  | P   | S H17 | T | AC  | AD  | L<br>Number of poles<br>2 | 4    | LD<br>Number of poles<br>2 | 4   |
| 225S                                               | 22                    | 400 | 350   | 450 | 18,5  | 5 | 455 | 409 | -                         | 932  | -                          | 377 |
| 225M                                               | 22                    | 400 | 350   | 450 | 18,5  | 5 | 455 | 409 | 902                       | 932  | 347                        | 377 |
| 250M                                               | 18                    | 500 | 450   | 550 | 18,5  | 5 | 493 | 471 | 1015                      | 1015 | 482                        | 482 |
| 280S                                               | 18                    | 500 | 450   | 550 | 18,5  | 5 | 548 | 512 | 1124                      | 1124 | 483                        | 483 |
| 280M                                               | 18                    | 500 | 450   | 550 | 18,5  | 5 | 548 | 512 | 1124                      | 1124 | 483                        | 483 |
| 315S                                               | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |
| 315M                                               | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |
| 315L1                                              | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |
| 315L2                                              | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1433                      | 1495 | 496                        | 526 |
| 315L3                                              | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1433                      | 1495 | 496                        | 526 |
| 355M                                               | 25                    | 740 | 680   | 800 | 24    | 6 | 725 | 729 | 1682                      | 1682 | 672                        | 702 |
| Type<br>CD...Y2/Y3/Y A****<br>CD...Y2/Y3/Y AR **** | Mounting flange<br>LA | M   | N h6  | P   | S H17 | T | AC  | AD  | L<br>Number of poles<br>2 | 4    | LD<br>Number of poles<br>2 | 4   |
| 250S                                               | 18                    | 500 | 450   | 550 | 18,5  | 5 | 493 | 471 | 1015                      | 1015 | 482                        | 482 |
| 250M                                               | 18                    | 500 | 450   | 550 | 18,5  | 5 | 548 | 512 | 1124                      | 1124 | 483                        | 483 |
| 280S                                               | 18                    | 500 | 450   | 550 | 18,5  | 5 | 548 | 512 | 1124                      | 1124 | 483                        | 483 |
| 280M                                               | 22                    | 600 | 550   | 550 | 18,5  | 5 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |
| 315S                                               | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |
| 315M                                               | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |
| 315L1                                              | 22                    | 600 | 550   | 660 | 24    | 6 | 635 | 582 | 1233                      | 1295 | 496                        | 526 |

**Note:**

2) For types 250 to 315-4 with measures DA, EA, GC, FA and DC, the 2-pole specifications apply.

| Type<br>CD...Y2/Y3/Y A<br>CD...Y2/Y3/Y AR         | LE  | O          | Shaft end<br>D                         | E                   | GA                   | F                   | DB                   |
|---------------------------------------------------|-----|------------|----------------------------------------|---------------------|----------------------|---------------------|----------------------|
| 132S                                              | 30  | 2x M32x1,5 | 38 k6                                  | 80                  | 41                   | 10                  | M12                  |
| 132S1                                             | 30  | 2x M32x1,5 | 38 k6                                  | 80                  | 41                   | 10                  | M12                  |
| 132S2                                             | 30  | 2x M32x1,5 | 38 k6                                  | 80                  | 41                   | 10                  | M12                  |
| 132M                                              | 30  | 2x M32x1,5 | 38 k6                                  | 80                  | 41                   | 10                  | M12                  |
| 132M1                                             | 30  | 2x M32x1,5 | 38 k6                                  | 80                  | 41                   | 10                  | M12                  |
| 132M2                                             | 30  | 2x M32x1,5 | 38 k6                                  | 80                  | 41                   | 10                  | M12                  |
| 160M                                              | 63  | 2x M40x1,5 | 42 k6                                  | 110                 | 45                   | 12                  | M16                  |
| 160L Y2                                           | 63  | 2x M40x1,5 | 42 k6                                  | 110                 | 45                   | 12                  | M16                  |
| 160L Y3/Y                                         | 63  | 2x M40x1,5 | 42 k6                                  | 110                 | 45                   | 12                  | M16                  |
| 180M                                              | 63  | 2x M40x1,5 | 48 k6                                  | 110                 | 51,5                 | 14                  | M16                  |
| 180L Y2                                           | 63  | 2x M40x1,5 | 48 k6                                  | 110                 | 51,5                 | 14                  | M16                  |
| 180L Y3/Y                                         | 63  | 2x M40x1,5 | 48 k6                                  | 110                 | 51,5                 | 14                  | M16                  |
| 200L                                              | 74  | 2x M50x1,5 | 55 m6                                  | 110                 | 59                   | 16                  | M20                  |
| Type<br>CD...Y2/Y3/Y A<br>CD...Y2/Y3/Y AR         | LE  | O          | Shaft end<br>D m6, DA m6 <sup>2)</sup> | E, EA <sup>2)</sup> | GA, GC <sup>2)</sup> | F, FA <sup>2)</sup> | DB, DC <sup>2)</sup> |
|                                                   |     |            | 2 4                                    | 2 4                 | 2 4                  | 2 4                 | 2 4                  |
| 225S                                              | 85  | 2xM50x1,5  | - 60                                   | - 140               | - 64                 | - 18                | - M20                |
| 225M                                              | 85  | 2xM50x1,5  | 55 60                                  | 110 140             | 59 64                | 16 18               | M20 M20              |
| 250M                                              | 95  | 2xM63x1,5  | 60 65                                  | 140 140             | 64 69                | 18 18               | M20 M20              |
| 280S                                              | 110 | 2xM63x1,5  | 65 75                                  | 140 140             | 69 79,5              | 18 20               | M20 M20              |
| 280M                                              | 110 | 2xM63x1,5  | 65 75                                  | 140 140             | 69 79,5              | 18 20               | M20 M20              |
| 315S                                              | 125 | 2xM63x1,5  | 65 80                                  | 140 170             | 69 85                | 18 22               | M20 M20              |
| 315M                                              | 125 | 2xM63x1,5  | 65 80                                  | 140 170             | 69 85                | 18 22               | M20 M20              |
| 315L1                                             | 125 | 2xM63x1,5  | 65 80                                  | 140 170             | 69 85                | 18 22               | M20 M20              |
| 315L2                                             | 125 | 2xM63x1,5  | 65 80                                  | 140 170             | 69 85                | 18 22               | M20 M20              |
| 315L3                                             | 125 | 2xM63x1,5  | 65 80                                  | 140 170             | 69 85                | 18 22               | M20 M20              |
| 355M                                              | 130 | 2x M80x2   | 75 90                                  | 140 170             | 79,5 95              | 20 25               | M20 M24              |
| Type<br>CD...Y2/Y3/Y A****<br>CD...Y2/Y3/Y AR**** | LE  | O          | Shaft end<br>D m6, DA m6 <sup>2)</sup> | E, EA <sup>2)</sup> | GA, GC <sup>2)</sup> | F, FA <sup>2)</sup> | DB, DC <sup>2)</sup> |
|                                                   |     |            | 2 4                                    | 2 4                 | 2 4                  | 2 4                 | 2 4                  |
| 250S                                              | 95  | 2xM63x1,5  | 60 65*                                 | 140 140             | 64 69*               | 18 18*              | M20 M20              |
| 250M                                              | 110 | 2xM63x1,5  | 60 65*                                 | 140 140             | 64 69*               | 18 18*              | M20 M20              |
| 280S                                              | 110 | 2xM63x1,5  | 65 75**                                | 140 140**           | 69 79,5**            | 18 20**             | M20 M20              |
| 280M                                              | 125 | 2xM63x1,5  | 65 75**                                | 140 140**           | 69 79,5**            | 18 20**             | M20 M20              |
| 315S                                              | 125 | 2xM63x1,5  | 65 80***                               | 140 170             | 69 85***             | 18 22               | M20 M20              |
| 315M                                              | 125 | 2xM63x1,5  | 65 80***                               | 140 170             | 69 85***             | 18 22               | M20 M20              |
| 315L1                                             | 125 | 2xM63x1,5  | 65 80***                               | 140 170             | 69 85***             | 18 22               | M20 M20              |

\* Diameter 70 for British Allocation on request - please note: Measure becomes 74.5 and measure F becomes 20

\*\* Diameter 80 for British Allocation on request - please note: Measures L, LC, LD and E become 30mm longer, measure GA becomes 85 and measure F becomes 22.

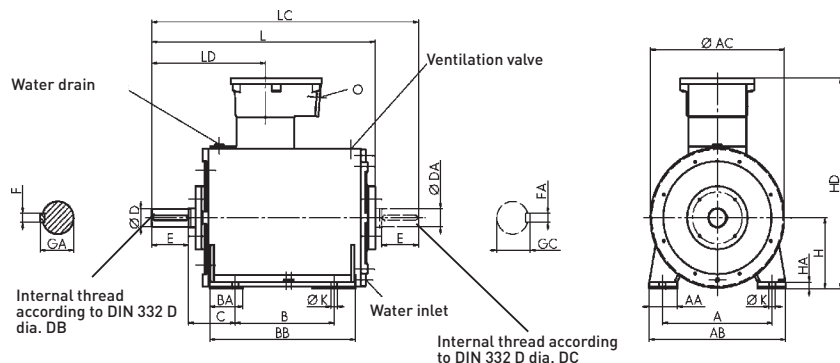
\*\*\* Diameter 85 for British Allocation on request - please note: Measure GA becomes 90 and measure F corresponds to the catalog.

\*\*\*\* British Allocation

# Water-Cooled Low-Voltage Motors

Noise class 4

Construction type IM B3, IM B6, IM B7, IM B8, IM V5, IM V6



All motors have carrying lugs.  
The box can be rotated by 4x90°.  
Measure HD refers to terminal box Ex e.

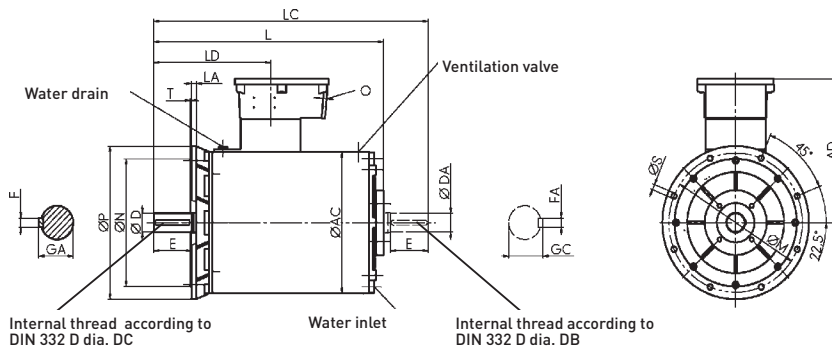
| Type<br>CD...W | A   | AA  | AB  | AC  | B   | BA  | BB  | BC    | C   | H       | HA | HD   | K  |
|----------------|-----|-----|-----|-----|-----|-----|-----|-------|-----|---------|----|------|----|
| 160M           | 254 | 65  | 310 | 317 | 210 | 100 | 300 | 21,5  | 108 | 160-0,5 | 15 | 477  | 15 |
| 160L           | 254 | 65  | 310 | 317 | 254 | 100 | 300 | 21,5  | 108 | 160-0,5 | 15 | 477  | 15 |
| 180M           | 279 | 75  | 350 | 454 | 241 | 100 | 340 | -     | 121 | 180-0,5 | 15 | 545  | 15 |
| 180L           | 279 | 75  | 350 | 454 | 279 | 100 | 340 | -     | 121 | 180-0,5 | 15 | 545  | 15 |
| 200L           | 318 | 80  | 390 | 385 | 305 | 90  | 365 | 30    | 133 | 200-0,5 | 20 | 581  | 20 |
| 225S           | 356 | 85  | 450 | 440 | 286 | 90  | 370 | 29,5  | 149 | 225-0,5 | 25 | 634  | 20 |
| 225M           | 356 | 85  | 450 | 440 | 311 | 90  | 370 | 29,5  | 149 | 225-0,5 | 25 | 634  | 20 |
| 250M           | 406 | 105 | 510 | 480 | 349 | 110 | 420 | -     | 168 | 250-0,5 | 30 | 721  | 26 |
| 280S           | 457 | 110 | 570 | 536 | 368 | 120 | 500 | 80,5  | 190 | 280-1   | 35 | 791  | 26 |
| 280M           | 457 | 110 | 570 | 536 | 419 | 120 | 500 | 80,5  | 190 | 280-1   | 35 | 791  | 26 |
| 315S           | 508 | 150 | 630 | 619 | 406 | 210 | 615 | 106,5 | 216 | 315-1   | 35 | 896  | 30 |
| 315M           | 508 | 150 | 630 | 619 | 457 | 210 | 615 | 106,5 | 216 | 315-1   | 35 | 896  | 30 |
| 315L1          | 508 | 150 | 630 | 619 | 508 | 210 | 615 | 106,5 | 216 | 315-1   | 35 | 896  | 30 |
| 315L2          | 508 | 150 | 630 | 619 | 508 | 210 | 615 | 106,5 | 216 | 315-1   | 35 | 896  | 30 |
| 355M           | 610 | 130 | 720 | 702 | 560 | 220 | 720 | 151,5 | 254 | 355-1   | 35 | 1084 | 30 |
| 355L1          | 610 | 130 | 720 | 702 | 630 | 220 | 720 | 151,5 | 254 | 355-1   | 35 | 1084 | 30 |
| 355L2          | 610 | 130 | 720 | 702 | 630 | 220 | 720 | 151,5 | 254 | 355-1   | 35 | 1084 | 30 |

| Type<br>CD...W | L<br>Number of poles<br>2 4,6,8 |      | LC<br>Number of poles<br>2 4,6,8 |      | LD<br>Number of poles<br>2 4,6,8 |     | O          | Shaft end<br>D, DA<br>2 4,6,8 |      | E, EA<br>2 4,6,8 |     | GA, GC<br>2 4,6,8 |      | F, FA<br>2 4,6,8 |    | DB, DC<br>2 4,6,8 |     |
|----------------|---------------------------------|------|----------------------------------|------|----------------------------------|-----|------------|-------------------------------|------|------------------|-----|-------------------|------|------------------|----|-------------------|-----|
| 160M           | 614                             | 614  | 755                              | 755  | 261                              | 261 | 2x M40x1,5 | 42k6                          | 42k6 | 110              | 110 | 45                | 45   | 12               | 12 | M16               | M16 |
| 160L           | 614                             | 614  | 755                              | 755  | 261                              | 261 | 2x M40x1,5 | 42k6                          | 42k6 | 110              | 110 | 45                | 45   | 12               | 12 | M16               | M16 |
| 180M           | 643                             | 643  | 773                              | 773  | 369                              | 369 | 2x M40x1,5 | 48k6                          | 48k6 | 110              | 110 | 51,5              | 51,5 | 14               | 14 | M16               | M16 |
| 180L           | 643                             | 643  | 773                              | 773  | 369                              | 369 | 2x M40x1,5 | 48k6                          | 48k6 | 110              | 110 | 51,5              | 51,5 | 14               | 14 | M16               | M16 |
| 200L           | 660                             | 660  | 773                              | 773  | 390                              | 390 | 2x M50x1,5 | 55m6                          | 55m6 | 110              | 110 | 59                | 59   | 16               | 16 | M20               | M20 |
| 225S           | -                               | 771  | -                                | 931  | -                                | 377 | 2x M50x1,5 | -                             | 60m6 | -                | 140 | -                 | 64   | -                | 18 | -                 | M20 |
| 225M           | 741                             | 771  | 871                              | 931  | 347                              | 377 | 2x M50x1,5 | 55m6                          | 60m6 | 110              | 140 | 59                | 64   | 16               | 18 | M20               | M20 |
| 250M           | 880                             | 880  | 1040                             | 1040 | 482                              | 482 | 2x M63x1,5 | 60m6                          | 65m6 | 140              | 140 | 64                | 69   | 18               | 18 | M20               | M20 |
| 280S           | 983                             | 983  | 1143                             | 1143 | 483                              | 483 | 2x M63x1,5 | 65m6                          | 75m6 | 140              | 140 | 69                | 79,5 | 18               | 20 | M20               | M20 |
| 280M           | 983                             | 983  | 1143                             | 1143 | 483                              | 483 | 2x M63x1,5 | 65m6                          | 75m6 | 140              | 140 | 69                | 79,5 | 18               | 20 | M20               | M20 |
| 315S           | 1093                            | 1123 | 1248                             | 1308 | 496                              | 526 | 2x M63x1,5 | 65m6                          | 80m6 | 140              | 170 | 69                | 85   | 18               | 22 | M20               | M20 |
| 315M           | 1093                            | 1123 | 1248                             | 1308 | 496                              | 526 | 2x M63x1,5 | 65m6                          | 80m6 | 140              | 170 | 69                | 85   | 18               | 22 | M20               | M20 |
| 315L1          | 1093                            | 1123 | 1248                             | 1308 | 496                              | 526 | 2x M63x1,5 | 65m6                          | 80m6 | 140              | 170 | 69                | 85   | 18               | 22 | M20               | M20 |
| 315L2          | 1293                            | 1323 | 1448                             | 1508 | 496                              | 526 | 2x M63x1,5 | 65m6                          | 80m6 | 140              | 170 | 69                | 85   | 18               | 22 | M20               | M20 |
| 355M           | 1483                            | 1783 | 1648                             | 1978 | 672                              | 702 | 2x M80x2   | 75m6                          | 90m6 | 140              | 170 | 79,5              | 95   | 20               | 25 | M20               | M24 |
| 355L1          | 1483                            | 1783 | 1648                             | 1978 | 672                              | 702 | 2x M80x2   | 75m6                          | 90m6 | 140              | 170 | 79,5              | 95   | 20               | 25 | M20               | M24 |
| 355L2          | 1483                            | 1783 | 1648                             | 1978 | 672                              | 702 | 2x M80x2   | 75m6                          | 90m6 | 140              | 170 | 79,5              | 95   | 20               | 25 | M20               | M24 |

Noise class 4

Construction type IM B5, IM V1, IM V3

115

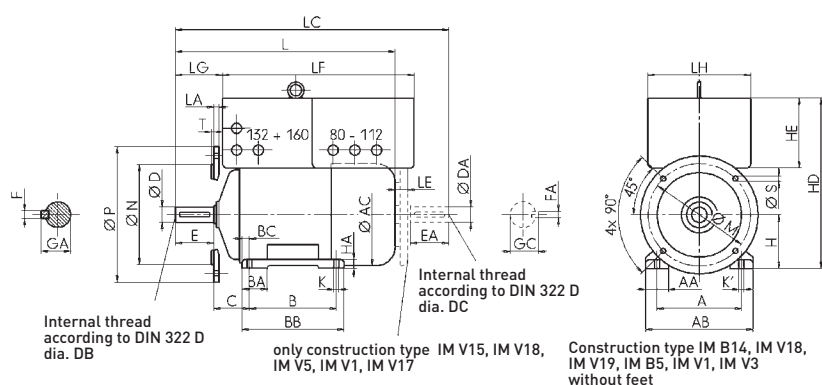


Mounting flange according to EN 50347, type FF.  
All motors have carrying lugs.  
Measure AD refers to terminal box Ex e.  
The box can be rotated by 4x90°.

| Type<br>CD...W | Mounting flange |     | N     | P   | S H17 | T | AC  | AD  |
|----------------|-----------------|-----|-------|-----|-------|---|-----|-----|
|                | LA              | M   |       |     |       |   |     |     |
| 160M           | 20              | 300 | 250j6 | 350 | 18,5  | 5 | 317 | 317 |
| 160L           | 20              | 300 | 250j6 | 350 | 18,5  | 5 | 317 | 317 |
| 180M           | 20              | 300 | 250j6 | 350 | 18,5  | 5 | 454 | 365 |
| 180L           | 20              | 300 | 250j6 | 350 | 18,5  | 5 | 454 | 365 |
| 200L           | 20              | 350 | 300h6 | 400 | 18,5  | 5 | 385 | 381 |
| 225S           | 22              | 400 | 350h6 | 450 | 18,5  | 5 | 440 | 409 |
| 225M           | 22              | 400 | 350h6 | 450 | 18,5  | 5 | 440 | 409 |
| 250M           | 18              | 500 | 450h6 | 550 | 18,5  | 5 | 480 | 471 |
| 280S           | 18              | 500 | 450h6 | 550 | 18,5  | 5 | 536 | 511 |
| 280M           | 18              | 500 | 450h6 | 550 | 18,5  | 5 | 536 | 511 |
| 315S           | 22              | 600 | 550h6 | 660 | 24    | 6 | 619 | 581 |
| 315M           | 22              | 600 | 550h6 | 660 | 24    | 6 | 619 | 581 |
| 315L1          | 22              | 600 | 550h6 | 660 | 24    | 6 | 619 | 581 |
| 315L2          | 22              | 600 | 550h6 | 660 | 24    | 6 | 619 | 581 |
| 355M           | 25              | 740 | 680h6 | 800 | 24    | 6 | 702 | 729 |
| 355L1          | 25              | 740 | 680h6 | 800 | 24    | 6 | 702 | 729 |
| 355L2          | 25              | 740 | 680h6 | 800 | 24    | 6 | 702 | 729 |

# Surface-Cooled Motors with Integrated Frequency Inverter

116



Mounting flange according to EN 50347, type FF.  
All motors have carrying lugs.  
Measure AC measured from screw heads

**Note:**  
1) Construction type IM V1, IM V5, IM V15, IM V17 and IM V18 with fan canopy

| Type CD...I | A   | AA | AB  | AC  | B   | BA  | BB  | BC   | C   | H-0,5 | HA | HD  | K H17 | K' H17 | L   | LC  | LE | LF  | LG  | LH  | HE  | Weight approx. (kg) |
|-------------|-----|----|-----|-----|-----|-----|-----|------|-----|-------|----|-----|-------|--------|-----|-----|----|-----|-----|-----|-----|---------------------|
| 80M         | 125 | 35 | 160 | 163 | 100 | 35  | 130 | 15   | 50  | 80    | 12 | 335 | Ø 10  | -      | 313 | 387 | 25 | 355 | 46  | 274 | 207 | 60                  |
| 90S         | 140 | 40 | 180 | 183 | 100 | 40  | 130 | 15   | 56  | 90    | 12 | 348 | Ø 10  | -      | 364 | 445 | 25 | 355 | 67  | 274 | 207 | 66                  |
| 90L         | 140 | 40 | 180 | 183 | 125 | 40  | 155 | 15   | 56  | 90    | 12 | 380 | Ø 10  | -      | 364 | 445 | 25 | 355 | 67  | 274 | 207 | 67                  |
| 100L        | 160 | 45 | 200 | 201 | 140 | 45  | 175 | 17,5 | 63  | 100   | 15 | 390 | Ø 12  | -      | 415 | 510 | 30 | 355 | 79  | 274 | 207 | 79                  |
| 112M        | 190 | 50 | 235 | 225 | 140 | 50  | 175 | 17,5 | 70  | 112   | 17 | 447 | Ø 12  | -      | 423 | 524 | 30 | 355 | 84  | 274 | 207 | 93                  |
| 132S        | 216 | 60 | 266 | 265 | 140 | 60  | 187 | 23,5 | 89  | 132   | 20 | 447 | Ø 12  | -      | 529 | 645 | 30 | 456 | 95  | 358 | 209 | 154                 |
| 132M        | 216 | 60 | 266 | 265 | 178 | 60  | 225 | 23,5 | 89  | 132   | 20 | 513 | Ø 12  | -      | 529 | 645 | 30 | 456 | 95  | 358 | 209 | 164                 |
| 160M-2      | 254 | 65 | 310 | 318 | 210 | 100 | 300 | 23   | 108 | 160   | 25 | 513 | 15    | 20     | 708 | 863 | 35 | 456 | 130 | 358 | 209 | 222                 |
| 160M-4      | 254 | 65 | 310 | 318 | 210 | 100 | 300 | 23   | 108 | 160   | 25 | 348 | 15    | 20     | 708 | 863 | 35 | 456 | 130 | 358 | 209 | 227                 |

| Type CD...I | Shaft end dimensions |       |        |       |        | Construction types IM B35, IM B5, IM V1 <sup>1)</sup> , IM V3, IM V15 <sup>1)</sup> , IM V35 |     |      |     |       |     |
|-------------|----------------------|-------|--------|-------|--------|----------------------------------------------------------------------------------------------|-----|------|-----|-------|-----|
|             | D, DA                | E, EA | GA, GC | F, FA | DB, DC | LA                                                                                           | M   | N j6 | P   | S H17 | T   |
| 80M         | 19j6                 | 40    | 21,5   | 6     | M6     | 12                                                                                           | 165 | 130  | 200 | 12    | 3,5 |
| 90S+L       | 24j6                 | 50    | 27     | 8     | M8     | 12                                                                                           | 165 | 130  | 200 | 12    | 3,5 |
| 100L        | 28j6                 | 60    | 31     | 8     | M10    | 16                                                                                           | 215 | 180  | 250 | 14,5  | 4   |
| 112M        | 28j6                 | 60    | 31     | 8     | M10    | 16                                                                                           | 215 | 180  | 250 | 14,5  | 4   |
| 132S        | 38k6                 | 80    | 41     | 10    | M12    | 16                                                                                           | 265 | 230  | 300 | 14,5  | 4   |
| 132M        | 38k6                 | 80    | 41     | 10    | M12    | 16                                                                                           | 265 | 230  | 300 | 14,5  | 4   |
| 160M        | 42k6                 | 110   | 45     | 12    | M16    | 20                                                                                           | 300 | 250  | 350 | 18,5  | 5   |

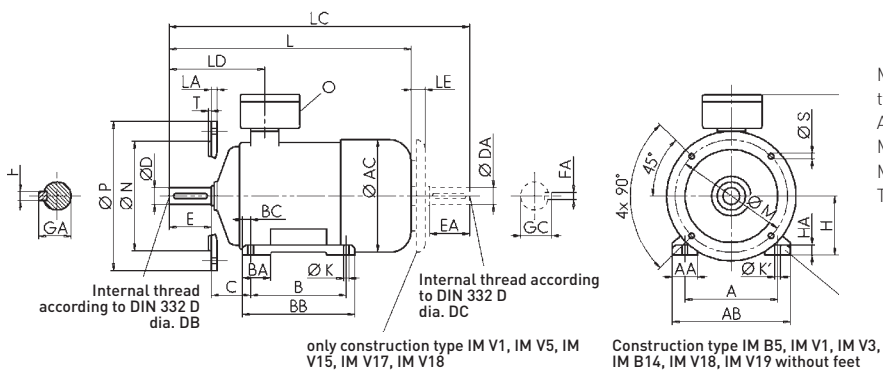
| Type<br>CD...I | Construction types IM B14, IM V18 <sup>1)</sup> , IM V19, IM B34, IM V17 <sup>1)</sup> , IM V37 |     |      |     |     | T   |
|----------------|-------------------------------------------------------------------------------------------------|-----|------|-----|-----|-----|
|                | LA                                                                                              | M   | N j6 | P   | S   |     |
| 80M            | 10                                                                                              | 100 | 80   | 120 | M6  | 3   |
| 90S+L          | 10                                                                                              | 115 | 95   | 140 | M8  | 3   |
| 100L           | 12                                                                                              | 130 | 110  | 160 | M8  | 3,5 |
| 112M           | 12                                                                                              | 130 | 110  | 160 | M8  | 3,5 |
| 132S+M         | 12                                                                                              | 165 | 130  | 200 | M10 | 3,5 |

# Motors with Integral Brake

## Motors with External Brake

All construction types

117



Mounting flange according to EN 50347, type FF.  
All motors have carrying lugs.  
Measure AC measured from screw heads  
Measure HD refers to terminal box Ex e.  
Terminal box can be rotated 4x90°.

| Type<br>BD...B(R) | A   | AA | AB  | AC  | B   | BA | BB  | BC   | C  | H-0,5 | HA | HD  | K H17 | K' H17 | L   | LC  | LD  | LE |
|-------------------|-----|----|-----|-----|-----|----|-----|------|----|-------|----|-----|-------|--------|-----|-----|-----|----|
| 80M               | 125 | 35 | 160 | 163 | 100 | 35 | 130 | 15   | 50 | 80    | 12 | 260 | Ø 10  | -      | 367 | 437 | 116 | 25 |
| 90S               | 140 | 40 | 180 | 183 | 100 | 40 | 130 | 15   | 56 | 90    | 12 | 275 | Ø 10  | -      | 421 | 502 | 137 | 25 |
| 90L               | 140 | 40 | 180 | 183 | 125 | 40 | 155 | 15   | 56 | 90    | 12 | 275 | Ø 10  | -      | 421 | 502 | 137 | 25 |
| 100L              | 160 | 45 | 200 | 201 | 140 | 45 | 175 | 17,5 | 63 | 100   | 15 | 305 | Ø 12  | -      | 481 | 574 | 149 | 30 |
| 112M              | 190 | 50 | 235 | 225 | 140 | 50 | 175 | 17,5 | 70 | 112   | 17 | 317 | Ø 12  | -      | 502 | 597 | 154 | 30 |
| 132S              | 216 | 60 | 266 | 265 | 140 | 60 | 187 | 23,5 | 89 | 132   | 20 | 411 | Ø 12  | -      | 621 | 720 | 226 | 30 |
| 132M              | 216 | 60 | 266 | 265 | 178 | 60 | 225 | 23,5 | 89 | 132   | 20 | 411 | Ø 12  | -      | 621 | 720 | 226 | 30 |

| Type<br>BD...B(R) | O          | Shaft end<br>D | DA   | E  | EA | GA   | GC   | F  | FA | DB  | DC  |
|-------------------|------------|----------------|------|----|----|------|------|----|----|-----|-----|
| 80M               | 2x M25x1,5 | 19j6           | 19j6 | 40 | 40 | 21,5 | 21,5 | 6  | 6  | M6  | M6  |
| 90S+L             | 2x M25x1,5 | 24j6           | 24j6 | 50 | 50 | 27   | 27   | 8  | 8  | M8  | M8  |
| 100L              | 2x M32x1,5 | 28j6           | 28j6 | 60 | 60 | 31   | 31   | 8  | 8  | M10 | M10 |
| 112M              | 2x M32x1,5 | 28j6           | 28j6 | 60 | 60 | 31   | 31   | 8  | 8  | M10 | M10 |
| 132S+M            | 2x M32x1,5 | 38k6           | 28k6 | 80 | 60 | 41   | 31   | 10 | 8  | M12 | M10 |

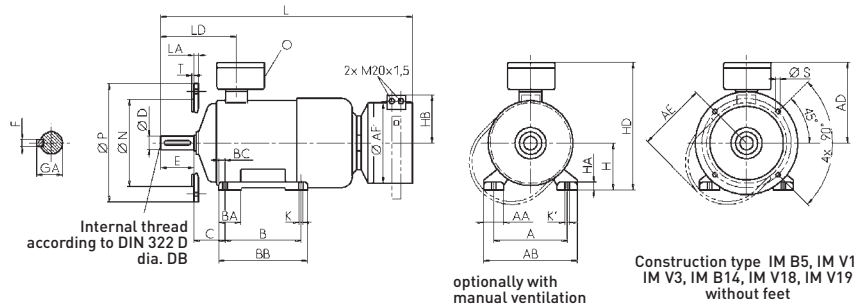
| Type<br>BD...B(R) | FF flanges<br>LA | M   | N j6 | P   | S H17 | T   | LE |
|-------------------|------------------|-----|------|-----|-------|-----|----|
| 80M               | 12               | 165 | 130  | 200 | 12    | 3,5 | 25 |
| 90S+L             | 12               | 165 | 130  | 200 | 12    | 3,5 | 25 |
| 100L              | 16               | 215 | 180  | 250 | 15    | 4   | 30 |
| 112M              | 16               | 215 | 180  | 250 | 15    | 4   | 30 |
| 132S+M            | 16               | 265 | 230  | 300 | 15    | 4   | 30 |

| Type<br>BD...B(R) | FT flanges<br>LA | M   | N j6 | P   | S   | T   |
|-------------------|------------------|-----|------|-----|-----|-----|
| 80M               | 10               | 100 | 80   | 120 | M6  | 3   |
| 90S+L             | 10               | 115 | 95   | 140 | M8  | 3   |
| 100L              | 12               | 130 | 110  | 160 | M8  | 3,5 |
| 112M              | 12               | 130 | 110  | 160 | M8  | 3,5 |
| 132S+M            | 12               | 165 | 130  | 200 | M10 | 3,5 |

# Motors with External Brake Type CD...S

118

All construction types



Mounting flange according to EN 50347, type FF and FT.

All motors have carrying lugs. Measure AC measured from screw heads Measure AD refers to terminal box Ex e.

Terminal box can be rotated 4x90°.

This also applies to the BD... series.

## Note:

1) For types 250 to 280-4, 6, 8 with measures DA, EA, GC, FA and DC, the 2-pole specifications apply.

| Type   | A   | AA  | AB  | AC  | AD  | B   | BA  | BB  | BC   | C   | H       | HA | HD  | K H17 | K' H17 | L          | LD  |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|---------|----|-----|-------|--------|------------|-----|
| CD...S |     |     |     |     |     |     |     |     |      |     |         |    |     |       |        |            |     |
| 80M    | 125 | 35  | 160 | 163 | 180 | 100 | 35  | 130 | 15   | 50  | 80-0,5  | 12 | 260 | Ø 10  | -      | 452        | 116 |
| 90S    | 140 | 40  | 180 | 183 | 185 | 125 | 40  | 155 | 15   | 56  | 90-0,5  | 12 | 275 | Ø 10  | -      | 502        | 137 |
| 90L    | 140 | 40  | 180 | 183 | 185 | 125 | 40  | 155 | 15   | 56  | 90-0,5  | 12 | 275 | Ø 10  | -      | 502        | 137 |
| 100L   | 160 | 45  | 200 | 201 | 205 | 140 | 45  | 175 | 17,5 | 63  | 100-0,5 | 15 | 305 | Ø 12  | -      | 602        | 149 |
| 112M   | 190 | 50  | 235 | 225 | 205 | 140 | 50  | 175 | 17,5 | 70  | 112-0,5 | 17 | 317 | Ø 12  | -      | 608        | 154 |
| 132S   | 216 | 60  | 266 | 265 | 279 | 140 | 60  | 187 | 23,5 | 89  | 132-0,5 | 20 | 411 | Ø 12  | -      | 715        | 226 |
| 132M   | 216 | 60  | 266 | 265 | 279 | 178 | 60  | 225 | 23,5 | 89  | 132-0,5 | 20 | 411 | Ø 12  | -      | 715        | 226 |
| 160M   | 254 | 65  | 310 | 318 | 317 | 210 | 100 | 300 | 23   | 108 | 160-0,5 | 25 | 477 | 15    | 20     | 881        | 261 |
| 160L   | 254 | 65  | 310 | 318 | 317 | 254 | 100 | 300 | 23   | 108 | 160-0,5 | 25 | 477 | 15    | 20     | 881        | 261 |
| 180M   | 279 | 75  | 350 | 353 | 365 | 241 | 100 | 340 | 30   | 121 | 180-0,5 | 25 | 545 | 15    | 20     | 924        | 369 |
| 180L   | 279 | 75  | 350 | 353 | 365 | 279 | 100 | 340 | 30   | 121 | 180-0,5 | 25 | 545 | 15    | 20     | 924        | 369 |
| 200L   | 318 | 80  | 390 | 393 | 381 | 305 | 90  | 365 | 30   | 133 | 200-0,5 | 30 | 581 | 20    | 26     | 986        | 390 |
| 225S   | 356 | 85  | 450 | 455 | 409 | 286 | 90  | 370 | 29,5 | 149 | 225-0,5 | 35 | 634 | 20    | 26     | on request |     |
| 225M   | 356 | 85  | 450 | 455 | 409 | 311 | 90  | 370 | 29,5 | 149 | 225-0,5 | 35 | 634 | 20    | 26     | on request |     |
| 250M   | 406 | 105 | 510 | 493 | 471 | 349 | 110 | 420 | 35,5 | 168 | 250-0,5 | 40 | 721 | 26    | 35     | on request |     |
| 280S   | 457 | 110 | 570 | 548 | 511 | 368 | 120 | 500 | 40,5 | 190 | 280-1   | 45 | 791 | 26    | 35     | on request |     |
| 280M   | 457 | 110 | 570 | 548 | 511 | 419 | 120 | 500 | 40,5 | 190 | 280-1   | 45 | 791 | 26    | 35     | on request |     |

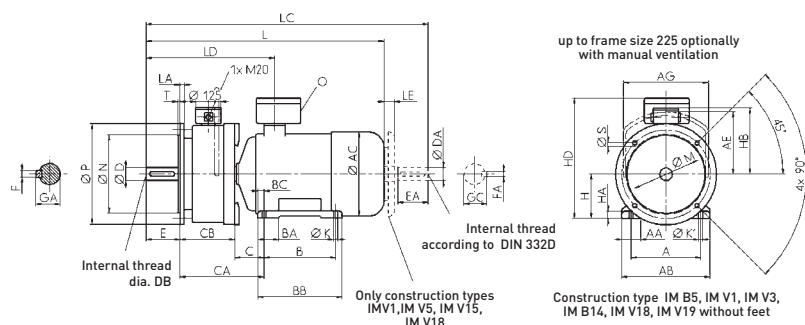
| Type   | FF flanges |     |        |     |       |     | Shaft end           |         |                     |         |                      |         |                     |         |     |            | DB,DC | O |
|--------|------------|-----|--------|-----|-------|-----|---------------------|---------|---------------------|---------|----------------------|---------|---------------------|---------|-----|------------|-------|---|
|        | LA         | M   | N      | P   | S H17 | T   | D, DA <sup>1)</sup> |         | E, EA <sup>1)</sup> |         | GA, GC <sup>1)</sup> |         | F, FA <sup>1)</sup> |         |     |            |       |   |
|        |            |     |        |     |       |     | 2                   | 4, 6, 8 | 2                   | 4, 6, 8 | 2                    | 4, 6, 8 | 2                   | 4, 6, 8 |     |            |       |   |
| CD...S |            |     |        |     |       |     |                     |         |                     |         |                      |         |                     |         |     |            |       |   |
| 80M    | 12         | 165 | 130 j6 | 200 | 12    | 3,5 | 19 j6               | 19 j6   | 40                  | 40      | 21,5                 | 21,5    | 6                   | 6       | M6  | 2x M25x1,5 |       |   |
| 90S+L  | 12         | 165 | 130 j6 | 200 | 12    | 3,5 | 24 j6               | 24 j6   | 50                  | 50      | 27                   | 27      | 8                   | 8       | M8  | 2x M25x1,5 |       |   |
| 100L   | 16         | 215 | 180 j6 | 250 | 14,5  | 4   | 28 j6               | 28 j6   | 60                  | 60      | 31                   | 31      | 8                   | 8       | M10 | 2x M32x1,5 |       |   |
| 112M   | 16         | 215 | 180 j6 | 250 | 14,5  | 4   | 28 j6               | 28 j6   | 60                  | 60      | 31                   | 31      | 8                   | 8       | M10 | 2x M32x1,5 |       |   |
| 132S+M | 16         | 265 | 230 j6 | 300 | 14,5  | 4   | 38 k6               | 38 k6   | 80                  | 80      | 41                   | 41      | 10                  | 10      | M12 | 2x M32x1,5 |       |   |
| 160M+L | 20         | 300 | 250 j6 | 350 | 18,5  | 5   | 42 k6               | 42 k6   | 110                 | 110     | 45                   | 45      | 12                  | 12      | M16 | 2x M40x1,5 |       |   |
| 180M+L | 20         | 300 | 250 j6 | 350 | 18,5  | 5   | 48 k6               | 48 k6   | 110                 | 110     | 51,5                 | 51,5    | 14                  | 14      | M16 | 2x M40x1,5 |       |   |
| 200L   | 20         | 350 | 300 h6 | 400 | 18,5  | 5   | 55 m6               | 55 m6   | 110                 | 110     | 59                   | 59      | 16                  | 16      | M20 | 2x M50x1,5 |       |   |
| 225S+M | 22         | 400 | 350 h6 | 450 | 18,5  | 5   | 55 m6               | 60 m6   | 110                 | 140     | 59                   | 64      | 16                  | 18      | M20 | 2x M50x1,5 |       |   |
| 250M   | 18         | 500 | 450 h6 | 550 | 18,5  | 5   | 60 m6               | 65 m6   | 140                 | 140     | 64                   | 69      | 18                  | 18      | M20 | 2x M63x1,5 |       |   |
| 280S+M | 18         | 500 | 450 h6 | 550 | 18,5  | 5   | 65 m6               | 75 m6   | 140                 | 140     | 69                   | 79,5    | 18                  | 20      | M20 | 2x M63x1,5 |       |   |

| Type   | FT flanges |     |      |     |     |     | Brake |     |     |       |
|--------|------------|-----|------|-----|-----|-----|-------|-----|-----|-------|
|        | LA         | M   | N j6 | P   | S   | T   | AE    | AF  | HB  | Size  |
| CD...S |            |     |      |     |     |     |       |     |     |       |
| 80M    | 10         | 100 | 80   | 120 | M6  | 3   | 134   | 178 | 133 | 10    |
| 90S+L  | 10         | 115 | 95   | 140 | M8  | 3   | 134   | 178 | 133 | 10/11 |
| 100L   | 12         | 130 | 110  | 160 | M8  | 3,5 | 164   | 245 | 161 | 13    |
| 112M   | 12         | 130 | 110  | 160 | M8  | 3,5 | 164   | 245 | 161 | 13    |
| 132S+M | 12         | 165 | 130  | 200 | M10 | 3,5 | 164   | 245 | 161 | 13/16 |
| 160M+L | -          | -   | -    | -   | -   | -   | 215   | 330 | 205 | 19    |
| 180M+L | -          | -   | -    | -   | -   | -   | 215   | 330 | 205 | 19/24 |
| 200L   | -          | -   | -    | -   | -   | -   | 215   | 330 | 205 | 24    |

# Motors with external brake Type CD...SV and CD...SVN

## All construction types

119

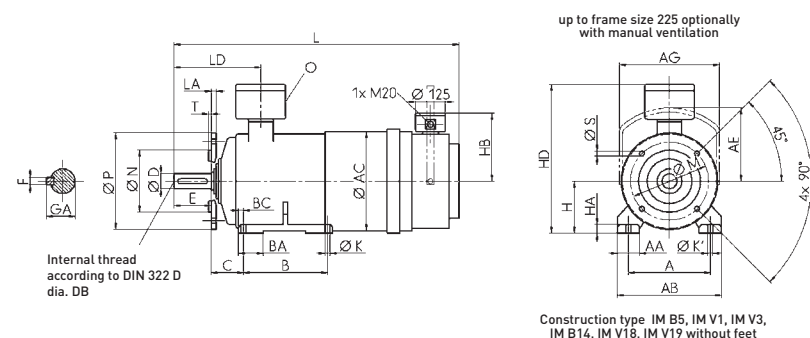


### Note:

Mounting flange according to EN 50347, type FF and FT.  
Type FF corresponds to Type B5.  
Type FT corresponds to Type B14.

Measures not listed here correspond to the measures of type CD...S on page 118.

| Type CD...SV | L               |      |      | LC              |      |      | LD              |         | CA  | CB  | LE  | Flange  |      |      | DB   |        |
|--------------|-----------------|------|------|-----------------|------|------|-----------------|---------|-----|-----|-----|---------|------|------|------|--------|
|              | Number of poles |      |      | Number of poles |      |      | Number of poles |         |     |     |     | FF type |      |      |      |        |
|              | 2               | 4    | 6, 8 | 2               | 4    | 6, 8 | 2               | 4, 6, 8 |     |     |     | LA      | N h8 | P ±1 |      |        |
| 63M          | 384             | 384  | 384  | 418             | 418  | 418  | 249             | 249     | 185 | 145 | -   | 10      | 95   | 140  | 9,5  | M4x10  |
| 71M          | 423             | 423  | 423  | 479             | 479  | 479  | 256             | 256     | 190 | 145 | 25  | 10      | 110  | 160  | 9,5  | M4x10  |
| 80M          | 509             | 509  | 509  | 583             | 583  | 583  | 312             | 312     | 246 | 196 | 25  | 12      | 130  | 200  | 11,5 | M6x20  |
| 90S+L        | 560             | 560  | 560  | 641             | 641  | 641  | 333             | 333     | 252 | 196 | 25  | 12      | 130  | 200  | 11,5 | M6x20  |
| 100L         | 631             | 631  | 631  | 726             | 726  | 726  | 365             | 365     | 279 | 216 | 30  | 14      | 180  | 250  | 14,5 | M8x20  |
| 112M         | 641             | 641  | 641  | 740             | 740  | 740  | 370             | 370     | 286 | 216 | 30  | 14      | 180  | 250  | 14,5 | M8x20  |
| 132S+M       | 771             | 771  | 771  | 887             | 887  | 887  | 468             | 468     | 331 | 242 | 30  | 18      | 230  | 300  | 14,5 | M10x25 |
| 160M+L       | 955             | 918  | 918  | 1105            | 1073 | 1073 | 503             | 503     | 350 | 242 | 63  | 18      | 250  | 350  | 18   | M10x25 |
| 180M+L       | 1026            | 1026 | 1026 | 1209            | 1209 | 1209 | 669             | 669     | 421 | 300 | 63  | 21      | 250  | 350  | 18   | M20x30 |
| 200L         | 1089            | 1089 | 1089 | 1283            | 1209 | 1209 | 690             | 690     | 433 | 300 | 74  | 21      | 300  | 400  | 18   | M20x30 |
| 225S+M       | 1237            | 1267 | 1218 | 1441            | 1505 | 1505 | 677             | 707     | 449 | 300 | 85  | 21      | 350  | 448  | 18   | M20x30 |
| 250M         | -               | 1310 | 1244 | -               | 1561 | 1495 | -               | 792     | 478 | 310 | 94  | 26      | 450  | 550  | 18   | M20x30 |
| 280S+M       | -               | 1419 | 1419 | -               | 1685 | 1685 | -               | 793     | 500 | 310 | 110 | 26      | 450  | 550  | 18   | M20x30 |



### Note:

Mounting flange according to EN 50347, type FF.  
Type FF corresponds to Type B5.  
Type FT corresponds to Type B14.  
Measures not listed here correspond to the measures of type CD...S on page 118.

| Type CD...SVN | L             |
|---------------|---------------|
| 63M           | not available |
| 71M           | not available |
| 80M           | 576           |
| 90S+L         | 595           |
| 100L          | 672           |
| 112M          | 678           |
| 132S+M        | 811           |
| 160M+L        | 985           |
| 180M+L        | 1086          |
| 200L          | 1148          |
| 225S+M        | on request    |
| 250M          | on request    |
| 280S+M        | on request    |

| valid for<br>Type CD...SV<br>Type CD...SVN | Brake |     |     | Type |
|--------------------------------------------|-------|-----|-----|------|
|                                            | AE    | AG  | HB  |      |
| 63M                                        | 205   | 205 | 185 | 63   |
| 71M                                        | 205   | 205 | 185 | 71   |
| 80M                                        | 230   | 250 | 215 | 80   |
| 90S+L                                      | 230   | 250 | 215 | 90   |
| 100L                                       | 255   | 305 | 240 | 100  |
| 112M                                       | 255   | 305 | 240 | 112  |
| 132S+M                                     | 290   | 355 | 265 | 132  |
| 160M+L                                     | 290   | 355 | 265 | 160  |
| 180M+L                                     | 320   | 370 | 282 | 180  |
| 200L                                       | 320   | 370 | 282 | 200  |
| 225S+M                                     | 320   | 370 | 282 | 225  |
| 250M                                       | -     | -   | 328 | 250  |
| 280S+M                                     | -     | -   | 328 | 280  |

## 120

The technical drawing shows two views of the IM B3 motor. The left view is a front elevation showing the motor's profile with dimensions L (total length), LD (length to terminal box), LA (terminal box height), T (flange thickness), N (flange diameter), D (flange bore), P (mounting hole pitch), GA (mounting hole diameter), F (flange face width), E (motor frame height), AC (acronym), HA (height to top of terminal box), C (base width), BA (base mounting hole distance), BB (base mounting hole diameter), OK (keyway), and A (base flange diameter). The right view is a side elevation showing the terminal box with dimensions 651 (top width), 438 (terminal box width), 754 (terminal box height), 270° (flange angle), 8x45° (flange holes), S (terminal box mounting bracket), M (terminal box mounting hole), AA (base flange mounting hole), AB (base flange diameter), and H (total height). A cable entry point is shown at the top with a dimension of 425 and the note 'Cable dia. 48-70'. A cross-section of the mounting foot is shown on the far left with dimensions GA, F, and internal thread.

**Internal thread according to DIN 332 D**

**Construction type IM B3, IM B6, IM B7, IM B8, IM V5, IM V6 without flange.**

**Construction type IM B5, IM V1, IM V3 without feet.**

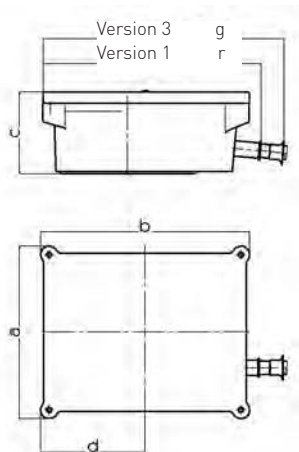
**Note:**  
Sizes 400 and 450 with flange design are only available for V1.

| Type<br>CD...H | D m6<br>Number of poles<br>2                      4, 6, 8 |     | E<br>Number of poles<br>2                      4, 6, 8 |     | GA<br>Number of poles<br>2                      4, 6, 8 |     | F<br>Number of poles<br>2                      4, 6, 8 |    | DB<br>Number of poles<br>2                      4, 6, 8 |     | Mounting flange |     |     | P    | S H17 | T |
|----------------|-----------------------------------------------------------|-----|--------------------------------------------------------|-----|---------------------------------------------------------|-----|--------------------------------------------------------|----|---------------------------------------------------------|-----|-----------------|-----|-----|------|-------|---|
|                | LA                                                        | M   | N h6                                                   |     |                                                         |     |                                                        |    |                                                         |     |                 |     |     |      |       |   |
| 355M           | 75                                                        | 90  | 140                                                    | 170 | 79,5                                                    | 95  | 20                                                     | 25 | M20                                                     | M24 | 25              | 740 | 680 | 800  | 24    | 6 |
| 355L           | 75                                                        | 90  | 140                                                    | 170 | 79,5                                                    | 95  | 20                                                     | 25 | M20                                                     | M24 | 25              | 740 | 680 | 800  | 24    | 6 |
| 400M           | 75                                                        | 100 | 140                                                    | 210 | 79,5                                                    | 106 | 20                                                     | 28 | M20                                                     | M24 | 28              | 940 | 880 | 1000 | 28    | 6 |
| 400L           | 75                                                        | 100 | 140                                                    | 210 | 79,5                                                    | 106 | 20                                                     | 28 | M20                                                     | M24 | 28              | 940 | 880 | 1000 | 28    | 6 |
| 450M           | 75                                                        | 100 | 140                                                    | 210 | 79,5                                                    | 116 | 20                                                     | 28 | M20                                                     | M24 | 28              | 940 | 880 | 1000 | 28    | 6 |
| 450L1          | 75                                                        | 100 | 140                                                    | 210 | 79,5                                                    | 116 | 20                                                     | 28 | M20                                                     | M24 | 28              | 940 | 880 | 1000 | 28    | 6 |
| 450L2          | 75                                                        | 100 | 140                                                    | 210 | 79,5                                                    | 116 | 20                                                     | 28 | M20                                                     | M24 | 28              | 940 | 880 | 1000 | 28    | 6 |
| 450L3          | 75                                                        | 100 | 140                                                    | 210 | 79,5                                                    | 116 | 20                                                     | 28 | M20                                                     | M24 | 28              | 940 | 880 | 1000 | 28    | 6 |

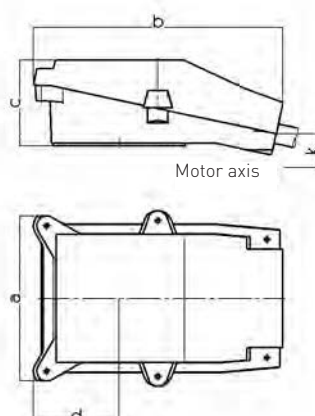
# Terminal Boxes up to 690 V

121

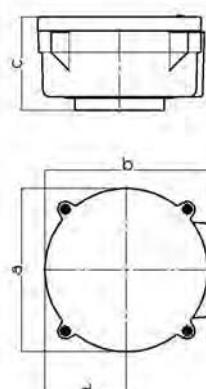
EAR - Ex e  
Version 1 and 3



EAR - Ex e  
Version 9 (VIK)



CAR - Ex d



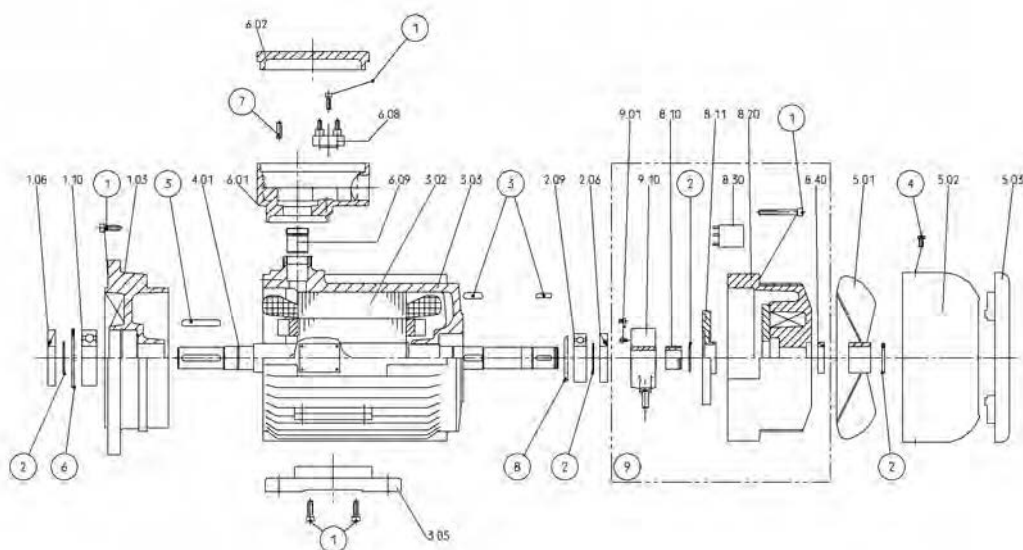
| Protection type<br>Cable entry<br>Frame size<br>Terminal boxes |         | EAR - Ex e<br>Versions 1 and 3 |     | c   | d   | r   | g   | CAR - Ex d<br>without cable gland<br>Frame size<br>Terminal boxes |         | a   | b   | c   | d   |
|----------------------------------------------------------------|---------|--------------------------------|-----|-----|-----|-----|-----|-------------------------------------------------------------------|---------|-----|-----|-----|-----|
| 63                                                             | EAR 80  | 145                            | 145 | 88  | 53  | 179 | 185 | 63                                                                | CAR 80  | 145 | 145 | 92  | 53  |
| 71                                                             | EAR 80  | 145                            | 145 | 88  | 53  | 179 | 185 | 71                                                                | CAR 80  | 145 | 145 | 92  | 53  |
| 80                                                             | EAR 80  | 145                            | 145 | 88  | 53  | 179 | 185 | 80                                                                | CAR 80  | 145 | 145 | 92  | 53  |
| 90                                                             | EAR 80  | 145                            | 145 | 88  | 53  | 179 | 185 | 90                                                                | CAR 80  | 145 | 145 | 92  | 53  |
| 100                                                            | EAR 80  | 145                            | 145 | 88  | 53  | 185 | 200 | 100                                                               | CAR 80  | 145 | 145 | 92  | 53  |
| 112                                                            | EAR 80  | 145                            | 145 | 88  | 53  | 185 | 200 | 112                                                               | CAR 80  | 145 | 145 | 92  | 53  |
| 132                                                            | EAR 132 | 220                            | 220 | 117 | 110 | 260 | 275 | 132                                                               | CAR 132 | 220 | 220 | 103 | 110 |
| 160                                                            | EAR 132 | 220                            | 220 | 117 | 110 | 265 | 281 | 160                                                               | CAR 132 | 220 | 220 | 103 | 110 |
| 180                                                            | EAR 180 | 280                            | 340 | 152 | 140 | 385 | 401 | 180                                                               | CAR 180 | 265 | 270 | 162 | 133 |
| 200                                                            | EAR 180 | 280                            | 340 | 152 | 140 | 390 | 420 | 200                                                               | CAR 180 | 265 | 270 | 162 | 133 |
| 225                                                            | EAR 180 | 280                            | 340 | 154 | 140 | 390 | 420 | 225                                                               | CAR 225 | 380 | 380 | 202 | 190 |
| 250                                                            | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 250                                                               | CAR 225 | 380 | 380 | 202 | 190 |
| 280                                                            | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 280                                                               | CAR 225 | 380 | 380 | 202 | 190 |
| 315                                                            | EAR 250 | 340                            | 422 | 198 | 161 | 474 | 512 | 315                                                               | CAR 315 | 380 | 380 | 208 | 190 |
| 355                                                            | EAR 355 | 480                            | 527 | 249 | 224 | -   | 617 | 355                                                               | CAR 355 | 484 | 734 | 335 | 242 |
| 400                                                            | EAR 355 | 480                            | 527 | 249 | 224 | -   | 630 | 400                                                               | CAR 355 | 484 | 734 | 335 | 242 |
| 450                                                            | EAR 355 | 480                            | 527 | 249 | 224 | -   | 630 | 450                                                               | CAR 355 | 484 | 734 | 335 | 242 |

| Protection type<br>Cable entry<br>Frame size<br>Terminal boxes |         | EAR - Ex e<br>Version 9 (VIK) |     | a   | b   | c   | d | k |
|----------------------------------------------------------------|---------|-------------------------------|-----|-----|-----|-----|---|---|
| 250                                                            | EAR 250 | 356                           | 512 | 186 | 179 | 317 |   |   |
| 280                                                            | EAR 250 | 356                           | 512 | 186 | 179 | 357 |   |   |
| 315                                                            | EAR 250 | 356                           | 512 | 186 | 179 | 427 |   |   |
| 355                                                            | EAR 355 | 415                           | 621 | 249 | 221 | 541 |   |   |
| 400                                                            | EAR 355 | 415                           | 621 | 249 | 221 | 558 |   |   |
| 450                                                            | EAR 355 | 415                           | 621 | 249 | 221 | 626 |   |   |

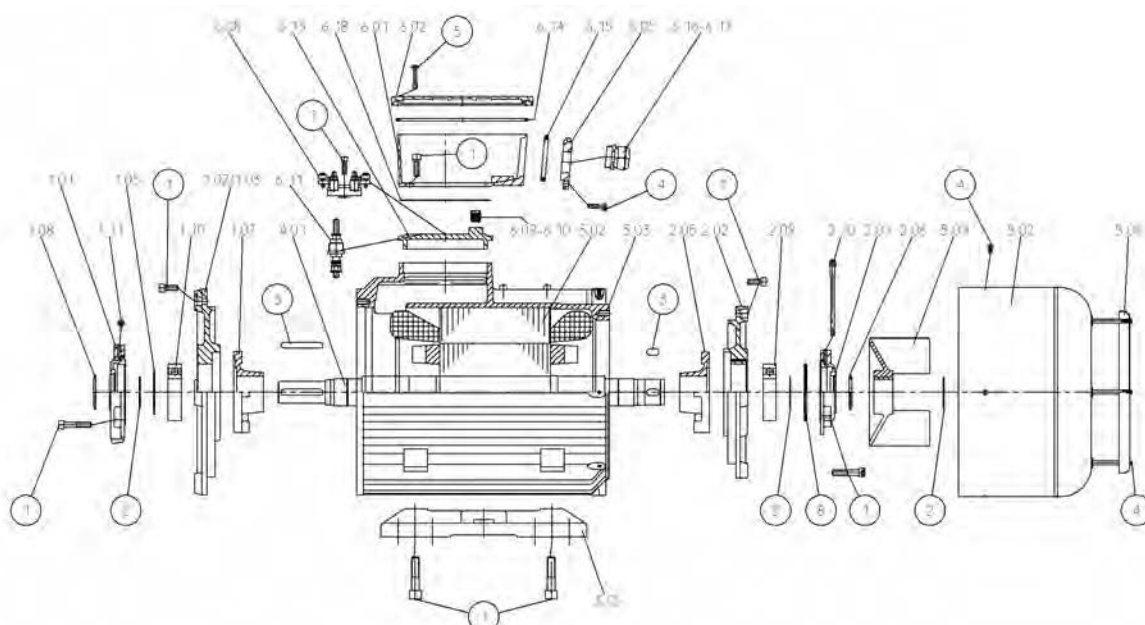
| Protection type<br>Cable entry<br>Type CD...XY*<br>Terminal boxes |         | EAR - Ex e<br>Versions 1 and 3 |     | c   | d   | r   | g   | CAR - Ex d<br>without cable gland<br>Frame size<br>Terminal boxes |         | a   | b   | c   | d   |
|-------------------------------------------------------------------|---------|--------------------------------|-----|-----|-----|-----|-----|-------------------------------------------------------------------|---------|-----|-----|-----|-----|
| 250S                                                              | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 250S                                                              | CAR 225 | 380 | 380 | 202 | 190 |
| 250M                                                              | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 250M                                                              | CAR 225 | 380 | 380 | 202 | 190 |
| 280S                                                              | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 280S                                                              | CAR 225 | 380 | 380 | 202 | 190 |
| 280M                                                              | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 280M                                                              | CAR 315 | 380 | 380 | 208 | 190 |
| 315                                                               | EAR 250 | 340                            | 422 | 196 | 161 | 474 | 512 | 315                                                               | CAR 315 | 380 | 380 | 208 | 190 |

\* British Allocation

VII



Exploded drawing for frame sizes 63 to 132



Exploded drawing for frame sizes 160 and up

① Screw according to DIN EN ISO 4762

② Circlip according to DIN 471

③ Feather key according to DIN 6885

④ Screw according to EN 2401 7

⑤ Screw according to DIN 7964

⑥ Circlip according to DIN 472

⑦ Threaded pin according to DIN 914

⑧ Belleville washer or shim

⑨ Only for brake motors and motors with built-in tachogenerator

The listed parts are available directly from the factory. Their design and combination depend on the motor supplied.

Please specify the following information when making an inquiry or placing an order:

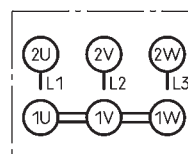
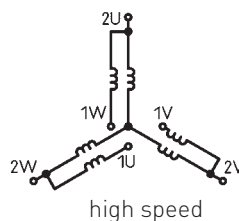
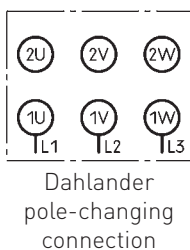
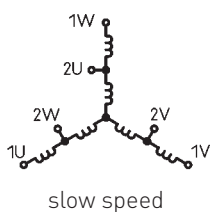
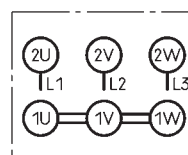
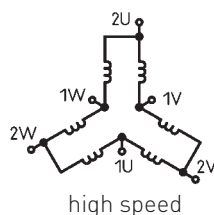
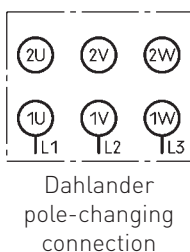
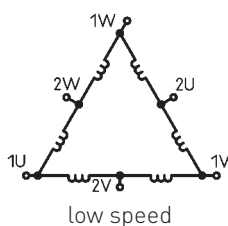
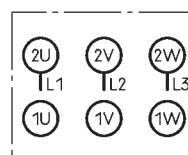
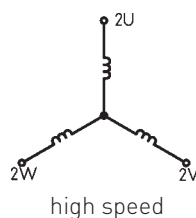
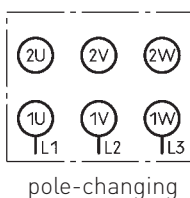
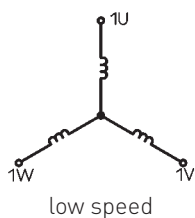
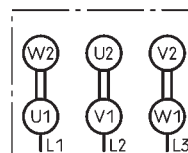
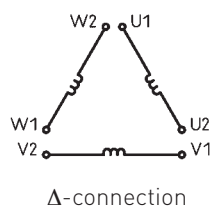
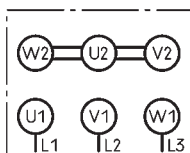
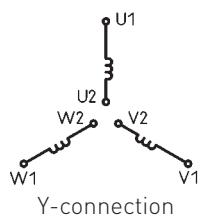
- Part number and designation
- Motor type and construction type
- Motor number

### Spare parts list

| Part No. | Designation                      |
|----------|----------------------------------|
| <b>1</b> | <b>Drive End Bearing</b>         |
| 1.01     | Bearing cover d.e. outside       |
| 1.02     | End shield d.e.                  |
| 1.03     | Flanged end shield d.e.          |
| 1.05     | Grease slinger d.e. outside      |
| 1.07     | Bearing cover d.e. inside        |
| 1.08     | Shaft seal d.e.                  |
| 1.10     | Bearing d.e.                     |
| 1.11     | Regreasing unit d.e.             |
| <b>2</b> | <b>Non-Drive End Bearing</b>     |
| 2.01     | Bearing cover n.d.e. outside     |
| 2.02     | Endshield n.d.e.                 |
| 2.05     | Bearing cover n.d.e. inside      |
| 2.06     | Shaft seal n.d.e.                |
| 2.08     | Cup spring                       |
| 2.09     | Bearing n.d.e.                   |
| 2.10     | Regreasing unit n.d.e.           |
| <b>3</b> | <b>Housing</b>                   |
| 3.02     | Complete stator winding          |
| 3.03     | Housing                          |
| 3.05     | Feet (1 pair) machined           |
| <b>4</b> | <b>Rotor</b>                     |
| 4.01     | Complete rotor                   |
| <b>5</b> | <b>Ventilation</b>               |
| 5.01     | Fan                              |
| 5.02     | Fan cowl                         |
| 5.03     | Fan canopy                       |
| <b>6</b> | <b>Terminal box</b>              |
| 6.01     | Terminal box                     |
| 6.02     | Terminal box cover               |
| 6.05     | Cable entry plate                |
| 6.08     | Complete terminal board          |
| 6.09     | Core gland                       |
| 6.10     | Core gland for PTC thermistor    |
| 6.11     | Conductor bushing                |
| 6.13     | Bushing plate                    |
| 6.14     | Cover gasket                     |
| 6.15     | Entry plate gasket               |
| 6.16     | Cable entry                      |
| 6.17     | Cable gland for PTC thermistor   |
| 6.18     | Bushing plate gasket             |
| <b>8</b> | <b>Brake</b>                     |
| 8.10     | Friction disc driver             |
| 8.11     | Friction disc                    |
| 8.20     | Complete brake housing with coil |
| 8.30     | One-way rectifier                |
| 8.40     | Shaft seal - brake               |
| <b>9</b> | <b>Tachogenerator</b>            |
| 9.01     | Tacho                            |
| 9.10     | Flexible mounting clip           |
| 9.20     | Encoder housing                  |
| 9.40     | Shaft seal                       |

# Circuit Diagram

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|                 |                                                                                     |                                                   |                                      |               |                                                                                     |        |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------|---------------|-------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|
| 1 TP 1 - 1 TP 2 | PTC-thermistor warning                                                              | U>2,5 V<br>not allowed                            | Tripping device<br>with II (G) label | Terminal stud |                                                                                     |        |                                                                                     |
| 2 TP 1 - 2 TP 2 | PTC-thermistor switch-off                                                           |                                                   |                                      |               |                                                                                     |        |                                                                                     |
| 1 R 1 - R 2     | Resistance temperature sensor<br>PT 100 / Winding                                   | Resistance temperature sensor PT 100 /<br>Bearing |                                      | Winding size  | Tightening torque [Nm]                                                              |        |                                                                                     |
| 4 R 1 - 5 R 2   |  |                                                   |                                      | d.e.          |  | n.d.e. |  |
|                 |                                                                                     |                                                   |                                      | M4            | 1,2                                                                                 |        |                                                                                     |
|                 |                                                                                     |                                                   |                                      | M5            | 2                                                                                   |        |                                                                                     |
|                 |                                                                                     |                                                   |                                      | M6            | 3                                                                                   |        |                                                                                     |
|                 |                                                                                     |                                                   |                                      | M8            | 6                                                                                   |        |                                                                                     |
|                 |                                                                                     | M10                                               | 10                                   |               |                                                                                     |        |                                                                                     |
| 1 HE 1 - 1 HE 2 | Anti-condensation heater                                                            |                                                   |                                      | M12           | 15,5                                                                                |        |                                                                                     |
| TB 1 - TB 2     | Thermo switch Microtherm T10                                                        |                                                   |                                      | M16           | 30                                                                                  |        |                                                                                     |

Note:

1) Requires tripping device with Ex label

# Conversion of Technical Units

## To SI units

[Système Internationale d'Unitée]

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### Power

1 kW = 1,36 PS = 102 kpm/s = 1000 Nm/s  
1 PS = 0,736 kW = 75 kpm/s = 736 Nm/s

### Energy

1 kWh =  $3,6 \times 10^6$  J =  $3,6 \times 10^6$  Nm  
= 0,367 x 10<sup>6</sup> kpm  
1 Ws = 1 J = 1 Nm = 0,102 kpm

### Force

1 N = 0,102 kp  
1 kp = 9,81 N

### Torque

1 Nm = 0,102 kpm = 1 Ws  
1 kpm = 9,81 Nm = 9,81 Ws

### Pressure

1 Pa = 1 N/m<sup>2</sup>  
1 bar = 100 kPa  
1 mm water column = 9,81 Pa

### Moment of inertia

1 kgm<sup>2</sup> = 1 Ws<sup>2</sup> = 1 Nms<sup>2</sup> = 0,102 kpm<sup>2</sup>

### Output (three-phase motors)

$P_1 = U \times I \times \cos \varphi \times \sqrt{3} \times 10^{-3}$   
 $P_2 = P_1 \times \eta$   
P1 = power input [kW]  
P2 = power output [kW]  
U = Voltage [V]  
I = Current [A]  
 $\cos \varphi$  = Power factor  
 $\eta$  = Efficiency

### Power requirements of some driven machines

#### Lifting movement

$P = \frac{F \times v}{\eta} \times 10^{-3}$  [kW]

#### Rotation movement

$P = \frac{M \times n}{9550 \times \eta}$  [kW]

#### Fan operation

$P = \frac{V \times p}{\eta} \times 10^{-3}$  [kW]

#### Pump operation

$P = \frac{V \times p}{\eta} \times 10^{-3}$  [kW]

P = Power [kW]

F = Force [N]

v = Speed [m/s]

$\eta$  = Efficiency

M = Torque [Nm]

n = Speed of rotation [1/min]

V = flow rate [m<sup>3</sup>/s]

p = overall back pressure [N/m<sup>2</sup>]

### Torque

#### Torque resulting from motor output

$M = 9550 \frac{P_2}{n}$  [Nm]

P<sub>2</sub> = motor output [kW]

n = motor speed [1/min]

#### Conversion of torques for low or high transmission ratios

$M_2 = \frac{M_1 \times n_1}{n_2}$

n<sub>1</sub> = Motor speed [1/min]

M<sub>1</sub> = Motor torque [Nm]

n<sub>2</sub> = Working speed [1/min]

M<sub>2</sub> = Torque at n<sub>2</sub> [Nm]

### Moment of inertia

#### Relationship with flywheel effect

$J = \frac{GD^2}{4}$

J = Moment of inertia [kgm<sup>2</sup>]

GD<sup>2</sup> = flywheel effect [kgm<sup>2</sup>]

#### Moment of inertia of masses in linear motion

$J = 91,2 \times m \left( \frac{v}{n} \right)^2$  [kgm<sup>2</sup>]

m = Mass [kg]

v = speed [m/s]

n = Motor speed [1/min]

#### Conversion of moments of inertia to a different speed for low or high transmission ratios

$J_2 = J_1 \left( \frac{n_1}{n_2} \right)^2$

n<sub>1</sub> = Motor speed

J<sub>1</sub> = Moment of inertia at n<sub>1</sub>

n<sub>2</sub> = Working speed

J<sub>2</sub> = Moment of inertia at n<sub>2</sub>

### Factor of inertia

$FI = \frac{J_{mot} + J_{zus}}{J_{mot}}$

J<sub>mot</sub> = Moment of inertia of the motor

J<sub>zus</sub> = Moment of inertia of the driven machine

### Starting time

$t_a = \frac{FI \times J_{mot} \times n}{9,55 \times M_b}$  [s]

M<sub>b</sub> = M<sub>mot</sub> - M<sub>geg</sub> [Nm]

FI = Factor of inertia

J<sub>mot</sub> = Moment of inertia of the motor [kgm<sup>2</sup>]

n = Motor speed [1/min]

M<sub>b</sub> = Acceleration torque [Nm]

M<sub>mot</sub> = Motor startup torques (averaged)

M<sub>geg</sub> = Startup counter torques (averaged)

### Acoustic formulae

#### Pressure level

$L_p = 20 \log \frac{p}{p_o}$  [dB]

#### Reference sound pressure

$p_o = 2 \times 10^{-5} \left[ \frac{N}{m^2} \right]$

#### Sound power level

$L_W = 10 \log \frac{P}{P_o}$  [dB]

#### Reference sound power

$P_o = 10^{-12}$  [W]

#### Sound power

$P = \frac{p^2}{\alpha \times c} A$  [W]

#### Sound impedance

$\alpha \times c = 408 \left[ \frac{N \cdot s}{m^3} \right]$   
at 100 mbar  
and 20 °C

#### Measuring surface level

$L_s = 10 \log \frac{A}{A_o}$

L<sub>w</sub> = L<sub>p</sub> + L<sub>s</sub>

L<sub>p</sub> = Sound pressure level [dB]

p = Sound pressure  $\left[ \frac{N}{m^2} \right]$

p<sub>o</sub> = Reference sound pressure

L<sub>w</sub> = Sound pressure level [dB]

P = Sound power [W]

P<sub>o</sub> = Reference sound power [W]

A = Reflecting area [m<sup>2</sup>]

$\alpha \times c$  = Sound impedance  $\left[ \frac{N \cdot s}{m^3} \right]$

A<sub>o</sub> = Reference area = 1 m<sup>2</sup>

L<sub>s</sub> = Measuring surface level [dB]

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