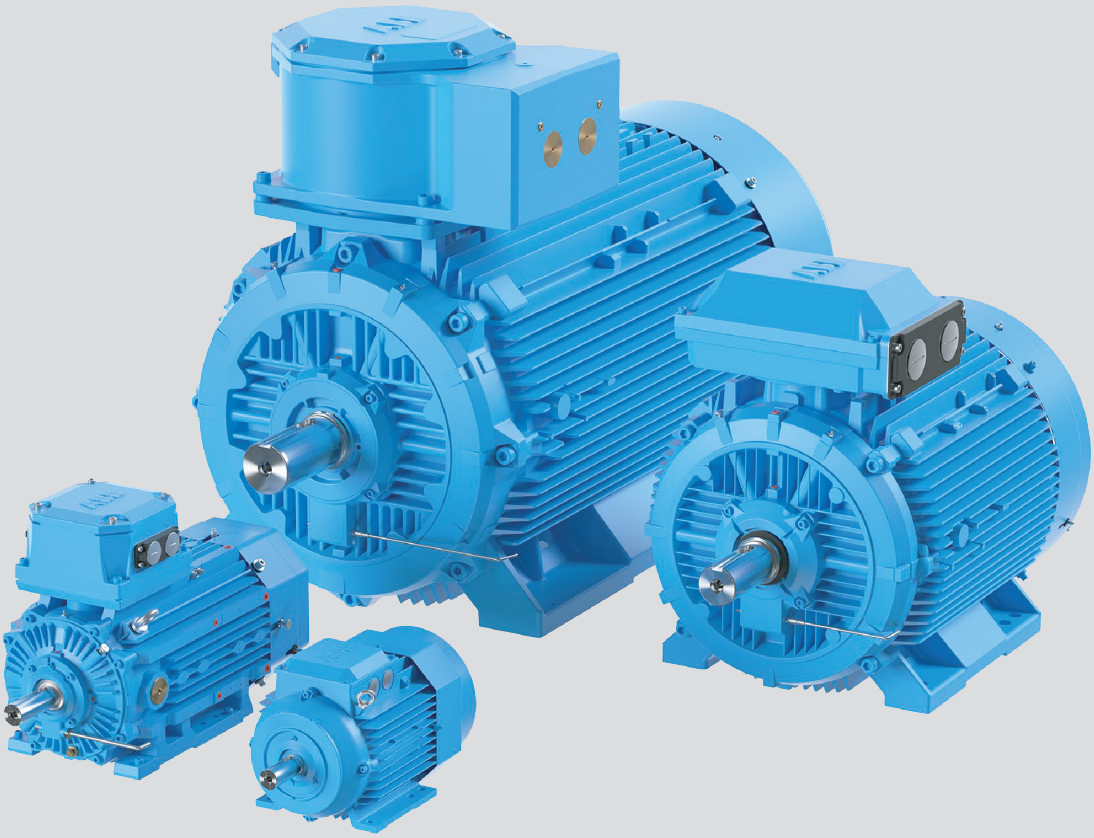
CATALOG | OCTOBER 2025

# Low voltage

## Motors for explosive atmospheres

400 V 50 Hz, 460V 60 Hz



**With expertise, and a comprehensive portfolio of products and life-cycle services, we help value-minded industrial customers improve their energy efficiency and productivity.**

# Low voltage
# Motors for explosive atmospheres

Sizes 71 to 450, 0,12 to 1000 kW


| | |
|---|---|
| 4 | General information |
| 30 | Flameproof motors Ex db IIB/IIC T4 Gb |
| 72 | Flameproof motors Ex db eb IIB/IIC T4 Gb |
| 116 | Increased safety cast iron motors Ex ec IIC T3 Gc |
| 162 | Dust ignition protection cast iron motors |
| 208 | IE5 SynRM Increased safety motors |
| 250 | Aluminum Ex ec and Ex t motors |
| 272 | Total product offering |
| 274 | ABB's portfolio of drives |

# General information

### European ATEX Directives

The ATEX Directives harmonize safety rules in line with the free trading principles of the European Community.

Responsibilities are split between the manufacturers and end users. Manufacturers have to comply with the "Essential Health and Safety Requirements" of the Products Directive 2014/34/EU and end users must prepare an Explosion Protection Document based on risk assessments of their "work places" and "work equipment" to fulfi l the "minimum requirements" listed in the Worker Protection Directive 1999/92/EC.

ABB low voltage motors for explosive atmospheres comply fully with the ATEX Product Directive.

### IECEx System

The IECEx System is a certification system which verifies compliance with IEC (International Electrotechnical Commission) standards and IECEx Operational Documents relating to safety in explosive atmospheres. It covers equipment, service facilities and personnel competencies and conformity mark licensing system.

Created in September 1999, the System aims "to facilitate international trade in equipment and services for use in explosive atmospheres, while maintaining the required level of safety…" (source: IECEx website, www.iecex.com). It is a voluntary system which provides an internationally accepted means of proving that products and services are in compliance with IEC standards.

IECEx certification involves – in addition to product tests - assessment of quality control procedures and testing plans, audits of manufacturing plants, and routine on-going surveillance and inspections.

### Who is responsible for the certification work?

A manufacturer needing to have equipment certified under the IECEx System can apply to an IECEx Competent Body (ExCB) in any member country. At present there are more than 30 IECEx member countries. The ExCB performs or coordinates the activities of certification.

A quality assessment of the manufacturer is undertaken by the ExCB itself, and the auditor issues an IECEx Quality Assessment Report (QAR).

### How do I know if a motor is IECEx certified?

IECEx certified motors show the certification number on their rating plate, for example: "IECEx LCI 05.0008". In this case "LCI" indicates that the IECEx certificate was issued by LCIE, an IECEx approved Certification Body in France.

In addition, IECEx certificates are issued in electronic form and are publicly available on the IECEx website. They can therefore be viewed and printed by anyone with access to the Internet. See "Certificates & Licences" at www.iecex.com.

### Compliance on basis of recently updated standards

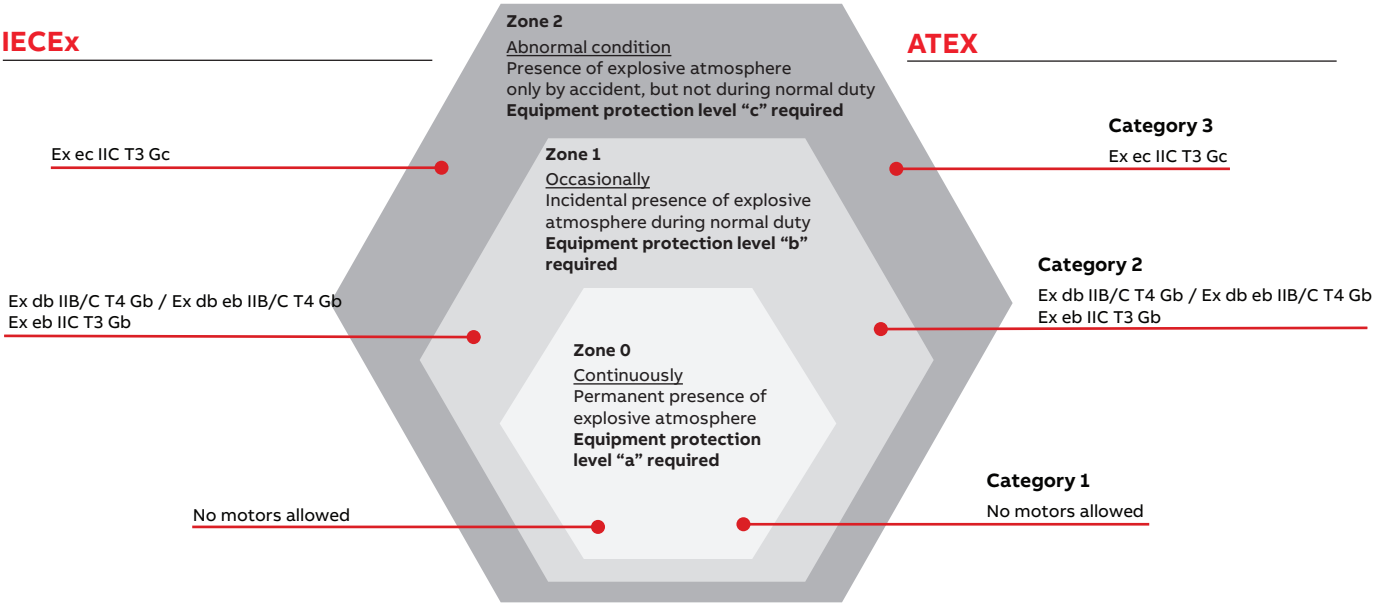
In complying with the ATEX directives, ABB follows the requirements of recently updated EN standards. Otherwise ABB follows the requirements of the IEC standards shown in the relevant certificates.

| Main standards for explosive atmospheres: | |
|---|---|
| IEC/EN 60079-0 | Equipment - General requirements |
| IEC/EN 60079-1 | Equipment protection by flameproof enclosures "d" |
| IEC/EN 60079-7 | Equipment protection by increased safety "e" |
| IEC/EN 60079-31 | Equipment dust ignition protection by enclosure "t" |
| IEC/EN 60079-14 | Electrical installations design, selection and erection |
| IEC/EN 60079-17 | Electrical installations inspections and maintenance |
| IEC/EN 60079-19 | Equipment repair, overhaul and reclamation |
| IEC 60050-426 | Equipment for explosive atmospheres |
| IEC/EN 60079-10 | Classification of hazardous areas (gas areas) |
| IEC 60079-10-1 | Classification of areas - Explosive gas atmospheres |
| IEC 60079-10-2 | Classification of areas - Combustible dust atmospheres |

### Equipment Protection Level (EPL)

The concept of "equipment protection levels" identifies products according to the ignition risk they might cause. A motor's EPL therefore indicates its inherent ignition risk, regardless of its protection type. This makes the selection of equipment for different zones easier. EPLs also enable a true risk assessment approach, where the potential consequences of a possible explosion are taken into consideration. Please refer to the table on the next page for more information about EPLs and EPL markings.

# Zones for explosive gas atmospheres - IECEx and ATEX




Note: Based on traditional relationship between EPL`s and zones.

There are systems in place worldwide to classify explosive atmospheres by zones, according to the risk posed by explosive gas ("G").

### Classification of explosive atmospheres according to EN and IEC

The standard IEC/EN 60079-10-1 define areas according to the presence gas in the atmosphere.

| Standard IEC 60079-0 EN 60079-0 Group | EPL | Protection level | Installation Zone acc. to IEC 60079-10-x EN 60079-10-x Zones | ATEX Directive 2014/34/EU Equipment group | Equipment category | Main motor protection types |
|---|---|---|---|---|---|---|
| I | Ma | very high | NA | I | M1 | NA |
| (Mines) | Mb | high | | (Mines) | M2 | |
| II | Ga | very high | 0 | II | 1G | NA |
| (Gas) | Gb | high | 1 | (Surface) | 2G | Ex d/Ex de Ex p |
| | | | | | | Ex db, Ex db eb |
| | | | | | | Ex eb (Ex e) |
| | Gc | enhanced | 2 | | 3G | Ex ec (Ex nA) |

# Marking of temperatures, gas groups and explosive atmospheres

To ensure equipment can be safely used in potentially explosive atmospheres, the explosive atmospheres where the equipment is installed must be known. The temperature class of equipment must be compared with the spontaneous ignition the equipment of the gas mixtures concerned, and in specific cases the gas group must be known (e.g. flameproof protection).

## Classification

### Gas classification

| Temperature class | Ignition temp. of gas/ vapor °C | Max. permutiet temp. of equipment °C | Gas examples |
|---|---|---|---|
| T1 | > 450 | 450 | Hydrogen |
| T2 | > 300 < 450 | 300 | Ethanol |
| T3 | > 200 < 300 | 200 | Hydrogen sulfide |
| T4 | > 135 < 200 | 135 | Diethyl ether |
| T5 | > 100 < 135 | 100 | - |
| T6 | > 85 < 100 | 85 | Carbon disul- fide |

### Gas subdivision

| | |
|---|---|
| IIA | ~120 gases and vapors, e.g. butane / petroleum / propane |
| IIB | ~30 gases and vapors, e.g. ethylene / dimethyl ether |
| IIC | limited number of gases and vapors, e.g. hydrogen H2 / acetylene $C_2H_2$ carbon disulfide $CS_2$ |

## Marking of equipment protection for gas according to ATEX

CE 0081 Ex II 2G

- CE marking
- Identification of the notified body responsible for the approval, e.g. 0081 - LCIE
- The European Commission mark for Ex products
- Equipment group: II for surface industry
- Equipment category: 2G for gas environment demanding a high level of protection

## Marking of equipment protection for gas according to IEC

Example for gas:

Ex db IIB T4 Gb

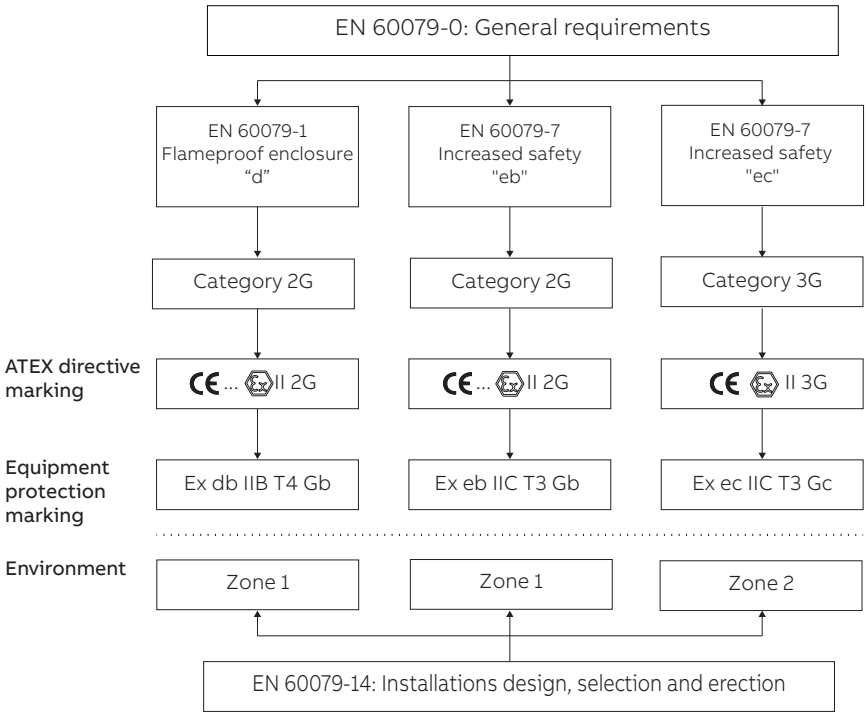
- Protection type Ex db = flameproof with protection level b
- Equipment group IIB for gas group B
- Temperature class T4 = max. permitted 135 °C
- Equipment protection level = level b for gas

Equipment protection marking for gas:

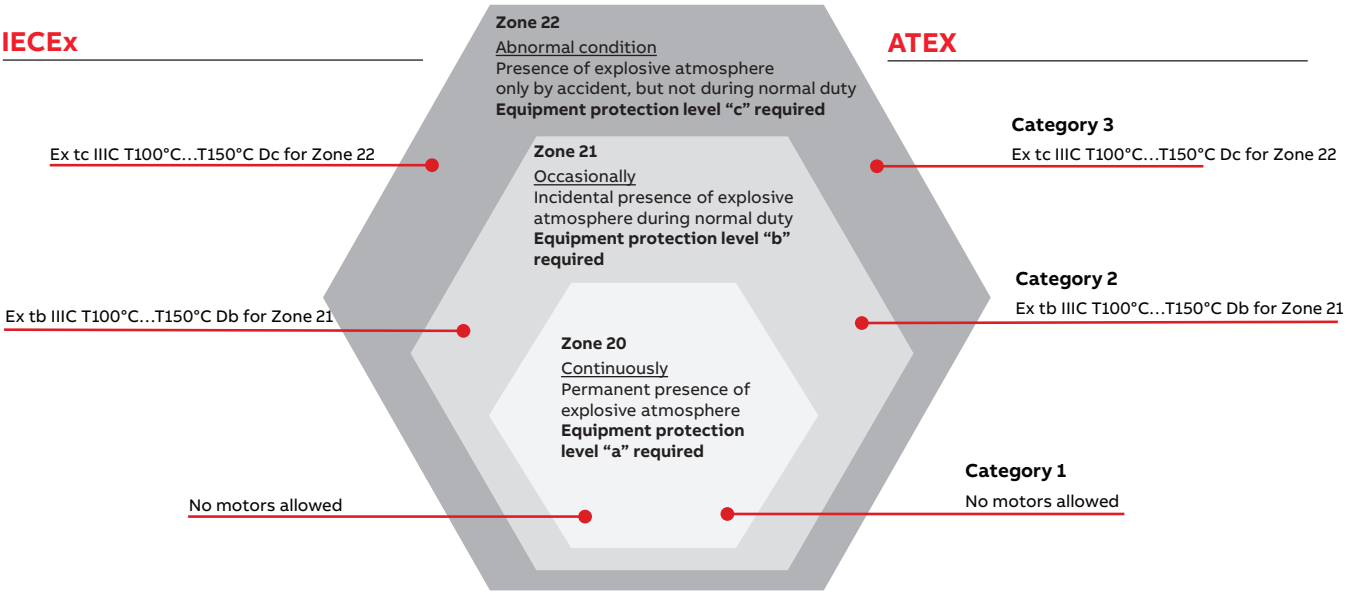
Ex db IIB T4 Gb

- Protection type Ex db = flameproof with protection level b
- Equipment group IIB for gas group B
- Temperature class T4 = max. permitted 135 °C
- Equipment protection level = level b for gas

## Selection of products for explosive atmospheres, EN Standard and ATEX Directive for gas environments



# Zones for explosive dust atmospheres - IECEx and ATEX




Note: Based on traditional relationship between EPL`s and zones.

There are systems in place worldwide to classify explosive atmospheres by zones, according to the risk posed by explosive dust ("D").

### Classification of explosive atmospheres according to EN and IEC

The standard IEC/EN 60079-10-2 define areas according to the presence dust in the atmosphere.

| Standard EN and IEC 60079-0 Group | EPL | Protection level | Installation Zone acc. to EN and IEC 60079-10-2 Zones | ATEX Directive 2014/34/EU Equipment group | Equipment category | Main motor protection types |
|---|---|---|---|---|---|---|
| III | Da | very high | 20 | II | 1D | NA |
| (Dust) | Db | high | 21 | (Surface) | 2D | Ex tb IP 65 |
| | Dc | enhanced | 22 | | 3D | Ex tc IP 65/IP 55 |

# Dust ignition protection/ Protection by enclosures “t” in explosive atmospheres

Combustible dust is hazardous as it can form potentially explosive atmospheres when dispersed in air. Furthermore, layers of combustible dust may ignite and act as an ignition source for an explosive atmosphere. Explosive atmospheres with dust can be found in a variety of industries such as agriculture, chemicals, plastics, food and beverage.

### Selection and installation of electrical equipment

To ensure equipment can be safely used in explosive atmospheres with dust, it is vital that the following issues are taken into account when selecting product:

Type of dust:

- Will a cloud of dust be present around the product or
- will a layer of dust build up on the product and if so, what will be the maximum thickness of the layer between two cleaning/ maintenance procedures.

Characteristics of the dust:

Is the dust electrically conductive or non-conductive?

Ignition temperature of the dust:

- $T_{Cl}$: Ignition temperature of dust in a “cloud” or
- $T_{5\,mm}$: Ignition temperature of a 5 mm dust layer

Selection and installation of the product according to IEC/EN60079 part 14: Electrical installations design, selection and erection. Please see the tables below.

**Dust classification**

| | | TCL (cloud)°C | T5 mm (layer)°C | Surface temperature provided that dust layer below 5 mm |
|---|---|---|---|---|
| Food/ Feeder industry | Wheat | 350 | 270 | 195 |
| | Barley, corn | 380 | 280 | 205 |
| | Sugar | 350 | 430 | 233 |
| Natural materials | Wood | 330 | 280 | 205 |
| | Charcoal | 520 | 230 | 195 |
| | Hard coal | 460 | 240 | 165 |
| Chemicals | PVC | 450 | 330 | 255 |
| | Synch, rubber | 470 | 220 | 145 |
| | Sulfur | 240 | 250 | 160 |

Source BIA-report 13/97 HVBG

This protection prevents any explosion of dust because:

- The ingress of dust into the motor is prevented by the IP protection, being either IP 55 (“dust protected”) or IP 65 (“dust tight”).
- The maximum surface temperature outside the motor must not exceed the temperature class for which the motor is certified.
- No sparks must occur outside the motor enclosure.

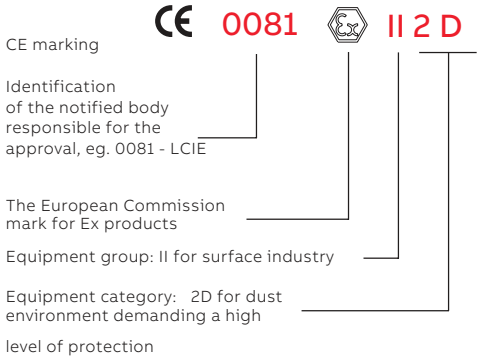
Certification: Ex tb IIIB/C T...°C Db (for zone 21) motors are certified according to ATEX with an EC type examination certificate and according to the IEC Ex System. Ex tc IIIB/C T...°C Dc (for zone 22) motors are certified according to ATEX with a “voluntary type examination certificate” and according to the IEC Ex System.

The standard surface temperature class on dust ignition protection motors from ABB is T125 °C, other temperature classes are available on request.

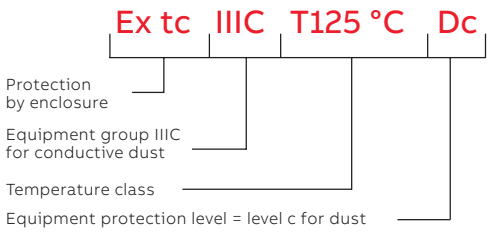
**Dust subdivisions**

| | |
|---|---|
| IIIA | combustible flyings |
| IIIB | non-conductive dust |
| IIIC | conductive dust |

### Marking of equipment protection for dust according to ATEX

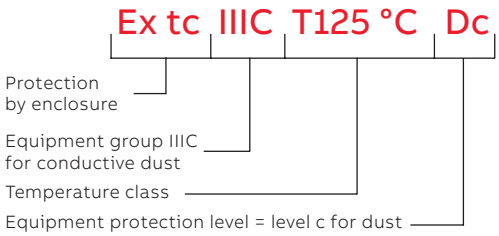



Equipment protection for dust:

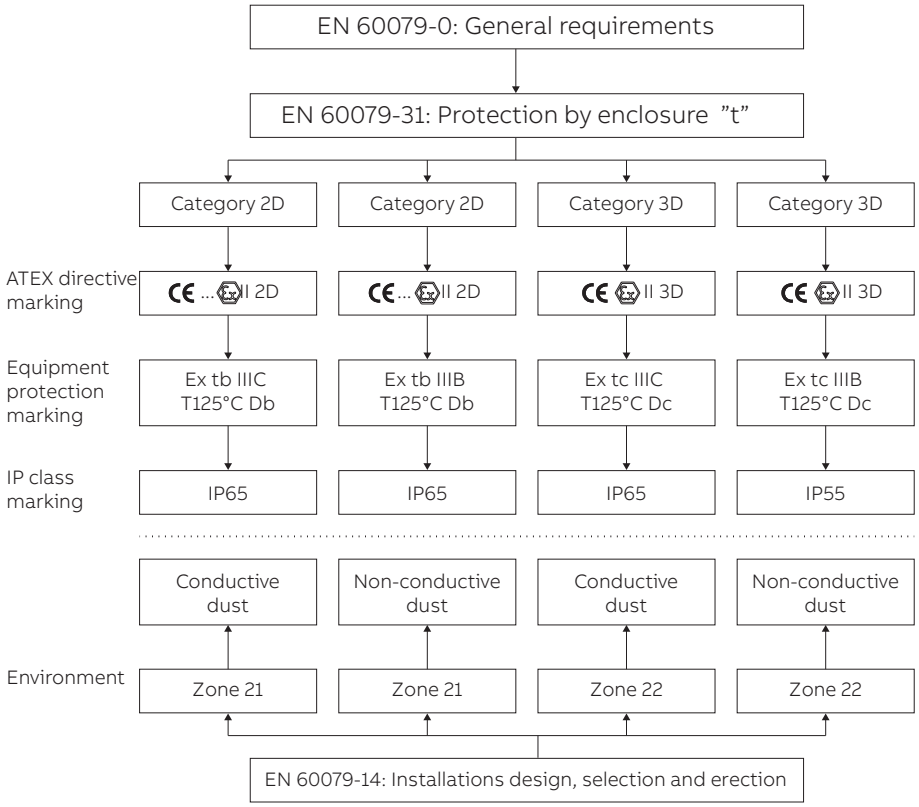



### Marking of equipment protection for dust according to IEC

Example for dust:




### Selection of products for explosive atmospheres, EN Standard and ATEX Directive for dust environments



# Explosive atmospheres

In explosive atmospheres, it is of the utmost importance to ensure the safe use of electrical apparatus. To this end, many countries have standards concerning both the design and use of such apparatus. These standards are becoming increasingly harmonized within the framework of IEC recommendations and European Standards. The hazard may be due to an explosive atmosphere composed of a mixture of gas, vapors or dusts with air. This section is concerned only with safety in explosive gas atmospheres for which European Standards and IEC recommendations exist.

### Flameproof enclosure Ex db and Ex db eb

The motor enclosure is designed in such a way that no internal explosion can be transmitted to the explosive atmosphere surrounding the motor. The enclosure must withstand, without damage, any pressure levels caused by an internal explosion. The shape, length and gap of joints of part assemblies, at shaft openings, cable entries, etc., shall be designed to allow for throttling and cooling of hot gases escaping outside. The standards emphasize the impact of an explosive atmosphere (for instance, explosion pressure) over constructional requirements of such apparatus.

Work on accessories of enclosure components is only permitted using prescribed tools. Cable entries must meet the requirements of this type of protection.

The temperature of the motor's external enclosure shall not exceed the self-ignition temperature of the explosive atmosphere of the installation area during operation. For this reason, rated output depends on this rated maximum temperature for the area in question. The standard temperature class on flameproof motors from ABB is T4 (135 °C), other temperature classes as T5 (100 °C) and T6 (85 °C) are available on request.

No motor device outside the flameproof enclosure (e.g., ventilator) shall be a potential source of sparks, arcs or dangerous overheating. Variants combining two types of protection usually combine "d" and "e" protection. The motor is designed with an Ex d flameproof enclosure, while the terminal box features Ex e increased safety protection. Such design combines the superior safety degree of the "d" type of protection with the more simple and worker friendly "e" type protection terminal box.

### Increased safety design, Ex eb for Zone 1

The design of this motor type prevents the occurance in operation (including starting and lockedrotor situations), in all inner and outer parts of themachine, of sparks, arcs or hot spots that could reach the self-ignition temperature of the surrounding, potentially explosive atmosphere.

This is ensured by applying constructional or dimensional provisions that mainly concern:

- specified minimum values for creepage distances and clearances
- use of tracking-proof isolating materials
- suppression of sharp angles where static electrical loads could build-up
- ensuring electrical and mechanical assemblies are tightly secured
- minimum backlash values between stationary and rotating parts (e.g. air gap, ventilator, etc.)
- temperature-rise limits, taking into account locked rotor, normal operation, accidental mechanical stalling of machine under the most adverse thermal conditions, i.e. when thermal equilibrium of machine is reached while in service

Temperature rise limits should be considered for two operating aspects; normal operating conditions and accidental stalling conditions.

### Increased safety design, Ex ec for Zone 2

The use of this type of protection is allowed in hazardous areas corresponding to zone 2. The design is known as "non-sparking" or nowdays increased safety ec, because the motor must be designed in such a way that no sparks can occur in any conditions, when used within the ratings specified by the manufacturer, and that no excessive temperatures occur under normal operating conditions, which excludes thermal requirements due to starting or accidental stalling.

### Risk assessment and gas tests

Increased safety Ex eb and Ex ec motors have to meet tough requirements with regard to sparking. The latest IEC and EN standards specify criteria for risk assessment and gas environment tests for rotor and stator designs to show that the motors are spark-free in all operational conditions.

By testing and securing certification for its motors, ABB is helping to streamline the risk assessment process for its customers.

The alternative to testing and certification involves, in the majority of cases, equipping the motor with provision for pre-start ventilation. This means investing in a higher capacity air compressor, piping, and a ventilation control unit. It also requires an additional operation – pre-start ventilation – every time the motor is started.

Benefits of the ABB approach therefore include reduced initial capital expenditure, lower operating costs, and faster starting. Reliability is improved as no additional components are required. Most importantly, ABB's certified motors offer proven safety.

### ABB's approach to meeting the requirements

Following a program of gas environment tests in which all rotor and stator tests were passed, ABB has secured certification for its low voltage cast iron motors for explosive atmospheres with aluminum die cast rotor.

Ex ec motors are certified according to the ATEX directive with a voluntary type examination certificate from an ATEX notified body, and according to the IECEx system with an IECEx certificate of conformity.

### Dual certificates for gas or dust

Due to the high IP protection class and low surface temperature of the products, the certificates allow also in many cases dual certification for either gas or dust environments. This gives further flexibility as the same motor can either be used in a location with potentially explosive atmospheres with gas, or another with dust. For use in hybrid atmospheres (gas and dust present simultaneously) should limitations in IEC/EN 60079-14 be respected.

The following combinations are possible:

- Ex db IIB/C T4 Gb / Ex tb IIIB/C T125°C Db
- Ex db eb IIB/C T4 Gb / Ex tb IIIB/C T125°C Db
- Ex eb IIC T3 Gb / Ex tb IIIB/C T125°C Db
- Ex ec IIC T3 Gc / Ex tc IIIB/C T125°C Dc

Please refer to the variant code section of flameproof, increased safety eb and ec motors for further information about availability of dual certification.

# Testing and certificates

Motors for explosive atmospheres have to be officially approved by a recognized test organization, authorized to issue test certificates, to ensure compliance with standards for this type of equipment.

ABB low voltage motors for explosive atmospheres are classified according to the categories, protection types and equipment protection type which are specified in the relevant standards.

Depending on the nature of the potentially explosive atmosphere, it is the responsibility of the user to determine which group and which maximum surface temperature should be specified for the motor installation. The motors are rated and certified for ambient temperature between –20 °C and +40 °C according to standards. For ambient temperatures below –20 °C and above +40 °C certificates are available for most of the motors.

ABB's motors conform to the stringent standards set by CENELEC (European Committee for Electrotechnical Standardization) and IEC (International Electrotechnical Commission), and are approved by testing laboratories (ExNB/Notified Body) and certification bodies (ExCB).

The motors can be certified according to the ATEX Directive by any of the Notified Bodies "ExNB" of EU member countries. These motors are therefore acceptable in all EU countries and many other countries. In addition, IECEx certificates are available for the most motor types. These certificates can be issued by any registered IECEx certification body (ExCB) worldwide.

### Certification other than ATEX or IECEx

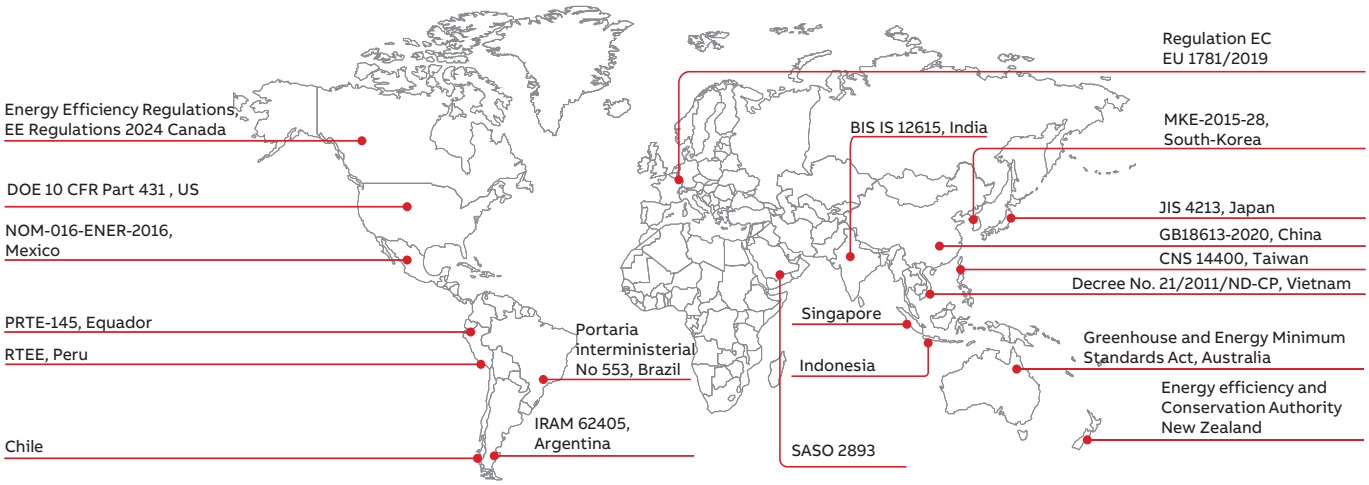
The certification provided as standard (ATEX and usually IECEx), is accepted in countries where these are mandatory or accepted as a substitute for other local certification, in addition are they also commonly accepted in countries which do not have any specific certification requirements.

There is number of countries which according to their local regulations require a specific certificate for equipment installed in explosive atmospheres, examples of such certificates are:

- INMETRO certification for Brazil
- cULus for Canada and the United States by Underwriters Laboratories
- Canadian electric code CEC certification for Canada
- China Compulsory Certificate mark, also known as CCC mark
- PESO certification for India
- Certificates issued by TIIS for Japan
- Certificates issued by KOSHA, KGS or KTL for South Korea
- IA certificates for South Africa issued by laboratories like SABS or Explolabs
- Certificates issued by ITRI for Taiwan
- NEC National electric code certification of USA

ABB is maintaining a wide selection of local certificates for the different products, please refer to the variant code section for each product for information about availability. The marking of the products certified according a specific local certification system is usually differing from the ATEX and IECEx markings, this means that the ATEX and IECEx markings will be replaced with the markings required for the local certification system if a such is ordered.

# International motor efficiency standards and regulations




IEC 60034-30-1 is the worldwide energy efficiency classification standard for low voltage three-phase asynchronous motors. International IEC standards are created to enable and increase the level of harmonization in efficiency regulations, safety and many other areas around the world, and to also cover motors and other equipment for explosive atmospheres.

IEC 60034-30-1 with all past and future editions defines International Efficiency (IE) classes for single speed, three-phase, 50 Hz and 60 Hz induction motors. The efficiency levels defined therein are based on the test method specified in IEC 60034-2-1. Both standards are part of an effort to unify motor testing procedures with CSA390-10 and IEEE 112 standards as well as efficiency and product labeling (IE) requirements to enable motor purchasers worldwide to easily recognize premium efficiency products.

To promote transparency in the market, IEC 60034-30-1 states that both the efficiency class and efficiency value must be shown on the motor rating plate and in product documentation.

### Minimum energy performance standards

While the IEC as an international standardization organization sets guidelines for motor testing and efficiency classes, IEC does not regulate efficiency levels in countries. The biggest drivers for mandatory Minimum Energy Performance Standard (MEPS) levels for electric motors are global climate change, government targets to curb $CO_2$ emissions and globally rising electricity demand. The whole value chain, from manufacturer up to end user, must be aware of the legislation in order to meet local requirements, to save energy and reduce the carbon footprint.

Harmonized global standards and the increasing adoption of MEPS around the world are good news for all. However, it is important to remember that harmonization is an ongoing process. Even though MEPS are already in effect in several regions and countries, they are evolving and differ in terms of scope and requirements. At the same time, more countries are planning to adopt their own MEPS regulations. A view of existing and coming global MEPS regulations can be seen on the World map above.

To get the latest information please visit www.abb.com/motors&generators/energyefficiency.

### IEC 60034-30-1:2024

This standard defines four International Efficiency (IE) classes for single speed electric motors that are rated according to IEC 60034-1 or IEC 60079-0 (explosive atmospheres) and designed for operation on sinusoidal voltage.

- IE5 = Ultra premium efficiency
- IE4 = Super premium efficiency
- IE3 = Premium efficiency, identical to the table in 10CFR431 ('NEMA Premium') in the USA and CSA C390-10:2015 for 60 Hz
- IE2 = High efficiency
- IE1 = Standard efficiency

Most of the different technical constructions of electric motors are covered as long as they are rated for direct on-line operation. The coverage of the IEC 60034-30-1 includes:

- single speed electric motors (single and three-phase), 50 and 60 Hz
- 2, 4, 6 and 8 poles
- Rated output $P_N$ from 0.12 kW to 1000 kW

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01 IE Classes – 4-pole motors

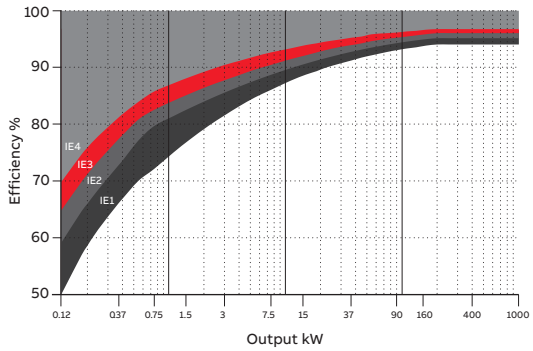
– Rated voltage $U_N$ above 50 V up to 1 kV
– Motors capable of continuous operation at their rated power with a temperature rise within the specified insulation temperature class
– Motors, marked with any ambient temperature within the range of –20 °C to +60 °C
– Motors, marked with an altitude up to 4000 m above sea level

By comparing IEC 60034-30-1 to CSA C390-10:2015 and “10CFR431 Subpart B – Electric motors”, it can be seen that the efficiency limits and tables are well aligned and their major difference is in the scope of the output power where CSA and 10CFR431 have a maximum power of 500 hp. There are also some minor differences in the scope of excluded motors.

Note: CFR is Code of Federal Regulations.

The following motors are excluded from IEC 60034-30-1:

– Single-speed motors with 10 or more poles or multi-speed motors
– Motors completely integrated into a machine (for example pump, fan or compressor) that cannot be tested separately from the machine
– Brake motors, when the brake cannot be dismantled or separately fed

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## ABB and efficiency standards

ABB determines efficiency values according to IEC 60034-2-1 using the low uncertainty method (i.e. summaration of losses), with additional load losses determined by the method of residual loss.

It is good to mention and emphasize that the IEC 60034-2-1 test method, which is known as an indirect method, is technically equivalent to the test methods in the standards CSA 390-10 and IEEE 112 Method B leading to the equivalent losses and thus efficiency values. All three test methods are recognized and accepted today in US and Canada and any of the three methods may be used for compliance purposes to both countries.

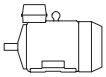
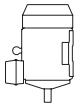
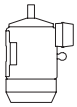
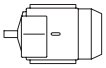
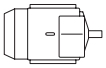
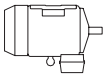
As the world market leader, ABB offers the largest range of LV motors available. It has long advocated the need for efficiency in motors, and high efficiency products have formed the core of its portfolio for many years. The core of ABB’s product portfolio is based on a full range of IE3 and IE4 motors – with many available from stock. ABB is the originator of the Energy Efficiency Movement empowering at scale adoption of energy efficiency within industry, to accelerate the world towards net-zero.

**Nominal efficiency limits defined in IEC 60034-30-1:2024 (reference values at 50 Hz, based on test methods specified in IEC 60034-2-1:2014).**

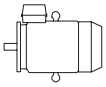
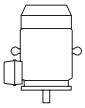
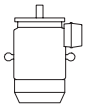
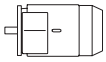
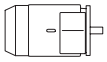
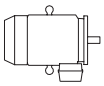
| Output | IE1Standard efficiency | | | | IE2High efficiency | | | | IE3 Premium efficiency | | | | IE4 Super Premium efficiency | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| kW | 2 pole | 4 pole | 6 pole | 8 pole | 2 pole | 4 pole | 6 pole | 8 pole | 2 pole | 4 pole | 6 pole | 8 pole | 2 pole | 4 pole | 6 pole | 8 pole |
| 0.12 | 45.0 | 50.0 | 38.3 | 31.0 | 53.6 | 59.1 | 50.6 | 39.8 | 60.8 | 64.8 | 57.7 | 50.7 | 66.5 | 69.8 | 64.9 | 62.3 |
| 0.18 | 52.8 | 57.0 | 45.5 | 38.0 | 60.4 | 64.7 | 56.6 | 45.9 | 65.9 | 69.9 | 63.9 | 58.7 | 70.8 | 74.7 | 70.1 | 67.2 |
| 0.20 | 54.6 | 58.5 | 47.6 | 39.7 | 61.9 | 65.9 | 58.2 | 47.4 | 67.2 | 71.1 | 65.4 | 60.6 | 71.9 | 75.8 | 71.4 | 68.4 |
| 0.25 | 58.2 | 61.5 | 52.1 | 43.4 | 64.8 | 68.5 | 61.6 | 50.6 | 69.7 | 73.5 | 68.6 | 64.1 | 74.3 | 77.9 | 74.1 | 70.8 |
| 0.37 | 63.9 | 66.0 | 59.7 | 49.7 | 69.5 | 72.7 | 67.6 | 56.1 | 73.8 | 77.3 | 73.5 | 69.3 | 78.1 | 81.1 | 78.0 | 74.3 |
| 0.40 | 64.9 | 66.8 | 61.1 | 50.9 | 70.4 | 73.5 | 68.8 | 57.2 | 74.6 | 78.0 | 74.4 | 70.1 | 78.9 | 81.7 | 78.7 | 74.9 |
| 0.55 | 69.0 | 70.0 | 65.8 | 56.1 | 74.1 | 77.1 | 73.1 | 61.7 | 77.8 | 80.8 | 77.2 | 73.0 | 81.5 | 83.9 | 80.9 | 77.0 |
| 0.75 | 72.1 | 72.1 | 70.0 | 61.2 | 77.4 | 79.6 | 75.9 | 66.2 | 80.7 | 82.5 | 78.9 | 75.0 | 83.5 | 85.7 | 82.7 | 78.4 |
| 1.1 | 75.0 | 75.0 | 72.9 | 66.5 | 79.6 | 81.4 | 78.1 | 70.8 | 82.7 | 84.1 | 81.0 | 77.7 | 85.2 | 87.2 | 84.5 | 80.8 |
| 1.5 | 77.2 | 77.2 | 75.2 | 70.2 | 81.3 | 82.8 | 79.8 | 74.1 | 84.2 | 85.3 | 82.5 | 79.7 | 86.5 | 88.2 | 85.9 | 82.6 |
| 2.2 | 79.7 | 79.7 | 77.7 | 74.2 | 83.2 | 84.3 | 81.8 | 77.6 | 85.9 | 86.7 | 84.3 | 81.9 | 88.0 | 89.5 | 87.4 | 84.5 |
| 3 | 81.5 | 81.5 | 79.7 | 77.0 | 84.6 | 85.5 | 83.3 | 80.0 | 87.1 | 87.7 | 85.6 | 83.5 | 89.1 | 90.4 | 88.6 | 85.9 |
| 4 | 83.1 | 83.1 | 81.4 | 79.2 | 85.8 | 86.6 | 84.6 | 81.9 | 88.1 | 88.6 | 86.8 | 84.8 | 90.0 | 91.1 | 89.5 | 87.1 |
| 5.5 | 84.7 | 84.7 | 93.1 | 81.4 | 87.0 | 87.7 | 86.0 | 83.8 | 89.2 | 89.6 | 88.0 | 86.2 | 90.9 | 91.9 | 90.5 | 88.3 |
| 7.5 | 86.0 | 86.0 | 84.7 | 83.1 | 88.1 | 88.7 | 87.2 | 85.3 | 90.1 | 90.4 | 89.1 | 87.3 | 91.7 | 92.6 | 91.3 | 89.3 |
| 11 | 87.6 | 87.6 | 86.4 | 85.0 | 89.4 | 89.8 | 88.7 | 86.9 | 91.2 | 91.4 | 90.3 | 88.6 | 92.6 | 93.3 | 92.3 | 90.4 |
| 15 | 88.7 | 88.7 | 87.7 | 86.2 | 90.3 | 90.6 | 89.7 | 88.0 | 91.9 | 92.1 | 91.2 | 89.6 | 93.3 | 93.9 | 92.9 | 91.2 |
| 18.5 | 89.3 | 89.3 | 88.6 | 86.9 | 90.9 | 91.2 | 90.4 | 88.6 | 92.5 | 92.6 | 91.7 | 90.1 | 93.7 | 94.2 | 93.4 | 91.7 |
| 22 | 89.9 | 89.9 | 89.2 | 87.4 | 91.3 | 91.6 | 90.9 | 89.1 | 92.7 | 93.0 | 92.2 | 90.6 | 94.0 | 94.5 | 93.7 | 92.1 |
| 30 | 90.7 | 90.7 | 90.2 | 88.3 | 92.0 | 92.3 | 91.7 | 89.8 | 93.3 | 93.6 | 92.9 | 91.3 | 94.5 | 94.9 | 94.2 | 92.7 |
| 37 | 91.2 | 91.2 | 90.8 | 88.8 | 92.5 | 92.7 | 92.2 | 90.3 | 93.7 | 93.9 | 93.3 | 91.8 | 94.8 | 95.2 | 94.5 | 93.1 |
| 45 | 91.7 | 91.7 | 91.4 | 89.2 | 92.9 | 93.1 | 92.7 | 90.7 | 94.0 | 94.2 | 93.7 | 92.2 | 95.0 | 95.4 | 94.8 | 93.4 |
| 55 | 92.1 | 92.1 | 91.9 | 89.7 | 93.2 | 93.5 | 93.1 | 91.0 | 94.3 | 94.6 | 94.1 | 92.5 | 95.3 | 95.7 | 95.1 | 93.7 |
| 75 | 92.7 | 92.7 | 92.6 | 90.3 | 93.8 | 94.0 | 93.7 | 91.6 | 94.7 | 95.0 | 94.6 | 93.1 | 95.6 | 96.0 | 95.4 | 94.2 |
| 90 | 93.0 | 93.0 | 92.9 | 90.7 | 94.1 | 94.2 | 94.0 | 91.9 | 95.0 | 95.2 | 94.9 | 93.4 | 95.8 | 96.1 | 95.6 | 94.4 |
| 110 | 93.3 | 93.3 | 93.3 | 91.1 | 94.3 | 94.5 | 94.3 | 92.3 | 95.2 | 95.4 | 95.1 | 93.7 | 96.0 | 96.3 | 95.8 | 94.7 |
| 132 | 93.5 | 93.5 | 93.5 | 91.5 | 94.6 | 94.7 | 94.6 | 92.6 | 95.4 | 95.6 | 95.4 | 94.0 | 96.2 | 96.4 | 96.0 | 94.9 |
| 160 | 93.8 | 93.8 | 93.8 | 91.9 | 94.8 | 94.9 | 94.8 | 93.0 | 95.6 | 95.8 | 95.6 | 94.3 | 96.3 | 96.6 | 96.2 | 95.1 |
| 200 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.3 | 95.4 |
| 250 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.5 | 95.4 |
| 315 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.6 | 95.4 |
| 355 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.6 | 95.4 |
| 400 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.6 | 95.4 |
| 450 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.6 | 95.4 |
| 500–1000 | 94.0 | 94.0 | 94.0 | 92.5 | 95.0 | 95.1 | 95.0 | 93.5 | 95.8 | 96.0 | 95.8 | 94.6 | 96.5 | 96.7 | 96.6 | 95.4 |

# Mounting arrangements

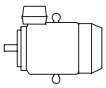
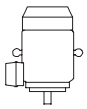
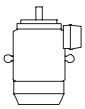
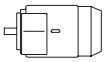
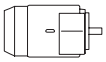
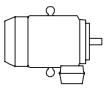
**Foot-mounted motor**

| Code I / code II | | | | | | Product code pos. 12 |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  | A: foot-mounted, term. box top |
| IM B3 | IM V5 | IM V6 | IM B6 | IM B7 | IM B8 | |
| IM 1001 | IM 1011 | IM 1031 | IM 1051 | IM 1061 | IM 1071 | |

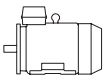
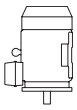
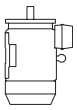
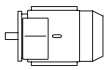
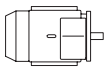
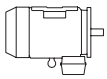
**Flange-mounted motor, large flange**

| Code I / code II | | | | | | Product code pos. 12 |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  | B: flange mounted, large flange |
| IM B5 | IM V1 | IM V3 | *) | *) | *) | |
| IM 3001 | IM 3011 | IM 3031 | IM 3051 | IM 3061 | IM 3071 | |

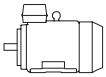
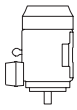
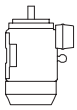
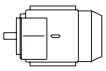
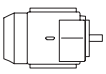
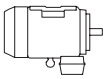
**Flange-mounted motor, small flange**

| Code I / code II | | | | | | Product code pos. 12 |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  | C: flange mounted, small flange |
| IM B14 | IM V18 | IM V19 | *) | *) | *) | |
| IM 3601 | IM 3611 | IM 3631 | IM 3651 | IM 3661 | IM 3671 | |

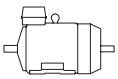
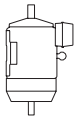
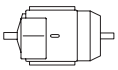
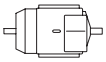
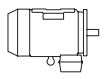
**Foot- and flange-mounted motor with feet, large flange**

| Code I / code II | | | | | | Product code pos. 12 |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  | H: foot/flange-mounted, term. box top |
| IM B35 | IM V15 | IM V35 | *) | *) | *) | |
| IM 2001 | IM 2011 | IM 2031 | IM 2051 | IM 2061 | IM 2071 | |

**Foot- and flange-mounted motor with feet, small flange**

| Code I / code II | | | | | | Product code pos. 12 |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  | J: foot/flange-mounted, small flange |
| IM B34 | IM V17 | | | | | |
| IM 2101 | IM 2111 | IM 2131 | IM 2151 | IM 2161 | IM 2171 | |

**Foot-mounted motor, shaft with free extensions**

| Code I / code II | | | | | | Product code pos. 12 |
|---|---|---|---|---|---|---|
|  | |  |  |  |  | |
| IM 1002 | IM 1012 | IM 1032 | IM 1052 | IM 1062 | IM 1072 | |

*) Not stated in IEC 60034-7.

Note: If the motor is mounted shaft upwards, take measures to prevent water or any other liquid from running down the shaft into the motor.

# Cooling

## Explanation of the product code

| International Cooling | Circuit arrangement | Primary coolant | Method of movement of primary coolant | Secondary coolant | Method of movement of secondary coolant |
|---|---|---|---|---|---|
| IC | 4 | (A) | 1 | (A) | 6 |
| | 1 | 2 | 3 | 4 | 5 |

Designation system concerning methods of cooling refers to standard IEC 60034-6. Standard cooling method is IC411. For further information please see the variant code section of each motor type for availability of other cooling methods.

### Position 1

| | |
|---|---|
| 0: | Free circulation (open circuit) |
| 4: | Free circulation (open circuit) |

### Position 2

| | |
|---|---|
| A: | For air (omitted for simplifi ed designation) |

### Position 3

| | |
|---|---|
| 0: | Free convection |
| 1: | Self-circulation |
| 6: | Machine-mounted independent component |

### Position 4

| | |
|---|---|
| A: | For air (omitted for simplifi ed designation) |
| W: | For water |

### Position 5

| | |
|---|---|
| 0: | Free convection |
| 1: | Self-circulation |
| 6: | Machine-mounted independent component |
| 8: | Relative displacement |

# Degrees of protection: IP code and resistance to impact

Classification for degrees of protection (IP code) provided by enclosures of rotating machines are defined in standards IEC 60034-5 or EN 60529.

### IP protection

Protection of persons against getting in contact with (or approaching) live parts and against contact with moving parts inside the enclosure. Also protection of the machine against ingress of solid foreign objects. Protection of machines against the harmful effects due to the ingress of water.

**Explanation of the IP code**

| Ingress protection | Degree of protection to persons and to parts of the motors inside the enclosure | Degree of protection provided by the enclosure with respect to harmful effects due to ingress of water |
|---|---|---|
| IP | 5 | 5 |
| | 1 | 2 |

**Position 1**

| | |
|---|---|
| 2: | Motors protected against solid objects greater than 12 mm |
| 4: | Motors protected against solid objects greater than 1 mm |
| 5: | Dust-protected motors |
| 6: | Dust-tight motors |

**Position 2**

| | |
|---|---|
| 3: | Motors protected against spraying water |
| 4: | Motors protected against splashing water |
| 5: | Motors protected against water jets |
| 6: | Motors protected against heavy seas |

Following IEC/EN 60079-0 non-metallic parts of enclosures in motors for explosive atmospheres must be thermal endurance tested for the temperature range the motors are designed for. Non-metallic parts are, for instance, rubber seals and gaskets. Thermal endurance tests and impact tests are carried out before the ingress protection test. This ensures that the motors meet the ingress protection level also after been put in service.

### Resistance to impact

ABB's motors for explosive atmospheres have been tested for resistance to impact as described in IEC/EN 60079-0. The more demanding high risk of mechanical danger limits have been used as qualification criteria. For group II and III motors this impactmeans an impact energy strenght of 7J for both enclosure and fan cover.

# Insulation

—
01 Safety margins per thermal class

ABB uses class F insulation, which, with temperature rise B, is the most common requirement among industry today.

The use of class F insulation with class B temperature rise gives ABB products a 25 °C safety margin. This can be used to increase the loading for limited periods, to operate at higher ambient temperatures or altitudes, or with greater voltage and frequency tolerances. It can also be used to extend insulation. For instance, a 10 K temperature reduction will extend the insulation life.

**Thermal class 130 (B)**

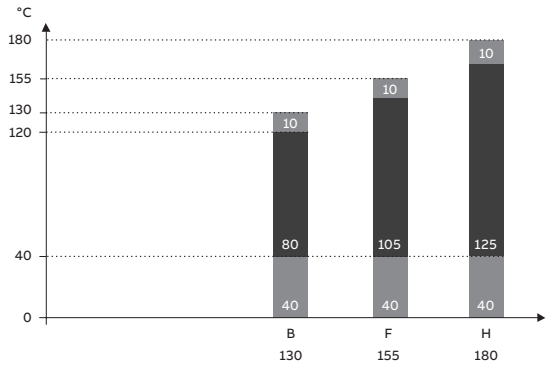
– Nominal ambient temperature 40 °C
– Max permissible temperature rise 80 K
– Hot spot temperature margin 10 K

**Thermal class 155 (F)**

– Nominal ambient temperature 40 °C
– Max permissible temperature rise 105 K
– Hot spot temperature margin 10 K

**Thermal class 180 (H)**

– Nominal ambient temperature 40 °C
– Max permissible temperature rise 125 K
– Hot spot temperature margin 15 K

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01

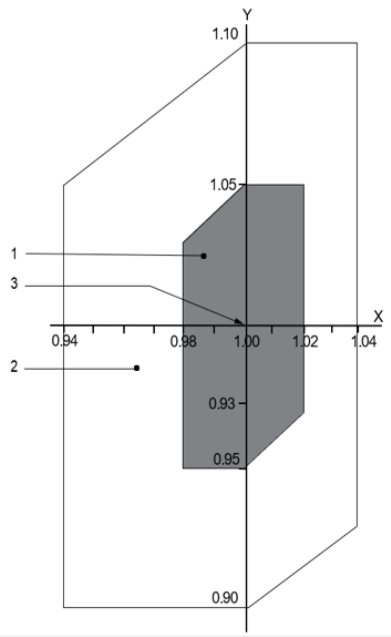
# Voltage and frequency

—
01 Voltage and frequency deviation in zones A and B

The table values for output, speed, efficiency, power factor, starting torque and starting current apply at the rated voltage and frequency. These values will be affected if the supply voltage or frequency deviate from the rated values.

The motors can operate continuously at the rated output, with a long-term voltage deviation of 5 % from the specified value or range of values, and the rated frequency not deviating more than 2% (zone A), without exceeding the temperature class stamped on the rating plate. The temperature rise of the winding may increase by 10 K, but without exceeding the insulation temperature class stamped on the rating plate. Voltage deviations of up to 10 % are permissible for short periods only.

If the motor is subject to continuous voltage variations of +/- 10 % this should be taken into consideration in the design. The permitted combinations of voltage and frequency tolerances are specified in IEC60034-1. This is illustrated in the figure below.

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01

**Key**

| | |
|---|---|
| X axis | frequency p.u. |
| Y axis | voltage p.u. |
| 1 | zone A |
| 2 | zone B (outside zone A) |
| 3 | rating point |

# Surface treatment

The standard surface treatment of the Process performance motors is designed to meet corrosivity category C3, both outdoors and indoors. This also meets the requirements in C1 and C2.

The corrosivity categories are defined in standard ISO12944-2.

Special surface treatments for other corrosivity categories as well as offshore environments are available as options.

The standard ABB paint color for motors is Munsell blue 8B 4.5/3.25, except for special systems such as NORSOK where a specific color is requested.

**Atmospheric-corrosivity categories and examples of typical environments**

| Corrosivity category | Examples of typical environments (informative only) | |
|---|---|---|
| | **Exterior** | **Interior** |
| C1 | - | Heated buildings with clean atmos-pheres, e.g., offices, shops, schools, hotels |
| C2 | Atmospheres with low levels of pollution: mostly rural areas | Unheated buildings where condensation can occur, e.g., depots, sports halls |
| C3 | Urban and industrial atmospheres, moderate sulfur dioxide pollution; coastal areas with low salinity | Production rooms with high humidity and some air pollution, e.g., food-processing plants, laundries, breweries, dairies |
| C4 | Industrial areas and coastal areas with moderate salinity | Chemical plants, swimming pools, coastal ship- and boatyards |
| C5 | Industrial areas with high humidity and an aggressive atmosphere, and coastal areas with high salinity | Buildings or areas with almost permanent condensation and with high pollution |
| CX | Offshore areas with high salinity, and industrial areas with extreme humidity and an aggressive atmosphere, and sub-tropical and tropical atmospheres | Industrial areas with extreme humidity and an aggressive atmosphere |

# Low voltage motors and frequency converters for explosive atmospheres

Frequency converters provide significant benefits when used with motors for explosive atmospheres. The advantages include better process control through regulation of the motor speed, as well as energy savings, and therefore improved environmental performance.

Certain criteria must be taken into account to ensure the safety of the frequency converter and motor combination, as well as the maximum usability of the application. The requirements depend on the protection type in use and whether the motor is regarded as being one component within a wider system or a separate subsystem.

ABB offers motors for explosive atmospheres for use with variable speed drives with the following protection types: flameproof, increased safety and dust ignition proof. These motors are designed and certified for operation with frequency converters. Solutions for the different protection types, as well as for the most common types of converters, are provided below. Further information is provided in the installation, operation and maintenance and safety manual.

### 1. Thermal dimensioning and protection

The IEC and EN standards set the requirements for ensuring surface temperature class is not exceeded, depending on the protection type. Thermal protection is based on embedded temperature sensors such as PTC or PT100 in relevant protection types. Tripping temperature of sensor protecting the surface temperature of the motor is defined on the motor rating plate.

**Thermal dimensioning and protection.**

| | **Flameproof Ex d / Ex de or Ex db / Ex db eb T4** | **Increased safety Ex ec, T3** | **Dust ignition proof – Ex t T125°C or T150°C** |
|---|---|---|---|
| Criteria for safe operation | Outer surface temperature may not exceed the temperature class. | Surface temperature of any part inside or outside the motor may not exceed temperature class in normal operation. | Outer surface temperature may not exceed temperature class (eg. 125°C) |
| Use with voltage source PWM type of converters | Combinations have already been type-tested, no need for further testing when specific loadability curves are followed. | Combinations have already been type-tested, no need for further testing when specific loadability curves are followed. | Combinations have already been type-tested, no need for further testing when specific loadability curves are followed. |
| | Mandatory direct temperature protection with temperature detector (optional VC816). | Winding protection acc. to insul.class F must be ensured by PTC in windings. | Surface temperature protection with temperature detectors (optional VC816), tempera¬ture class T150°C. |
| Operation with frequency converter is included in standard certificates | Yes | Yes | Yes |

All motors are equipped with thermistors by default.

In countries where the ATEX directive is in force must thermistors or other temperature sensors be connected to an ATEX approved relay that does function independently and does reliably trip off the supply to the motor. Such ap¬proved temperature detector relays are available as a standard integrated option to many frequency converters from ABB but can also be separate controlling the supply to the converter.

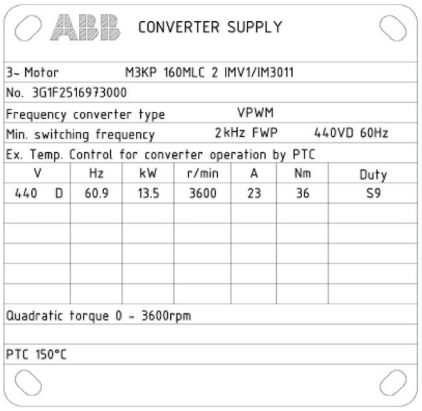
### 2. Operating speed

When a motor is used with a frequency converter, its actual operating speed may deviate consid¬erably from its nominal speed (i.e. the speed stamped on the main rating plate). In the VSD application the operating speed range is stamped on the separate VSD rating plate and this speed range is not allowed to be exceeded.

### 3. Rating plates

The EN and IEC standards require that the mo¬tors which are used in variable speed operation are provided with a rating plate that shows the parameters for which the motor is intended. There are two different types of rating plates available, one generic plate that shows loadability values in percentage of the nominal torque. This plate can be ordered using variant code 181. The other plate has order specific data, this can be ordered using variant code 163.

These parameters shall be used while checking the suitability of a specific motor for its intended application and for setting the limits of operation for the converter.




These parameters shall be used while checking the suitability of a specific motor for its intended application and for setting the limits of operation for the converter.

### 4. Winding insulation

The output voltage of voltage source frequency converters consists of steep voltage pulses. These pulses can be even higher and steeper when arriving at the motor terminals due to reflect-ing pulses in the cables. The motor's insulation must therefore be selected according to the actual pulses at the motor terminals.

### 4.1 Maximum voltage peaks

Two different insulation systems are available for ABB motors covered in this catalogue. The Special insulation can be ordered by using variant code +405. Otherwise motors are delivered with Standard insulation. Limit values for insulation systems are listed in Table 1. These values apply at motor terminals. The pk/pk values define motor insulation capacity regardless of the origin of the voltage stress. The pk values are given as reference. Typically highest stress occurs in pk/pk situation where pk/pk can be up to 2 x pk.

**Table 1. Limit values for ABB motor insulation systems**

| | | Standard insulation | + 405 Special insulation |
|---|---|---|---|
| $U_{phase\text{-}ground}$ | $V_{pk/pk}$ | 2500 | 3300 |
| | $V_{pk}$ | 1250 | 1650 |
| $U_{phase\text{-}phase}$ | $V_{pk/pk}$ | 3400 | 4800 |
| | $V_{pk}$ | 1700 | 2400 |
| Rise time Tr > acc. to IEC 60034-18-41 | | 0,24 µs | 0,24 µs |
| Rise time Tr > acc. To NEMA MG 1-2021 | | 0,1 µs | 0,1 µs |
| Voltage rise, max. | | 5,7 kV/µs | 7,8 kV/µs |
| Time between pulses | | > 6 µs | > 6 µs |

### 4.2 IVIC classes

IEC 60034-18-41 specifies limit values for different IVIC classes. The most typical classes specified for variable speed duty are IVIC B and C. Limit values are depending on network voltage. Table 2 includes limit values for IVIC B and C for the most typical network voltages. Limit values increase linearly according to network voltage.

**Table 2. Limit values for different IVIC classes and network voltages**

| Network voltage | | 400 V | | 480 V | | 500 V | | 575 V | | 690 V | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | IVIC B | IVIC C | IVIC B | IVIC C | IVIC B | IVIC C | IVIC B | IVIC C | IVIC B | IVIC C |
| $U_{phase\text{-}ground}$ | $V_{pk/pk}$ | 1248 | 1664 | 1497 | 1997 | 1560 | 2080 | 1794 | 2392 | 2153 | 2870 |
| $U_{phase\text{-}phase}$ | $V_{pk/pk}$ | 1783 | 2377 | 2139 | 2852 | 2228 | 2971 | 2563 | 3417 | 3075 | 4100 |

### 4.3 Guidance for ABB motor insulation system selection for use with ABB frequency converters

Choose ABB motor insulation system so that given requirements are reached. IVIC C/C is also reached with this selection.

**Table 3. Requirements for ABB motor insulation system when used with ABB frequency converters**

| Nominal AC line voltage | Requirements for motor insulation system [1)] |
|---|---|
| Un ≤ 420 V | $U_{phase\text{-}phase,\ pk}$ ≥ 1250 V<br>Rise time minimum 0,25 µs , IEC |
| 420 V < Un ≤ 500 V | $U_{phase\text{-}phase,\ pk}$ ≥ 1486 V<br>Rise time minimum 0,25 µs , IEC |
| 500 V < Un ≤ 600 V | $U_{phase\text{-}phase,\ pk}$ ≥ 1783 V<br>Rise time minimum 0,25 µs , IEC |
| 600 V < Un ≤ 690 V | $U_{phase\text{-}phase,\ pk}$ ≥ 2050 V<br>Rise time minimum 0,25 µs , IEC |

[1)] Consult ABB Drives publications for more details if needed

### 4.4 ABB motor insulation system selection with other frequency converters

Select ABB motor insulation system so that it meets or exceeds frequency converter manufacturers requirements for motor insulation system and that IVIC C/C limit values are met.

## 5. Bearing currents

Bearing voltages and currents must be avoided in all variable speed applications to ensure the reliability and safety of the application. For this purpose, insulated bearings or bearing constructions, common mode filters and suitable cable and grounding methods must be used.

### 5.1 EElimination of bearing currents with ABB ACS800, ACS880 and ACS550 converters

In the case of ABB ACS800, ACS880, ACS550 and ACS580 converters with a diode supply unit (uncontrolled DC voltage), the following methods must be used to avoid harmful bearing currents in the motors:

| Frame size | Preventive measures |
|---|---|
| 250 and smaller | No action needed |
| 280-315 | Insulated non-drive end bearing |
| 355-450 | Insulated non-drive end bearing<br>AND<br>Common mode filter at the converter |

#### Common mode filters

Common mode filters reduce common mode currents and thus decrease the risk of bearing currents. Common mode filters do not significantly affect the phase or main voltages on the motor terminals. For more information, please see ABB Drives catalogues.

#### Insulated bearings

Bearings with aluminum oxide insulated and sealed inner or outer bores are used as standard with variant code 701. Hybrid bearings, i.e. bearings with non-conductive ceramic rolling elements, can also be used in special applications. More information on selection of the correct parts is available on request.

### 5.2 Elimination of bearing currents with all other converters

The user is responsible for protecting the mo¬tor and driven equipment from harmful bearing currents. The instructions provided in section 5.1 can be followed, but their effectiveness cannot be guaranteed in all cases.

## 6. Cabling, grounding and EMC

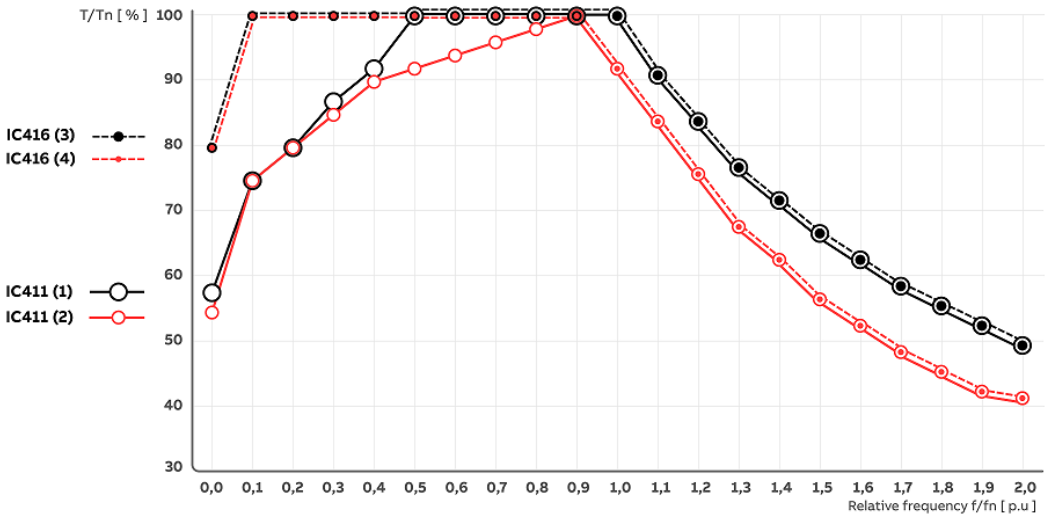
The use of a frequency converter places greater demands on the cabling and grounding of the drive system. To ensure proper grounding of the system, EMC compliance and avoid bearing currents should the instructions given in the installation, operation, and maintenance manual be followed. EMC cable glands providing 360° bonding of a concentric PE conductor are available using variant code 704, also many flameproof glands for armoured cable provide similar bounding.

## 7. Loadability curves

The loadability curves presented below are based on combined tests of different motors together with the converter types listed. The loadability curves assume that the nominal frequency of the motor (i.e. field weakening point) is 50 or 60Hz. The curves present the maximum allowed torque in percentage of the nominal direct online torque of the motor over the speed range.

## Flameproof motors Ex db / Ex db eb and Dust ignition protection motors Ex t T150˚C IE3 and higher efficiency classes.

Loadability for frequency converter applications utilizing voltage source PWM-type converters (incl. DTC, vector or scalar control). Flameproof motors Ex db / Ex db eb T4, frame sizes 80 – 400 and Dust ignition protection motors Ex t T150°C, frame sizes 71 – 400.




| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC411 (1)* | 58 | 75 | 80 | 87 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | 91 | 84 | 77 | 72 | 67 | 63 | 59 | 56 | 53 | 50 |
| IC411 (2) ** | 55 | 75 | 80 | 85 | 90 | 92 | 94 | 96 | 98 | 100 | 92 | 84 | 76 | 68 | 63 | 57 | 53 | 49 | 46 | 43 | 42 |
| IC416 (3) *** | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 91 | 84 | 77 | 72 | 67 | 63 | 59 | 56 | 53 | 50 |
| IC416 (4) ** | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 92 | 84 | 76 | 68 | 63 | 57 | 53 | 49 | 46 | 43 | 42 |

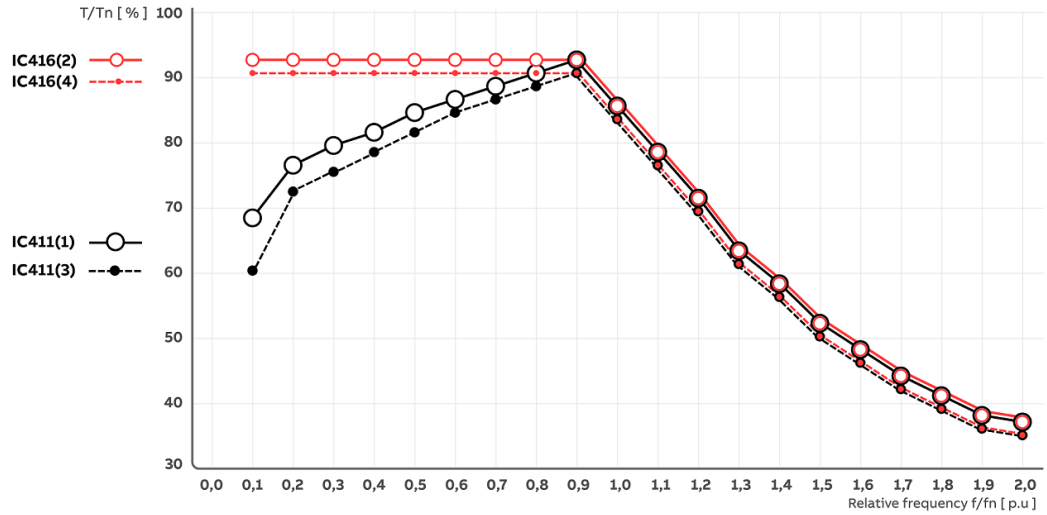
*Ex db T4 / Ex db eb T4, frame sizes 80-250 / Ex t T150°C, frame sizes 71-250

** Ex db T4 / Ex db eb T4, frame sizes 280-400 / Ex t T150°C, frame sizes 280-400

***Ex db T4 / Ex db eb T4, frame sizes 160-250 / Ex t T150°C, frame sizes 160-250

## Flameproof motors Ex db / Ex db eb and Dust ignition protection motors Ex t T150˚C, frame size 450.

Loadability for frequency converter applications utilizing voltage source PWM-type converters (incl. DTC, vector or scalar control). Flameproof motors Ex db/ Ex db eb T4, frame size 450 with or without Dust ignition protection Ex t T150°C and Dust ignition protection motors Ex t T150°C, frame size 450.



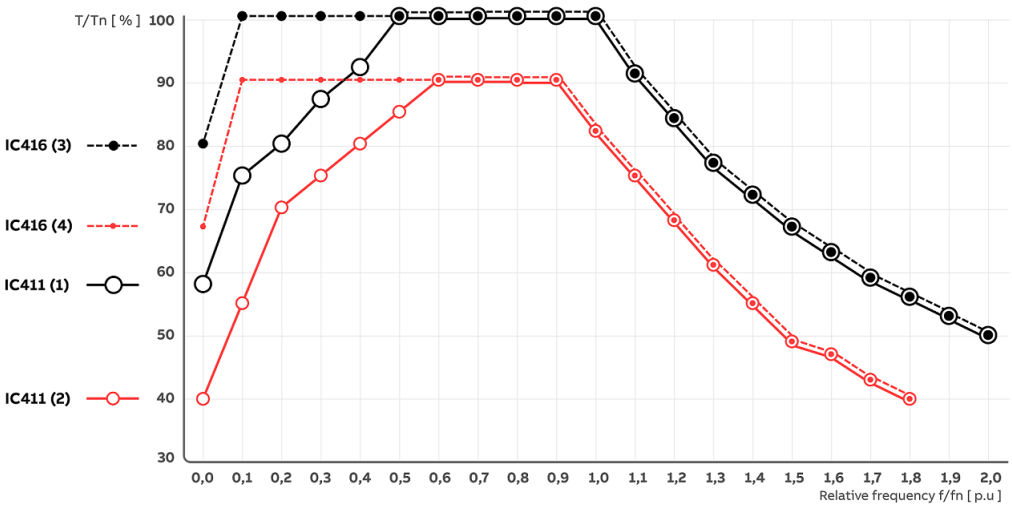

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC411 (1)* | | 69 | 77 | 80 | 82 | 85 | 87 | 89 | 91 | 93 | 86 | 79 | 72 | 64 | 59 | 53 | 49 | 45 | 42 | 39 | 38 |
| IC416 (2)* | | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 86 | 79 | 72 | 64 | 59 | 53 | 49 | 45 | 42 | 39 | 38 |
| IC411 (3) ** | | 61 | 73 | 76 | 79 | 82 | 85 | 87 | 89 | 91 | 84 | 77 | 70 | 62 | 57 | 51 | 47 | 43 | 40 | 37 | 36 |
| IC416 (4) ** | | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 84 | 77 | 70 | 62 | 57 | 51 | 47 | 43 | 40 | 37 | 36 |

*Ex db T4 / Ex db eb T4, frame size 450 / Ex t T150°C, frame size 450 (DTC)

** Ex db T4 / Ex db eb T4, frame size 450 / Ex t T150°C, frame size 450 (vector or scalar control)

## Increased safety Ex ec and Dust ignition protection motors Ex t T125˚C IE3 and higher efficiency classes.

Loadability for frequency converter applications utilizing voltage source PWM-type converters (incl. DTC, vector or scalar control). Increased safety motors Ex ec, frame sizes 71 – 450 and Dust ignition protection motors Ex t T125°C, frame sizes 71 – 450.




| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC411 (1)* | 58 | 75 | 80 | 87 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | 91 | 84 | 77 | 72 | 67 | 63 | 59 | 56 | 53 | 50 |
| IC411 (2) ** | 40 | 55 | 70 | 75 | 80 | 85 | 90 | 90 | 90 | 90 | 82 | 75 | 68 | 61 | 55 | 49 | 47 | 43 | 40 | | |
| IC416 (3) *** | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 91 | 84 | 77 | 72 | 67 | 63 | 59 | 56 | 53 | 50 |
| IC416 (4) ** | 67 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 82 | 75 | 68 | 61 | 55 | 49 | 47 | 43 | 40 | | |

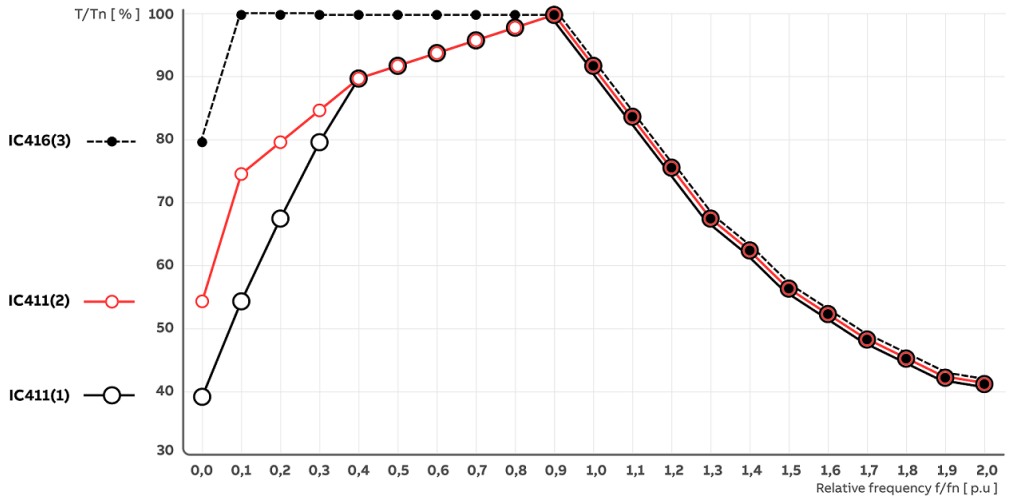
*Ex ec T3 / Ex t T125˚C, frame sizes 71-250

**Ex ec T3 / Ex t T125˚C, frame sizes 280-450

***Ex ec T3 / Ex t T125˚C, frame sizes 160-250

## Flameproof motors Ex db / Ex db eb and Dust ignition protection motors Ex t T150˚C IE2 and lower efficiency classes.

Loadability for frequency converter applications utilizing voltage source PWM-type converters (incl. DTC, vector or scalar control). Flameproof motors Ex db / Ex db eb T4, frame sizes 80 – 400 and Dust ignition protection motors Ex t T150°C, frame sizes 71 – 400.




| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC411 (1)* | 40 | 55 | 68 | 80 | 90 | 92 | 94 | 96 | 98 | 100 | 92 | 84 | 76 | 68 | 63 | 57 | 53 | 49 | 46 | 43 | 42 |
| IC411 (2) ** | 55 | 75 | 80 | 85 | 90 | 92 | 94 | 96 | 98 | 100 | 92 | 84 | 76 | 68 | 63 | 57 | 53 | 49 | 46 | 43 | 42 |
| IC416 (3) *** | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 92 | 84 | 76 | 68 | 63 | 57 | 53 | 49 | 46 | 43 | 42 |

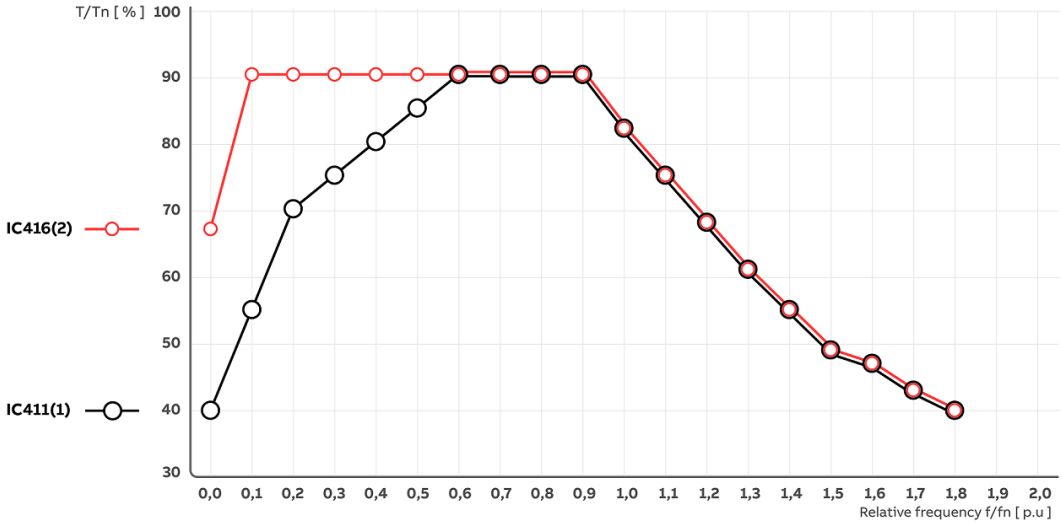
*Ex db T4 / Ex db eb T4, frame sizes 80-132 / Ex t T150°C, frame sizes 71-132

**Ex db T4 / Ex db eb T4, frame sizes 160-180 & 200-400 / Ex t T150°C, frame sizes 160-250 & 280-400

***Ex db T4 / Ex db eb T4, frame sizes 160-180 & 200-400 / Ex t T150°C, frame sizes 160-250 & 280-400

## Increased safety Ex ec and Dust ignition protection motors Ex t T125˚C IE2 and lower efficiency classes.

Loadability for frequency converter applications utilizing voltage source PWM-type converters (incl. DTC, vector or scalar control). Increased safety motors Ex ec, frame sizes 71 – 450 and Dust ignition protection motors Ex t T125°C, frame sizes 71 – 450.



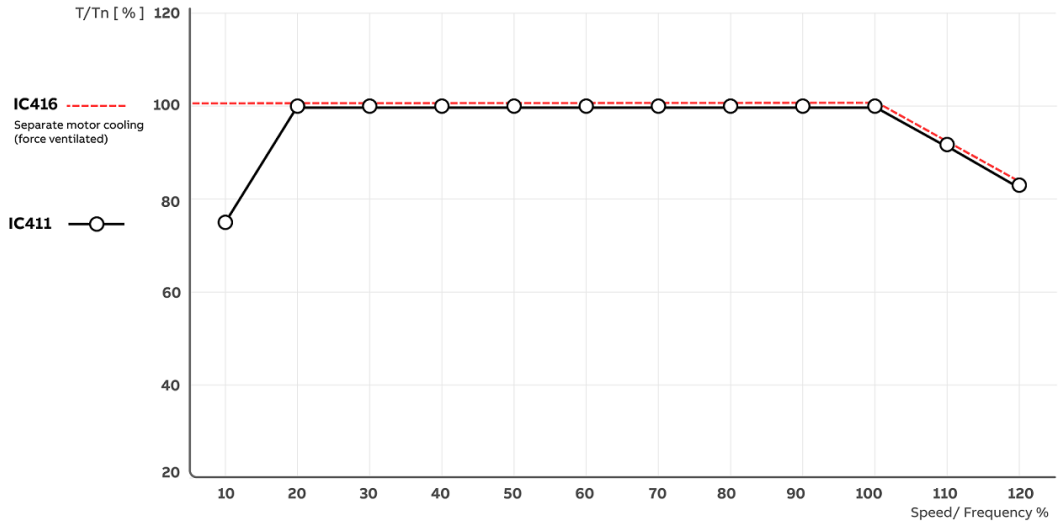

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC411 (1)* | 40 | 55 | 70 | 75 | 80 | 85 | 90 | 90 | 90 | 90 | 82 | 75 | 68 | 61 | 55 | 49 | 47 | 43 | 40 | | |
| IC416 (2) ** | 67 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 82 | 75 | 68 | 61 | 55 | 49 | 47 | 43 | 40 | | |

*Ex ec T3 / Ex t T125˚C, frame sizes 71-132 & 160-250 & 280-450

**Ex ec T3 / Ex t T125˚C, frame sizes 160-250 & 280-450

## Synchronous reluctance Ex-motor with protection type Ex eb, Ex ec Ex t T125°C-T150°C IE5 and higher efficiency classes.

Frequency converter must include synchronous reluctance motor control software.




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC411 | 75 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 92 | 83 |
| IC416 | Separate motor cooling (force ventillated) | | | | | | | | | | | |

# Flameproof motors Ex db IIB/IIC T4 Gb


| | |
|---|---|
| **31** | **Ordering information** |
| **32** | **Rating plates** |
| **33** | **Technical data** |
| 33 | IE4 Ex db cast iron motors, 3000 r/min |
| 34 | IE4 Ex db cast iron motors, 1500 r/min |
| 35 | IE4 Ex db cast iron motors, 1000 r/min |
| 36 | IE3 Ex db cast iron motors, 3000 r/min |
| 37 | IE3 Ex db cast iron motors, 1500 r/min |
| 38 | IE3 Ex db cast iron motors, 1000 r/min |
| 39 | IE3 Ex db cast iron motors, 800 r/min |
| **40** | **Variant codes** |
| 40 | Flameproof cast iron motors, Ex db IIB/IIC T4 Gb |
| **45** | **Mechanical design** |
| 45 | Motor frame and drain holes |
| 46 | Lifting lugs |
| 47 | Heating elements |
| 48 | Bearings |
| 53 | Radial forces |
| 56 | Axial forces |
| **59** | **Terminal box** |
| 59 | Standard terminal box |
| 61 | Terminal box dimensions |
| 62 | Terminal boxes and boards |
| 64 | Terminal box alternatives |
| **66** | **Dimension drawings** |
| 66 | Flameproof motors, Ex db |
| **68** | **Certificate examples** |
| **69** | **Motors in brief** |
| 69 | Flameproof motors Ex db, sizes 80 to 180 |
| 70 | Flameproof motors Ex db, sizes 200 to 450 |
| **71** | **Motor construction** |
| 71 | Cast iron flameproof motors, Ex db |

# Ordering information

## Explanation of the product code

| Motor type | Motor size | Product code | Mounting arrangement code, Voltage and frequency code, Generation code | Variant codes |
|---|---|---|---|---|
| M3JP | 160MLA | 3GJP 161 | 410 - ADH | 002, etc. |
| | | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14 | |

| Positions 1 to 4 | |
|---|---|
| 3GJP: | Totally enclosed flameproof motor Ex db with cast iron frame |

| Positions 5 and 6 | |
|---|---|
| IEC size | |
| 08: | 80 |
| 09: | 90 |
| 10: | 100 |
| 11: | 112 |
| 13: | 132 |
| 16: | 160 |
| 18: | 180 |
| 20: | 200 |
| 22: | 225 |
| 25: | 250 |
| 28: | 280 |
| 31: | 315 |
| 35: | 355 |
| 40: | 400 |
| 45: | 450 |

| Position 7 | |
|---|---|
| Speed (Pole pairs) | |
| 1: | 2 poles |
| 2: | 4 poles |
| 3: | 6 poles |
| 4: | 8 poles |
| 5: | 10 poles |
| 6: | 12 poles |
| 7: | ≥ 12 poles |
| 8: | Two-speed motors |
| 9: | Multi-speed motors |

| Positions 8 to 10 | |
|---|---|
| 8: | Frame lenght |
| 9: | Stator package length |
| 10: | Speed for two-speed induction, Permanent Magnet, SynRM and High Speed motors |

| Position 11 |
|---|
| - (Dash) |

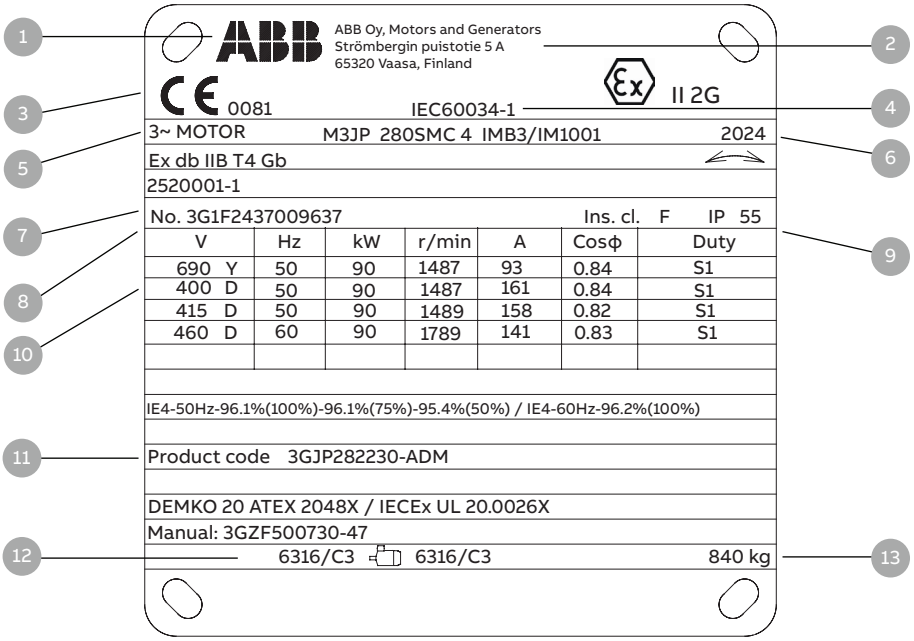
| Position 12 | |
|---|---|
| Mounting arrangement | |
| A: | Foot-mounted, top-mounted terminal box |
| B: | Flange-mounted, large flange with clearance holes |
| C: | Flange-mounted, small flange with tapped holes |

| Position 13 | |
|---|---|
| Voltage and frequency | |
| Single-speed motors | |
| C: | 400VY 50Hz, 460VY 60Hz |
| D: | 400 VΔ, 415 VΔ, 690 VY 50 Hz |
| E: | 500 VΔ 50 Hz |
| F: | 500 VY 50 Hz |
| P: | 400VD 50Hz, 460VD 60Hz |
| S: | 230 VΔ, 400 VY, 415 VY 50 Hz |

| Position 14 | |
|---|---|
| Generation code | |
| Generation code is followed by variant codes according to the hazardous area, seen below and on corresponding pages with variant codes: | |
| 461 | Ex d(e) design, Group IIC |

# Rating plates

—
01 Sample rating plate for a IE4 Flameproof Ex db motor




—
01

1 ABB logo

2 Manufacturing place

3 CE mark on Ecodesign approved motors UKCA mark on UK approved motors

4 Manufacturing standard

5 Product description

6 Manufacturing year

7 Factory order reference number

8 Serial number

9 Insulation class, IP protection class

10 Voltage, Frequency, output, speed, current, power factory, duty

11 Product code

12 Bearing type

13 Weight

# Technical data

## IE4 Ex db cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 75 | M3JP 280SMB 2 | 3GJP281220-**M | 2981 | 95,6 | 95,6 | 95 | 0,86 | 130 | 7,7 | 240 | 2,2 | 3,2 | 0,677 | 665 | 77 |
| 90 | M3JP 280SMC 2 | 3GJP281230-**M | 2982 | 95,8 | 95,8 | 95,2 | 0,88 | 153 | 8,7 | 288 | 2,7 | 3,5 | 0,822 | 725 | 77 |
| 110 | M3JP 315SMB 2 | 3GJP311220-**M | 2983 | 96 | 96 | 95,4 | 0,87 | 189 | 7,2 | 352 | 1,7 | 2,9 | 1,22 | 940 | 77 |
| 132 | M3JP 315SMC 2 | 3GJP311230-**M | 2985 | 96,2 | 96,2 | 95,8 | 0,87 | 225 | 8,6 | 422 | 2,3 | 3,3 | 1,44 | 1025 | 77 |
| 160 | M3JP 315MLA 2 | 3GJP311410-**M | 2983 | 96,3 | 96,4 | 96,2 | 0,89 | 267 | 8 | 512 | 2,2 | 2,8 | 1,7 | 1190 | 77 |
| 200 | M3JP 355SMA 2 | 3GJP351210-**M | 2985 | 96,5 | 96,4 | 95,9 | 0,89 | 335 | 8,2 | 640 | 1,9 | 3,5 | 2,73 | 1600 | 83 |
| 250 | M3JP 355SMB 2 | 3GJP351220-**M | 2984 | 96,5 | 96,5 | 96,1 | 0,89 | 415 | 8,1 | 800 | 2,2 | 3,3 | 3,1 | 1680 | 83 |
| 315 | M3JP 355SMC 2 | 3GJP351230-**M | 2985 | 96,5 | 96,4 | 95,9 | 0,88 | 533 | 7,3 | 1008 | 2,4 | 3,1 | 3,38 | 1750 | 83 |
| 355 | M3JP 355MLA 2 | 3GJP351410-**M | 2983 | 96,5 | 96,5 | 96,1 | 0,89 | 595 | 7,8 | 1137 | 2,4 | 2,8 | 3,74 | 2000 | 83 |
| 400 | M3JP 355MLB 2 | 3GJP351420-**M | 2982 | 96,5 | 96,4 | 95,8 | 0,87 | 683 | 7 | 1281 | 2,6 | 2,8 | 3,9 | 2000 | 83 |
| 450 | M3JP 355MLC 2 | 3GJP351430-**M | 2984 | 96,5 | 96,5 | 96 | 0,9 | 746 | 8,8 | 1440 | 2,7 | 3,8 | 3,95 | 2080 | 83 |
| 500 | M3JP 355LKA 2 | 3GJP351810-**M | 2983 | 96,5 | 96,5 | 96,1 | 0,9 | 823 | 8,7 | 1601 | 2,3 | 3,9 | 4,51 | 2320 | 83 |
| 560 | M3JP 400LA 2 | 3GJP401510-**M | 2988 | 96,5 | 96,4 | 95,8 | 0,89 | 939 | 8,4 | 1790 | 2,3 | 3,4 | 7,27 | 2950 | 82 |
| 560 | M3JP 400LKA 2 | 3GJP401810-**M | 2988 | 96,5 | 96,4 | 95,8 | 0,89 | 939 | 8,4 | 1790 | 2,3 | 3,4 | 7,27 | 2950 | 82 |
| 560 | M3JP 355LKB 2 | 3GJP351820-**M | 2983 | 96,5 | 96,4 | 95,9 | 0,9 | 922 | 8,7 | 1793 | 2,6 | 4,1 | 4,93 | 2460 | 83 |
| 630 | M3JP 400LB 2 | 3GJP401520-**M | 2988 | 96,5 | 96,4 | 95,9 | 0,89 | 1052 | 8,5 | 2013 | 2,4 | 3,4 | 7,81 | 2950 | 82 |
| 630 | M3JP 400LKB 2 | 3GJP401820-**M | 2988 | 96,5 | 96,4 | 95,9 | 0,89 | 1052 | 8,5 | 2013 | 2,4 | 3,4 | 7,81 | 2950 | 82 |
| 710 | M3JP 400LC 2 | 3GJP401530-**M | 2988 | 96,5 | 96,5 | 96 | 0,89 | 1185 | 7,3 | 2269 | 2,8 | 3,1 | 8,9 | 3050 | 82 |
| 710 | M3JP 400LKC 2 | 3GJP401830-**M | 2988 | 96,5 | 96,5 | 96 | 0,89 | 1185 | 7,3 | 2269 | 2,8 | 3,1 | 8,9 | 3050 | 82 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3JP 280SMD 2 | 3GJP281240-**M | 2980 | 96 | 96,2 | 95,8 | 0,86 | 192 | 8,3 | 352 | 2,7 | 3,4 | 0,822 | 725 | 77 |
| 132 | M3JP 280MLA 2 | 3GJP281410-**M | 2980 | 96,2 | 96,2 | 95,6 | 0,88 | 224 | 8,5 | 423 | 2,9 | 3,4 | 0,941 | 840 | 81 |
| 160 | M3JP 280MLB 2 | 3GJP281420-**M | 2970 | 96,3 | 96,7 | 96,7 | 0,9 | 265 | 6,9 | 514 | 2,3 | 2,5 | 1,06 | 890 | 81 |
| 200 | M3JP 315MLB 2 | 3GJP311420-**M | 2982 | 96,5 | 96,7 | 96,6 | 0,89 | 333 | 6,5 | 640 | 2,1 | 2,8 | 1,78 | 1220 | 77 |
| 250 | M3JP 315LKB 2 | 3GJP311820-**M | 2981 | 96,5 | 96,7 | 96,7 | 0,9 | 412 | 7,2 | 801 | 2,8 | 2,9 | 2,33 | 1540 | 77 |

# Technical data

## IE4 Ex db cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$ A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 75 | M3JP 280SMB 4 | 3GJP282220-**M | 1488 | 96 | 96,2 | 95,8 | 0,85 | 132 | 8,1 | 481 | 3,3 | 3,2 | 1,41 | 840 | 72 |
| 90 | M3JP 280SMC 4 | 3GJP282230-**M | 1487 | 96,1 | 96,2 | 95,7 | 0,84 | 161 | 7,7 | 578 | 3,5 | 3,3 | 1,41 | 840 | 72 |
| 110 | M3JP 315SMC 4 | 3GJP312230-**M | 1491 | 96,3 | 96,4 | 96 | 0,84 | 194 | 7,9 | 705 | 2,9 | 3,4 | 2,33 | 1000 | 68 |
| 132 | M3JP 315SMD 4 | 3GJP312240-**M | 1491 | 96,4 | 96,5 | 96,2 | 0,84 | 234 | 7,8 | 846 | 3 | 3,4 | 2,52 | 1065 | 68 |
| 160 | M3JP 315MLB 4 | 3GJP312420-**M | 1490 | 96,6 | 96,7 | 96,5 | 0,85 | 278 | 7,7 | 1026 | 3,2 | 3,3 | 3,04 | 1220 | 68 |
| 200 | M3JP 355SMA 4 | 3GJP352210-**M | 1492 | 96,7 | 96,7 | 96,4 | 0,86 | 346 | 7,1 | 1280 | 2,6 | 2,9 | 5,11 | 1610 | 74 |
| 250 | M3JP 355SMB 4 | 3GJP352220-**M | 1492 | 96,7 | 96,7 | 96,4 | 0,85 | 435 | 7,5 | 1600 | 3 | 3,1 | 6 | 1780 | 74 |
| 315 | M3JP 355SMC 4 | 3GJP352230-**M | 1491 | 96,7 | 96,7 | 96,4 | 0,84 | 555 | 7 | 2017 | 3,2 | 3 | 6,56 | 1820 | 74 |
| 355 | M3JP 355MLA 4 | 3GJP352410-**M | 1492 | 96,7 | 96,8 | 96,5 | 0,85 | 617 | 7,7 | 2273 | 3,3 | 3,1 | 7,44 | 2140 | 78 |
| 400 | M3JP 355MLB 4 | 3GJP352420-**M | 1490 | 96,7 | 96,8 | 96,6 | 0,86 | 691 | 8,2 | 2563 | 3,2 | 3 | 7,44 | 2140 | 78 |
| 450 | M3JP 355MLC 4 | 3GJP352430-**M | 1489 | 96,7 | 96,9 | 96,7 | 0,86 | 782 | 7,9 | 2885 | 3,1 | 2,9 | 7,44 | 2140 | 78 |
| 500 | M3JP 355LKA 4 | 3GJP352810-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,86 | 867 | 7 | 3202 | 3,7 | 3,1 | 9,35 | 2500 | 78 |
| 560 | M3JP 400LA 4 | 3GJP402510-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,85 | 985 | 7 | 3586 | 3,1 | 3,1 | 13,6 | 3200 | 78 |
| 560 | M3JP 400LKA 4 | 3GJP402810-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,85 | 985 | 7 | 3586 | 3,1 | 3,1 | 13,6 | 3200 | 78 |
| 630 | M3JP 400LB 4 | 3GJP402520-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,86 | 1093 | 8,6 | 4033 | 3 | 3,2 | 13,6 | 3300 | 78 |
| 630 | M3JP 400LKB 4 | 3GJP402820-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,86 | 1093 | 8,6 | 4033 | 3 | 3,2 | 13,6 | 3300 | 78 |
| 710 | M3JP 400LC 4 | 3GJP402530-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,85 | 1245 | 7,7 | 4545 | 2,9 | 3,2 | 14,6 | 3300 | 78 |
| 710 | M3JP 400LKC 4 | 3GJP402830-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,85 | 1245 | 7,7 | 4545 | 2,9 | 3,2 | 14,6 | 3300 | 78 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$ A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3JP 280MLB 4 | 3GJP282420-**M | 1489 | 96,3 | 96,3 | 95,7 | 0,81 | 203 | 8,3 | 705 | 4,3 | 3,8 | 1,7 | 890 | 75 |
| 132 | M3JP 280MLC 4 | 3GJP282430-**M | 1489 | 96,4 | 96,4 | 95,9 | 0,81 | 244 | 8,2 | 847 | 4,4 | 3,8 | 1,87 | 890 | 75 |
| 200 | M3JP 315LKB 4 | 3GJP312820-**M | 1491 | 96,7 | 96,9 | 96,7 | 0,86 | 345 | 7,6 | 1281 | 2,9 | 3,1 | 3,81 | 1480 | 74 |
| 250 | M3JP 315LKC 4 | 3GJP312830-**M | 1491 | 96,7 | 96,9 | 96,8 | 0,86 | 432 | 7,9 | 1602 | 2,7 | 3,2 | 3,91 | 1600 | 74 |
| 315 | M3JP 315LKE 4 | 3GJP312850-**M | 1489 | 96,7 | 97 | 96,9 | 0,84 | 560 | 7,8 | 2020 | 3,1 | 3 | 4,15 | 1640 | 74 |

# Technical data

## IE4 Ex db cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 45 | M3JP 280SMB 6 | 3GJP283220-**M | 992 | 94,8 | 94,9 | 94,4 | 0,84 | 81,3 | 7,7 | 433 | 2,9 | 2,8 | 2 | 680 | 65 |
| 55 | M3JP 280SMC 6 | 3GJP283230-**M | 991 | 95,1 | 95,3 | 94,9 | 0,84 | 99,3 | 7,5 | 530 | 3 | 2,8 | 2,26 | 725 | 65 |
| 75 | M3JP 315SMC 6 | 3GJP313230-**M | 994 | 95,4 | 95,5 | 95,1 | 0,82 | 137 | 7,5 | 720 | 2,6 | 2,9 | 4,35 | 1000 | 67 |
| 90 | M3JP 315SMD 6 | 3GJP313240-**M | 994 | 95,6 | 95,7 | 95,3 | 0,8 | 169 | 7,5 | 864 | 2,8 | 3 | 4,57 | 1040 | 67 |
| 110 | M3JP 315MLB 6 | 3GJP313420-**M | 994 | 95,8 | 95,9 | 95,6 | 0,81 | 202 | 7,3 | 1057 | 2,7 | 2,8 | 5,5 | 1200 | 68 |
| 132 | M3JP 315LKA 6 | 3GJP313810-**M | 994 | 96 | 96,1 | 95,8 | 0,81 | 243 | 7,4 | 1268 | 2,9 | 2,9 | 6,54 | 1410 | 68 |
| 160 | M3JP 355SMB 6 | 3GJP353220-**M | 995 | 96,2 | 96,3 | 95,9 | 0,82 | 292 | 7,7 | 1535 | 2,6 | 2,8 | 8,65 | 1680 | 73 |
| 200 | M3JP 355SMC 6 | 3GJP353230-**M | 995 | 96,3 | 96,3 | 96 | 0,81 | 367 | 7,1 | 1919 | 2,7 | 2,9 | 10,1 | 1820 | 73 |
| 250 | M3JP 355MLB 6 | 3GJP353420-**M | 995 | 96,5 | 96,6 | 96,4 | 0,82 | 455 | 7,7 | 2400 | 2,8 | 2,8 | 12 | 2180 | 73 |
| 315 | M3JP 355LKA 6 | 3GJP353810-**M | 994 | 96,6 | 96,7 | 96,4 | 0,82 | 574 | 6,7 | 3025 | 2,8 | 2,7 | 13,8 | 2500 | 76 |
| 355 | M3JP 355LKB 6 | 3GJP353820-**M | 995 | 96,6 | 96,5 | 96 | 0,79 | 667 | 7,4 | 3407 | 3,3 | 3,1 | 14,7 | 2600 | 76 |
| 400 | M3JP 400LA 6 | 3GJP403510-**M | 995 | 96,6 | 96,7 | 96,3 | 0,81 | 734 | 7,3 | 3840 | 2,8 | 3,1 | 15,8 | 2900 | 76 |
| 400 | M3JP 400LKA 6 | 3GJP403810-**M | 995 | 96,6 | 96,7 | 96,3 | 0,81 | 734 | 7,3 | 3840 | 2,8 | 3,1 | 15,8 | 2900 | 76 |
| 450 | M3JP 400LB 6 | 3GJP403520-**M | 996 | 96,6 | 96,4 | 95,6 | 0,81 | 825 | 8,5 | 4316 | 3,4 | 3,5 | 20,7 | 3300 | 76 |
| 450 | M3JP 400LKB 6 | 3GJP403820-**M | 996 | 96,6 | 96,4 | 95,6 | 0,81 | 825 | 8,5 | 4316 | 3,4 | 3,5 | 20,7 | 3300 | 76 |
| 500 | M3JP 400LC 6 | 3GJP403530-**M | 995 | 96,6 | 96,5 | 95,8 | 0,82 | 912 | 8 | 4798 | 3,2 | 3,3 | 20,7 | 3300 | 76 |
| 500 | M3JP 400LKC 6 | 3GJP403830-**M | 995 | 96,6 | 96,5 | 95,8 | 0,82 | 912 | 8 | 4798 | 3,2 | 3,3 | 20,7 | 3300 | 76 |
| 560 | M3JP 400LD 6 | 3GJP403540-**M | 994 | 96,6 | 96,6 | 96,2 | 0,85 | 982 | 6,8 | 5380 | 2,8 | 2,9 | 22,3 | 3400 | 77 |
| 560 | M3JP 400LKD 6 | 3GJP403840-**M | 994 | 96,6 | 96,6 | 96,2 | 0,85 | 982 | 6,8 | 5380 | 2,8 | 2,9 | 22,3 | 3400 | 77 |
| 610 | M3JP 450LA 6 | 3GJP453510-**M | 996 | 96,6 | 96,5 | 95,8 | 0,81 | 1126 | 7,5 | 5849 | 1,7 | 3,4 | 32,2 | 4150 | 81 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 75 | M3JP 280SMD 6 | 3GJP283240-**M | 991 | 95,4 | 95,6 | 95,3 | 0,81 | 140 | 7,2 | 723 | 3,1 | 2,7 | 2,25 | 730 | 65 |
| 160 | M3JP 315LKC 6 | 3GJP313830-**M | 994 | 96,2 | 96,3 | 96 | 0,81 | 296 | 7,1 | 1537 | 3,2 | 3 | 7,71 | 1600 | 68 |
| 200 | M3JP 315LKE 6 | 3GJP313850-**M | 994 | 96,3 | 96,4 | 96,1 | 0,81 | 368 | 7,5 | 1921 | 2,9 | 2,9 | 7,71 | 1600 | 68 |

# Technical data

## IE3 Ex db cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3JP 80MD 2 | 3GJP081340-**K | 2872 | 80,7 | 81,1 | 79,4 | 0,87 | 1,51 | 6,2 | 2,43 | 2,88 | 3,43 | 0,0012 | 48 | 57 |
| 1.1 | M3JP 80MG 2 | 3GJP081370-**K | 2862 | 82,7 | 83,7 | 82,8 | 0,87 | 2,1 | 6,3 | 3,65 | 3,03 | 3,5 | 0,0014 | 49 | 60 |
| 1.5 | M3JP 90SLB 2 | 3GJP091020-**K | 2892 | 84,2 | 85,3 | 84,5 | 0,89 | 2,7 | 7,3 | 4,8 | 3,4 | 3,7 | 0,0031 | 60 | 69 |
| 2.2 | M3JP 90LC 2 | 3GJP091530-**K | 2900 | 85,9 | 86,7 | 85,7 | 0,89 | 4 | 9,1 | 7,27 | 3,35 | 4,09 | 0,0044 | 63 | 64 |
| 3 | M3JP 100LKA 2 | 3GJP101810-**K | 2907 | 87,1 | 87,6 | 86,5 | 0,89 | 5,4 | 8,8 | 9,9 | 3,25 | 4,32 | 0,0086 | 80 | 68 |
| 4 | M3JP 112MG 2 | 3GJP111370-**K | 2882 | 88,1 | 89,7 | 90,3 | 0,93 | 7 | 8,1 | 13,3 | 2,8 | 3,6 | 0,0132 | 85 | 70 |
| 5.5 | M3JP 132SMF 2 | 3GJP131260-**K | 2902 | 89,2 | 89,9 | 89,4 | 0,9 | 9,7 | 7,3 | 18,2 | 2,72 | 3,6 | 0,0218 | 124 | 67 |
| 7.5 | M3JP 132SMG 2 | 3GJP131270-**K | 2907 | 90,1 | 91 | 91 | 0,9 | 13,2 | 8,1 | 24,7 | 2,66 | 3,74 | 0,0218 | 124 | 70 |
| 11 | M3JP 160MLA 2 | 3GJP161410-**K | 2943 | 91,2 | 91,7 | 91,3 | 0,92 | 18,7 | 8,1 | 35,6 | 2,7 | 3,4 | 0,052 | 232 | 69 |
| 15 | M3JP 160MLB 2 | 3GJP161420-**K | 2943 | 91,9 | 92,4 | 92,1 | 0,91 | 25,4 | 8,4 | 48,6 | 3,1 | 3,4 | 0,062 | 243 | 69 |
| 18.5 | M3JP 160MLC 2 | 3GJP161430-**K | 2942 | 92,4 | 93 | 92,8 | 0,93 | 30,8 | 8,3 | 60 | 3,1 | 3,6 | 0,072 | 267 | 69 |
| 22 | M3JP 180MLA 2 | 3GJP181410-**K | 2957 | 92,7 | 93,3 | 93 | 0,91 | 37,4 | 8,1 | 71 | 2,6 | 3,2 | 0,116 | 307 | 69 |
| 30 | M3JP 200MLA 2 | 3GJP201410-**K | 2958 | 93,3 | 93,7 | 93,6 | 0,9 | 51 | 7,8 | 96,8 | 2,8 | 3,1 | 0,196 | 358 | 72 |
| 37 | M3JP 200MLB 2 | 3GJP201420-**K | 2960 | 93,7 | 94,1 | 93,9 | 0,91 | 62,2 | 8,8 | 119 | 3,1 | 3,4 | 0,217 | 370 | 72 |
| 45 | M3JP 225SMA 2 | 3GJP221210-**K | 2972 | 94 | 94,2 | 93,8 | 0,89 | 76,8 | 7,8 | 144 | 3,1 | 3 | 0,323 | 457 | 74 |
| 55 | M3JP 250SMA 2 | 3GJP251210-**K | 2975 | 94,3 | 94,5 | 94,1 | 0,89 | 93,6 | 8 | 176 | 2,8 | 3,3 | 0,579 | 509 | 75 |
| 75 | M3JP 280SMB 2 | 3GJP281220-**K | 2980 | 94,7 | 94,7 | 94 | 0,87 | 129 | 7,8 | 240 | 2,5 | 3,3 | 0,9 | 766 | 77 |
| 90 | M3JP 280SMC 2 | 3GJP281230-**K | 2981 | 95 | 94,8 | 94,1 | 0,88 | 153 | 8 | 288 | 2,95 | 3,1 | 1,15 | 836 | 77 |
| 110 | M3JP 315SMB 2 | 3GJP311220-**K | 2982 | 95,2 | 95,2 | 94,3 | 0,88 | 189 | 6,7 | 352 | 1,9 | 2,6 | 1,4 | 1041 | 77 |
| 132 | M3JP 315SMC 2 | 3GJP311230-**K | 2986 | 95,4 | 95,5 | 95,1 | 0,88 | 226 | 7,9 | 422 | 2,4 | 3 | 1,7 | 1116 | 77 |
| 160 | M3JP 315MLA 2 | 3GJP311410-**K | 2983 | 95,6 | 95,9 | 95,6 | 0,9 | 268 | 7,3 | 512 | 2,2 | 2,7 | 2,1 | 1286 | 77 |
| 200 | M3JP 355SMA 2 | 3GJP351210-**K | 2985 | 95,8 | 95,5 | 94,5 | 0,89 | 336 | 7,6 | 640 | 2 | 3,1 | 3 | 1781 | 83 |
| 250 | M3JP 355SMB 2 | 3GJP351220-**K | 2983 | 95,8 | 96 | 95,5 | 0,9 | 415 | 7,6 | 800 | 2,2 | 3 | 3,4 | 1878 | 83 |
| 315 | M3JP 355SMC 2 | 3GJP351230-**K | 2984 | 95,8 | 95,8 | 95,1 | 0,89 | 533 | 7,8 | 1008 | 2,3 | 2,8 | 3,6 | 1953 | 83 |
| 355 | M3JP 355MLA 2 | 3GJP351410-**K | 2981 | 95,8 | 96,1 | 95,7 | 0,9 | 595 | 7,5 | 1137 | 2,3 | 2,6 | 4,1 | 2188 | 83 |
| 400 | M3JP 355MLB 2 | 3GJP351420-**K | 2982 | 95,8 | 95,6 | 94,7 | 0,88 | 677 | 7,1 | 1280 | 2,3 | 2,9 | 4,1 | 2190 | 83 |
| 450 | M3JP 355MLC 2 | 3GJP351430-**K | 2983 | 95,8 | 95,8 | 95 | 0,9 | 743 | 7,9 | 1440 | 2,2 | 2,9 | 4,3 | 2270 | 83 |
| 500 | M3JP 355LKA 2 | 3GJP351810-**K | 2982 | 95,8 | 95,8 | 95,3 | 0,9 | 827 | 7,5 | 1601 | 2 | 3,9 | 4,8 | 2510 | 83 |
| 560 | M3JP 400LA 2 | 3GJP401510-**K | 2988 | 95,8 | 95,8 | 94,9 | 0,89 | 934 | 7,8 | 1789 | 2,46 | 3,67 | 7,9 | 3230 | 82 |
| 630 | M3JP 400LB 2 | 3GJP401520-**K | 2987 | 95,8 | 95,5 | 94,8 | 0,89 | 1049 | 7,6 | 2014 | 2,56 | 3,7 | 8,2 | 3330 | 82 |
| 710 | M3JP 400LC 2 | 3GJP401530-**K | 2987 | 95,8 | 95,7 | 94,9 | 0,89 | 1178 | 7,2 | 2270 | 2,56 | 3,4 | 9,3 | 3580 | 82 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3JP 315MLB 2 | 3GJP311420-**K | 2983 | 96,4 | 96,7 | 96,6 | 0,9 | 333 | 6,8 | 640 | 1,9 | 2,6 | 2,2 | 1311 | 77 |
| 250 | M3JP 315LKB 2 | 3GJP311820-**K | 2982 | 95,8 | 96,2 | 96,2 | 0,91 | 413 | 7,9 | 800 | 2,5 | 2,7 | 2,9 | 1620 | 77 |

# Technical data

## IE3 Ex db cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_nA$ | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.55 | M3JP 80MLD 4 | 3GJP082440-**K | 1439 | 80,8 | 82,2 | 81,4 | 0,81 | 1,18 | 6,3 | 3,6 | 2,3 | 3,29 | 0,0028 | 49 | 45 |
| 0.75 | M3JP 80MLG 4 | 3GJP082470-**K | 1445 | 82,5 | 83,5 | 82,2 | 0,79 | 1,62 | 6,9 | 4,97 | 2,6 | 3,76 | 0,0033 | 50 | 57 |
| 1.1 | M3JP 90SLC 4 | 3GJP092030-**K | 1444 | 84,1 | 84,6 | 83,2 | 0,79 | 2,3 | 7,2 | 7,28 | 3,77 | 3,68 | 0,0067 | 61 | 56 |
| 1.5 | M3JP 90LD 4 | 3GJP092540-**K | 1439 | 85,3 | 86,4 | 85,9 | 0,78 | 3,1 | 7,8 | 9,95 | 3,35 | 4,47 | 0,0072 | 62 | 56 |
| 2.2 | M3JP 100LKA 4 | 3GJP102810-**K | 1452 | 86,7 | 87,8 | 87,7 | 0,83 | 4,2 | 8,9 | 14,46 | 3,4 | 4,1 | 0,0146 | 79 | 56 |
| 3 | M3JP 100LKB 4 | 3GJP102820-**K | 1452 | 87,7 | 89 | 89 | 0,83 | 5,8 | 9 | 19,7 | 3,2 | 4 | 0,0146 | 79 | 58 |
| 4 | M3JP 112MG 4 | 3GJP112370-**K | 1454 | 88,6 | 89,1 | 88,6 | 0,75 | 8,7 | 7,5 | 26,3 | 3,1 | 3,7 | 0,0176 | 81 | 59 |
| 5.5 | M3JP 132SMF 4 | 3GJP132260-**K | 1462 | 89,6 | 90,6 | 90,6 | 0,81 | 10,8 | 7,3 | 35,87 | 2,41 | 3,39 | 0,0401 | 119 | 67 |
| 7.5 | M3JP 132SMG 4 | 3GJP132270-**K | 1457 | 90,4 | 91,4 | 91,5 | 0,81 | 14,8 | 7,3 | 49,1 | 2,39 | 3,38 | 0,0401 | 119 | 64 |
| 11 | M3JP 160MLA 4 | 3GJP162410-**K | 1473 | 91,4 | 91,8 | 91,3 | 0,84 | 20,4 | 7,7 | 71,3 | 2,6 | 2,9 | 0,108 | 246 | 62 |
| 15 | M3JP 160MLB 4 | 3GJP162420-**K | 1474 | 92,1 | 92,7 | 92,4 | 0,84 | 27,8 | 7,9 | 97,1 | 2,8 | 3,3 | 0,125 | 261 | 62 |
| 18.5 | M3JP 180MLA 4 | 3GJP182410-**K | 1481 | 92,6 | 92,9 | 92,3 | 0,82 | 34,9 | 7,6 | 119 | 3 | 3,1 | 0,217 | 300 | 62 |
| 22 | M3JP 180MLB 4 | 3GJP182420-**K | 1480 | 93 | 93,5 | 93,2 | 0,82 | 41,5 | 8,2 | 141 | 2,8 | 3,1 | 0,217 | 296 | 62 |
| 30 | M3JP 200MLA 4 | 3GJP202410-**K | 1484 | 93,6 | 93,8 | 93,2 | 0,84 | 54,6 | 8,3 | 193 | 3 | 3,3 | 0,366 | 367 | 63 |
| 37 | M3JP 225SMA 4 | 3GJP222210-**K | 1482 | 93,9 | 94,6 | 94,5 | 0,86 | 65,4 | 7,7 | 238 | 2,8 | 3,1 | 0,536 | 448 | 66 |
| 45 | M3JP 225SMB 4 | 3GJP222220-**K | 1482 | 94,2 | 94,7 | 94,6 | 0,85 | 80,2 | 7,9 | 289 | 3,1 | 3,2 | 0,536 | 451 | 66 |
| 55 | M3JP 250SMA 4 | 3GJP252210-**K | 1485 | 94,6 | 95,2 | 95 | 0,85 | 97,8 | 7,9 | 353 | 3 | 3,3 | 0,933 | 545 | 67 |
| 75 | M3JP 280SMB 4 | 3GJP282220-**K | 1486 | 95 | 95,4 | 95,3 | 0,85 | 134 | 7,4 | 482 | 2,5 | 2,8 | 1,5 | 766 | 72 |
| 90 | M3JP 280SMC 4 | 3GJP282230-**K | 1487 | 95,2 | 95,5 | 95,1 | 0,85 | 161 | 7,9 | 578 | 2,9 | 3 | 1,85 | 827 | 72 |
| 110 | M3JP 315SMC 4 | 3GJP312230-**K | 1491 | 95,4 | 95,7 | 95,2 | 0,85 | 194 | 7,8 | 704 | 2,4 | 3,1 | 2,9 | 1093 | 68 |
| 132 | M3JP 315SMD 4 | 3GJP312240-**K | 1490 | 95,6 | 95,8 | 95,4 | 0,85 | 234 | 7,9 | 846 | 2,6 | 3,2 | 3,2 | 1149 | 68 |
| 160 | M3JP 315MLB 4 | 3GJP312420-**K | 1490 | 95,8 | 96 | 95,6 | 0,86 | 278 | 7,9 | 1026 | 2,7 | 3 | 3,9 | 1308 | 68 |
| 200 | M3JP 355SMA 4 | 3GJP352210-**K | 1491 | 96 | 96,1 | 95,7 | 0,87 | 345 | 7,3 | 1282 | 2,1 | 2,7 | 5,9 | 1794 | 74 |
| 250 | M3JP 355SMB 4 | 3GJP352220-**K | 1491 | 96 | 96,1 | 95,9 | 0,87 | 433 | 7,8 | 1601 | 2,5 | 2,9 | 6,9 | 1950 | 74 |
| 315 | M3JP 355SMC 4 | 3GJP352230-**K | 1490 | 96 | 96,1 | 95,9 | 0,85 | 554 | 7,4 | 2017 | 2,4 | 2,9 | 7,2 | 1998 | 74 |
| 355 | M3JP 355MLA 4 | 3GJP352410-**K | 1491 | 96 | 96,3 | 95,9 | 0,87 | 616 | 7,9 | 2274 | 2,7 | 2,9 | 8,4 | 2333 | 78 |
| 400 | M3JP 355MLB 4 | 3GJP352420-**K | 1489 | 96 | 96 | 95,5 | 0,85 | 705 | 6,8 | 2565 | 2,3 | 2,6 | 8,4 | 2330 | 78 |
| 500 | M3JP 355LKA 4 | 3GJP352810-**K | 1490 | 96 | 96 | 95,3 | 0,86 | 865 | 6,8 | 3204 | 2 | 3 | 10 | 2690 | 78 |
| 560 | M3JP 400LA 4 | 3GJP402510-**K | 1491 | 96 | 96 | 95,4 | 0,85 | 982 | 7,4 | 3586 | 2,4 | 2,8 | 15 | 3200 | 78 |
| 630 | M3JP 400LB 4 | 3GJP402520-**K | 1491 | 96 | 96 | 95,4 | 0,86 | 1077 | 7,6 | 4034 | 2,2 | 2,9 | 16 | 3580 | 78 |
| 710 | M3JP 400LC 4 | 3GJP402530-**K | 1491 | 96 | 96 | 95,5 | 0,85 | 1227 | 7,6 | 4547 | 2,4 | 3 | 17 | 3680 | 78 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_nA$ | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3JP 315LKB 4 | 3GJP312820-**K | 1490 | 96,6 | 96,8 | 96,7 | 0,87 | 346 | 7,6 | 1282 | 2,5 | 2,9 | 5 | 1610 | 74 |
| 250 | M3JP 315LKC 4 | 3GJP312830-**K | 1490 | 96 | 96,2 | 96,1 | 0,87 | 432 | 7,8 | 1601 | 2,3 | 3 | 5,5 | 1690 | 74 |

# Technical data

## IE3 Ex db cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3JP 90SLD 6 | 3GJP093040-**K | 940 | 78,9 | 80,3 | 79,2 | 0,75 | 1,8 | 4,4 | 7,57 | 2,1 | 2,8 | 0,0056 | 58 | 44 |
| 1.1 | M3JP 90LF 6 | 3GJP093560-**K | 944 | 81 | 81,7 | 80,1 | 0,75 | 2,66 | 4,7 | 11,1 | 2,1 | 2,8 | 0,0068 | 61 | 44 |
| 1.5 | M3JP 100LE 6 | 3GJP103550-**K | 960 | 82,5 | 82,5 | 80,1 | 0,68 | 3,8 | 5,4 | 14,9 | 2,7 | 3,4 | 0,012 | 74 | 49 |
| 2.2 | M3JP 112MJ 6 | 3GJP113390-**K | 962 | 84,3 | 85,5 | 84,7 | 0,68 | 5,3 | 6 | 21,8 | 2,4 | 3,5 | 0,0196 | 82 | 66 |
| 3 | M3JP 132SMD 6 | 3GJP133240-**K | 977 | 85,6 | 85,9 | 84,3 | 0,69 | 6,9 | 5,9 | 29 | 1,9 | 3,3 | 0,0416 | 121 | 57 |
| 4 | M3JP 132SMG 6 | 3GJP133270-**K | 974 | 86,8 | 87,4 | 86,6 | 0,69 | 9,3 | 5,6 | 38,7 | 1,8 | 2,84 | 0,0416 | 121 | 57 |
| 5.5 | M3JP 132SMH 6 | 3GJP133280-**K | 966 | 88 | 88,9 | 88,7 | 0,73 | 12,1 | 5 | 54,1 | 1,83 | 2,7 | 0,0654 | 118 | 57 |
| 7.5 | M3JP 160MLA 6 | 3GJP163410-**K | 980 | 89,1 | 89,4 | 88,2 | 0,78 | 15,2 | 7,9 | 73 | 1,7 | 2,8 | 0,114 | 243 | 59 |
| 11 | M3JP 160MLB 6 | 3GJP163420-**K | 979 | 90,3 | 90,4 | 89,1 | 0,74 | 23,5 | 8,5 | 107 | 2,2 | 3,9 | 0,131 | 256 | 59 |
| 15 | M3JP 180MLA 6 | 3GJP183410-**K | 981 | 91,2 | 91,9 | 91,6 | 0,77 | 30,4 | 5,5 | 146 | 1,7 | 2,7 | 0,225 | 296 | 59 |
| 18.5 | M3JP 200MLA 6 | 3GJP203410-**K | 990 | 91,7 | 91,8 | 90,8 | 0,77 | 37,3 | 7,5 | 178 | 2,6 | 3,2 | 0,448 | 340 | 63 |
| 22 | M3JP 200MLB 6 | 3GJP203420-**K | 990 | 92,2 | 92,3 | 91,3 | 0,79 | 43 | 7,8 | 212 | 2,6 | 3,2 | 0,531 | 363 | 63 |
| 30 | M3JP 225SMA 6 | 3GJP223210-**K | 989 | 92,9 | 93,1 | 92,5 | 0,81 | 56,8 | 7,9 | 289 | 2,8 | 3,1 | 0,813 | 440 | 63 |
| 37 | M3JP 250SMA 6 | 3GJP253210-**K | 991 | 93,3 | 93,6 | 93,1 | 0,83 | 68 | 7,7 | 356 | 2,7 | 2,9 | 1,49 | 529 | 63 |
| 45 | M3JP 280SMB 6 | 3GJP283220-**K | 992 | 93,7 | 94,1 | 93,5 | 0,85 | 80,9 | 7,5 | 434 | 2,4 | 2,6 | 2,2 | 777 | 65 |
| 55 | M3JP 280SMC 6 | 3GJP283230-**K | 990 | 94,1 | 94,4 | 94,1 | 0,85 | 99,4 | 6,8 | 506 | 2,4 | 2,6 | 2,85 | 817 | 65 |
| 75 | M3JP 315SMC 6 | 3GJP313230-**K | 994 | 94,6 | 94,8 | 94,4 | 0,83 | 138 | 7 | 721 | 2,2 | 2,8 | 4,9 | 1089 | 67 |
| 90 | M3JP 315SMD 6 | 3GJP313240-**K | 994 | 94,9 | 95,1 | 94,7 | 0,81 | 170 | 7,2 | 864 | 2,4 | 2,9 | 4,9 | 1123 | 67 |
| 110 | M3JP 315MLB 6 | 3GJP313420-**K | 994 | 95,1 | 95,3 | 95,1 | 0,83 | 202 | 6,9 | 1058 | 2,3 | 2,7 | 6,3 | 1288 | 68 |
| 132 | M3JP 315LKA 6 | 3GJP313810-**K | 993 | 95,4 | 95,6 | 95,4 | 0,82 | 243 | 6,9 | 1269 | 2,4 | 2,7 | 7,3 | 1490 | 68 |
| 160 | M3JP 355SMB 6 | 3GJP353220-**K | 995 | 95,6 | 95,6 | 95 | 0,82 | 294 | 7 | 1536 | 2,1 | 2,7 | 9,7 | 1778 | 73 |
| 200 | M3JP 355SMC 6 | 3GJP353230-**K | 995 | 95,8 | 96 | 95,6 | 0,82 | 367 | 7,3 | 1920 | 2,3 | 2,8 | 11,3 | 1921 | 73 |
| 250 | M3JP 355MLB 6 | 3GJP353420-**K | 995 | 95,8 | 96 | 95,9 | 0,83 | 456 | 7,1 | 2399 | 2,3 | 2,7 | 13,5 | 2345 | 73 |
| 315 | M3JP 355LKA 6 | 3GJP353810-**K | 994 | 95,8 | 96 | 95,6 | 0,83 | 576 | 6,9 | 3026 | 2,3 | 2,6 | 15,5 | 2670 | 76 |
| 355 | M3JP 355LKB 6 | 3GJP353820-**K | 995 | 95,8 | 95,9 | 95,3 | 0,81 | 668 | 7,7 | 3407 | 2,7 | 2,9 | 16,5 | 2770 | 76 |
| 400 | M3JP 400LA 6 | 3GJP403510-**K | 993 | 95,8 | 95,8 | 95,1 | 0,82 | 731 | 7,1 | 3846 | 2,3 | 2,7 | 17 | 3180 | 76 |
| 450 | M3JP 400LB 6 | 3GJP403520-**K | 994 | 95,8 | 95,8 | 95,2 | 0,82 | 819 | 7,4 | 4323 | 2,4 | 2,5 | 20,5 | 3430 | 76 |
| 500 | M3JP 400LC 6 | 3GJP403530-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3580 | 76 |
| 500 | M3JP 400LKC 6 | 3GJP403830-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3580 | 76 |
| 560 | M3JP 400LD 6 | 3GJP403540-**K | 993 | 95,8 | 95,8 | 95,2 | 0,85 | 984 | 7,4 | 5386 | 2,4 | 2,8 | 24 | 3680 | 77 |
| 610 | M3JP 450LA 6 | 3GJP453510-**K | 994 | 95,8 | 95,8 | 95,3 | 0,83 | 1098 | 7,1 | 5860 | 1,4 | 2,9 | 31 | 4320 | 81 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 160 | M3JP 315LKC 6 | 3GJP313830-**K | 994 | 95,6 | 95,8 | 95,7 | 0,82 | 297 | 7,4 | 1537 | 2,7 | 2,9 | 9,2 | 1690 | 68 |

# Technical data

## IE3 Ex db cast iron motors, 800 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kg$m_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_I/T_N$ | $T_b/T_N$ | | | |
| **800 r/min = 8 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3JP 100LKA 8 | 3GJP104810-**K | 710 | 75 | 74,5 | 70,5 | 0,65 | 2,13 | 4,4 | 10 | 2,35 | 2,8 | 0,00855 | 70 | 53 |
| 1.1 | M3JP 100LKB 8 | 3GJP104820-**K | 703 | 77,7 | 77,7 | 74,7 | 0,65 | 3,08 | 4,4 | 14,9 | 2,7 | 2,9 | 0,0128 | 78 | 53 |
| 1.5 | M3JP 112MC 8 | 3GJP114330-**K | 717 | 79,7 | 80,1 | 78,8 | 0,62 | 4,12 | 4,3 | 19,9 | 1,8 | 2,6 | 0,0194 | 82 | 55 |
| 2.2 | M3JP 132SMA 8 | 3GJP134210-**K | 725 | 81,9 | 82,3 | 80,2 | 0,64 | 5,8 | 5,2 | 28,9 | 2 | 3 | 0,0291 | 105 | 57 |
| 3 | M3JP 132SMG 8 | 3GJP134270-**K | 723 | 83,5 | 84,1 | 82,8 | 0,66 | 7,5 | 4,8 | 39,6 | 1,8 | 2,8 | 0,0375 | 115 | 57 |
| 4 | M3JP 160MLA 8 | 3GJP164410-**K | 734 | 84,8 | 85,1 | 83,2 | 0,65 | 10,3 | 4,5 | 52 | 1,8 | 2,3 | 0,091 | 218 | 59 |
| 5.5 | M3JP 160MLB 8 | 3GJP164420-**K | 732 | 86,2 | 87,1 | 86,1 | 0,69 | 13 | 5 | 71,7 | 2 | 2,35 | 0,091 | 219 | 59 |
| 7.5 | M3JP 160MLC 8 | 3GJP164430-**K | 733 | 87,3 | 88,2 | 87,2 | 0,69 | 17,6 | 5,1 | 97,7 | 2 | 2,4 | 0,12 | 238 | 59 |
| 11 | M3JP 180MLA 8 | 3GJP184410-**K | 731 | 88,6 | 89,2 | 88,4 | 0,7 | 25,3 | 5 | 143,6 | 2,1 | 2,1 | 0,2 | 281 | 59 |
| 15 | M3JP 200MLA 8 | 3GJP204410-**K | 737 | 89,6 | 90,5 | 90,1 | 0,74 | 32,5 | 5,2 | 194 | 2,1 | 2,4 | 0,45 | 339 | 60 |
| 18.5 | M3JP 225SMA 8 | 3GJP224210-**K | 736 | 90,1 | 90,8 | 90,2 | 0,74 | 39,8 | 5,2 | 240 | 2 | 2,25 | 0,669 | 422 | 63 |
| 22 | M3JP 225SMB 8 | 3GJP224220-**K | 736 | 90,6 | 91,6 | 91,5 | 0,73 | 47,5 | 5,3 | 285 | 2,26 | 2,47 | 0,722 | 435 | 63 |
| 30 | M3JP 250SMA 8 | 3GJP254210-**K | 741 | 91,3 | 91,7 | 91 | 0,71 | 67 | 5,6 | 386 | 2,7 | 2,7 | 1,4 | 512 | 63 |
| 37 | M3JP 280SMA 8 | 3GJP284210-**K | 741 | 91,8 | 92 | 91,3 | 0,79 | 72,6 | 7,3 | 476 | 1,7 | 3 | 1,85 | 605 | 65 |
| 45 | M3JP 280SMB 8 | 3GJP284220-**K | 741 | 92,2 | 92,3 | 91,7 | 0,78 | 89,2 | 7,6 | 579 | 1,8 | 3,1 | 2,2 | 645 | 65 |
| 55 | M3JP 315SMA 8 | 3GJP314210-**K | 742 | 92,5 | 93,1 | 92,5 | 0,8 | 106 | 7,1 | 707 | 1,6 | 2,7 | 3,2 | 830 | 62 |
| 75 | M3JP 315SMB 8 | 3GJP314220-**K | 741 | 93,1 | 93,2 | 93,1 | 0,82 | 146 | 7,1 | 966 | 1,7 | 2,7 | 4,1 | 930 | 62 |
| 90 | M3JP 315SMC 8 | 3GJP314230-**K | 741 | 93,4 | 93,7 | 93,4 | 0,82 | 170 | 7,4 | 1159 | 1,8 | 2,7 | 4,9 | 1000 | 64 |
| 110 | M3JP 315MLA 8 | 3GJP314410-**K | 740 | 93,7 | 94 | 94,1 | 0,83 | 211 | 7,3 | 1419 | 1,8 | 2,7 | 5,8 | 1150 | 72 |
| 132 | M3JP 355SMA 8 | 3GJP354210-**K | 744 | 94 | 93,9 | 93,4 | 0,79 | 256 | 7,5 | 1694 | 1,5 | 2,6 | 7,9 | 1520 | 69 |
| 160 | M3JP 355SMB 8 | 3GJP354220-**K | 744 | 94,3 | 94,3 | 93,8 | 0,79 | 293 | 7,6 | 2053 | 1,6 | 2,6 | 9,7 | 1680 | 69 |
| 200 | M3JP 355SMC 8 | 3GJP354230-**K | 742 | 94,6 | 95 | 94,8 | 0,79 | 385 | 7,4 | 2576 | 1,6 | 2,6 | 11,3 | 1930 | 69 |
| 250 | M3JP 355MLB 8 | 3GJP354420-**K | 743 | 94,6 | 94,7 | 94,1 | 0,8 | 472 | 7,5 | 3213 | 1,6 | 2,7 | 13,5 | 2370 | 72 |
| 315 | M3JP 400LA 8 | 3GJP404510-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 3180 | 71 |
| 315 | M3JP 400LKA 8 | 3GJP404810-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 3180 | 71 |
| 355 | M3JP 400LB 8 | 3GJP404520-**K | 743 | 94,6 | 94,9 | 94,6 | 0,83 | 641 | 6,8 | 4562 | 1,2 | 2,5 | 21 | 3480 | 71 |
| 400 | M3JP 400LC 8 | 3GJP404530-**K | 744 | 94,6 | 94,9 | 94,3 | 0,81 | 735 | 6 | 5134 | 1,3 | 2,7 | 24 | 3680 | 71 |
| 430 | M3JP 450LA 8 | 3GJP454510-**K | 744 | 94,6 | 94,9 | 94,5 | 0,82 | 789 | 6,2 | 5519 | 1 | 2,6 | 26 | 3920 | 80 |
| 470 | M3JP 450LB 8 | 3GJP454520-**K | 744 | 94,6 | 94,9 | 94,3 | 0,8 | 861 | 6,6 | 6032 | 1,1 | 2,7 | 29 | 4160 | 80 |
| 530 | M3JP 450LC 8 | 3GJP454530-**K | 745 | 94,6 | 94,7 | 94,2 | 0,81 | 982 | 7,3 | 6793 | 1,3 | 3 | 35 | 4520 | 80 |
| 600 | M3JP 450LD 8 | 3GJP454540-**K | 745 | 94,6 | 94,6 | 94 | 0,8 | 1124 | 7,9 | 7690 | 1,4 | 3,3 | 41 | 4960 | 80 |

# Variant codes

## Flameproof cast iron motors, Ex db IIB/IIC T4 Gb

Variant codes specify additional options and features to the standard motor. The desired features are listed as three-digit variant codes in the motor order. Note also that there are variants that cannot be used together.

Most of the variant codes apply to IE2 and IE3 motors. However, confirm the availability of variants for IE3 motors with your ABB sales office before making an order.

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| **Administration** | | | | | | | | | | | | | | | | |
| 529 | Customer witnessed visual inspection of complete order line. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 530 | Two-year extension on standard warranty | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 531 | Sea freight packing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 533 | Wooden sea freight packing | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 590 | Mounting of customer supplied part other than coupling. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 648 | Rating plate in special language | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 999 | Case specific design requiring a quotation | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Balancing** | | | | | | | | | | | | | | | | |
| 417 | Vibration acc. to Grade B (IEC 60034-14). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 423 | Balanced without key. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 424 | Full-key balancing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Bearings and Lubrication** | | | | | | | | | | | | | | | | |
| 036 | Transport lock for bearings. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 037 | Roller bearing at D-end. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| 040 | Heat-resistant grease | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 041 | Bearings regreasable via grease nipples. | - | - | - | - | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 058 | Angular contact bearing at D-end, shaft force away from bearing. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 107 | Pt100 2-wire in bearings. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 128 | Double PT100, 2-wire in bearings | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 129 | Double PT100, 3-wire in bearings | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 130 | Pt100 3-wire in bearings. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 194 | 2Z bearings greased for life at both ends. | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | - | - | - | - | - |
| 433 | Outlet grease collector | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 506 | Nipples for vibration measurement : SKF Marlin Quick Connect stud CMSS-2600-3 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 593 | Bearings grease suitable for food and beverage industry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 654 | Provision for vibration sensors (M8x1) | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 795 | Lubrication information plate | - | - | - | - | - | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| 796 | Grease nipples JIS B 1575 PT 1/8 Type A | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 797 | Stainless steel SPM nipples | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 798 | Stainless steel grease nipples | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 799 | Grease nipples flat type DIN 3404, thread M10x1 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 800 | Grease nipples JIS B 1575 PT 1/8" pin type | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 828 | SPM compatible nipple for vibration measurement at D-end only. | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| **Branch standard designs** | | | | | | | | | | | | | | | | |
| 178 | Stainless steel / acid proof bolts. | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 204 | Jacking bolts for foot mounted motors. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ |
| 209 | Non-standard voltage or frequency, (special winding). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 396 | Motor designed for minimum ambient temperature -20 °C to -40 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 397 | Motor designed for minimum ambient temperature -40 °C to -55 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 398 | Motor designed for minimum ambient temperature -20 °C to -40 °C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 399 | Motor designed for minimum ambient temperature -40 °C to -55 °C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 425 | Corrosion protected stator and rotor core. | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 524 | Special run-out tolerances on flange and shaft for close coupled pump applications. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 786 | Special design shaft upwards (V3, V35, V6) for outdoor mounting. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| **Cooling system** | | | | | | | | | | | | | | | | |
| 044 | Unidirectional fan for reduced noise level. Rotation clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | - |
| 045 | Unidirectional fan for reduced noise level. Rotation counter clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | - |
| 068 | Light alloy metal fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 183 | Separate motor cooling (fan axial, N-end). | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 206 | Steel fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 514 | Separate motor cooling (fan on top) | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 791 | Stainless steel fan cover | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Coupling** | | | | | | | | | | | | | | | | |
| 035 | Assembly of customer supplied coupling-half. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Documentation** | | | | | | | | | | | | | | | | |
| 141 | Binding 2D main dimension drawing. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 370 | Motor model drawing in 3D | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 374 | Binding 2D motor detailed drawing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 536 | Photos of manufactured motors | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 537 | Advanced data sheet | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 722 | Rotor dimension drawing (incl. torsional stiffness). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 777 | Premium documentation package | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Drain holes** | | | | | | | | | | | | | | | | |
| 448 | Draining holes with metal plugs. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Earthing Bolt** | | | | | | | | | | | | | | | | |
| 525 | External earthing bolts on motor feet | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Hazardous Environments** | | | | | | | | | | | | | | | | |
| 334 | Ex t, Dust group III B T125C Db, IP6X (non-conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 336 | Ex t, Dust group III C T125 Db, IP6X (conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 461 | Ex d(e) design, Group II C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 464 | Alleinschutz' design. Certification of flame proof motor and protection device together. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - |
| 516 | Temperature detectors approved to be connected to an Ex i circuit | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 813 | Thermistor-based surface temperature protection T4 for frequency converter duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 814 | Ex t (DIP) motors, temperature class T 150C. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 816 | Pt-100-based surface temperature protection T4 for frequency convertor duty. 3-wire system. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| **Heating elements** | | | | | | | | | | | | | | | | |
| 450 | Heating element, 100-120 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 451 | Heating element, 200 - 240 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Insulation system** | | | | | | | | | | | | | | | | |
| 014 | Winding insulation class H. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 405 | Special winding insulation for frequency converter supply. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Marine** | | | | | | | | | | | | | | | | |
| 024 | Fulfilling Bureau Veritas (BV) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 025 | Fulfilling DNV requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 026 | Fulfilling Lloyds Register of Shipping (LR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 027 | Fulfilling American Bureau of Shipping (ABS) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 050 | Fulfilling Registro Italiano Navale (RINA) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 096 | Fulfilling Lloyds Register of Shipping (LR) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 186 | Fulfilling DNV requirements, without certificate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 481 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 483 | Fulfilling China Classification Societies (CCS) requirements (Beijing), with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 484 | Fulfilling Korea Register of Shipping (KR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 491 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 492 | Fulfilling Registro Italiano Navale (RINA) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 493 | Fulfilling China Classification Societies (CCS) requirements (Beijing), without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 494 | Fulfilling Korea Register of Shipping (KR) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 496 | Fulfilling Bureau Veritas (BV) requirements, without certificate(non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 675 | Fulfilling American Bureau of Shipping (ABS) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mounting arrangements** | | | | | | | | | | | | | | | | |
| 008 | IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3). | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 009 | IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 047 | IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5). | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 066 | Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 229 | Flange FT 130. | ● | ● | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - |
| 235 | Flange FF 165. | ○ | ○ | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 236 | Flange FT 165. | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 245 | Flange FF 215. | - | - | ○ | ○ | ● | - | - | - | - | - | - | - | - | - | - |
| 246 | Flange FT 215. | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 256 | Flange FT 265. | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - |
| 257 | Flange FF 100. | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 259 | Flange FF 115. | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 260 | Flange FT 115. | ● | ○ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 305 | Additional lifting lugs. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Painting** | | | | | | | | | | | | | | | | |
| 105 | Paint thickness report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 114 | Special paint color, standard grade | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 115 | Painting system C4,durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 168 | Primer paint only. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 303 | Painted insulation layer on inside of the terminal boxes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 710 | Norsok M-501 rev. 7 Coating system no. 2B | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 711 | Painting system C5, durability High | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 712 | Painting system C5-M according to Petrobras specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 713 | Painting system according Total Egina specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 717 | Painting system C4, durability High | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 719 | Painting system CX | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 754 | Painting system C5, durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 755 | Norsok M-501 revision 6, Coating system no. 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Protection** | | | | | | | | | | | | | | | | |
| 005 | Protective roof | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 072 | Radial seal at D-end. Not possible for 2-pole , 280 and 315 frames | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| 073 | Sealed against oil at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| 158 | Degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 239 | Opendeck saltwater execution | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 240 | Opendeck fresh water execution | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 249 | Open deck execution for counter clockwise application, IP56 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 250 | Degree of protection IP66 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 401 | Protective roof, horizontal motor. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 403 | Degree of protection IP56. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 434 | Degree of protection IP56, open deck. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 783 | Labyrinth sealing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| **Rating & instruction plates** | | | | | | | | | | | | | | | | |
| 002 | Restamping voltage, frequency and output, continuous duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 004 | Additional text on std rating plate (max 12 digits on free text line). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 095 | Restamping output (maintained voltage, frequency), intermittent duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 126 | Tag plate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 135 | Mounting of additional identification plate, stainless. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 139 | Additional identification plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 159 | Additional plate with text "Made in ...." | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 160 | Additional rating plate affixed. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 161 | Additional rating plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 163 | Frequency converter rating plate. Rating data according to quotation. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 181 | Rating plate with ABB standard loadability values for VSD operation. Other auxiliaries for VSD operation to be selected as necessary. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 332 | Baldor Catalogue # | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 333 | Not for use in the USA | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 528 | Rating plate sticker | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Shaft & rotor** | | | | | | | | | | | | | | | | |
| 069 | Two shaft extensions according to catalog drawings. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 070 | Special shaft extension at D-End, standard shaft material | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 155 | Cylindrical shaft extension, D-end, without key-way. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 164 | Shaft extension with closed keyway | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | - |
| 165 | Shaft extension with open keyway | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| 410 | Shaft material stainless steel | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 591 | Special shaft extension according to customer specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 600 | Special shaft extension at N-end, standard shaft material. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 630 | Shaft material certificate 3.1/3.2 according to EN10204:2004 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Standards and Regulations** | | | | | | | | | | | | | | | | |
| 331 | Motor not for sale for use in EU or UK. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 381 | Frame agreement betw. ABB and Shell according to Shell DEP 33.66.05.31-GEN February 2018 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 421 | VIK design (Verband der Industriellen Energie- und Kraftwirtschaft e.V.). | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 523 | Neste Rotterdam design. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 540 | Fulfilling energy efficiency requirements for China | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 541 | Inmetro certification | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 544 | Australian HE MEPS | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 551 | IA certificate of conformity for South Africa | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 558 | Saudi Arabian MEPS (SASO) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 586 | Fulfilling UK Conformity Assessment (UKCA) requirements. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 599 | EQM – Emirates Quality Mark | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 682 | CCC Ex certificate for China | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 758 | Saudi Aramco design. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 803 | PESO/CCoE certificate for India | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 811 | JIP-33 standard design | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 827 | Petrobras N-2919 Specification design | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 841 | Shell DEP 33.66.05.31-GEN February 2022 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| **Stator winding temperature sensors** | | | | | | | | | | | | | | | | |
| 121 | Bimetal detectors, break type (NCC), (3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 122 | Bimetal detectors, break type (NCC), (3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 123 | Bimetal detectors, break type (NCC), (3 in series), 170 ºC, in stator winding | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 125 | Bimetal detectors, break type (NCC), (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 127 | Bimetal detectors, break type (NCC), (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 328 | PTC - thermistors (3 in series), 120ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 435 | PTC - thermistors (3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 439 | PTC - thermistors (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 441 | PTC - thermistors (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 445 | Pt100 2-wire in stator winding, 1 per phase | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 446 | Pt100 2-wire in stator winding, 2 per phase | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 502 | Pt100 3-wire in stator winding, 1 per phase | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 503 | Pt100 3-wire in stator winding, 2 per phase | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 511 | PTC thermistors (2 x 3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Terminal box** | | | | | | | | | | | | | | | | |
| 019 | Larger than standard terminal box. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 021 | Terminal box LHS (seen from D-end). | - | - | - | - | - | ● | ● | - | - | - | - | - | - | - | - |
| 022 | Cable entry LHS (seen from D-end). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 157 | Terminal box degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 180 | Terminal box RHS (seen from D-end). | - | - | - | - | - | ● | ● | - | - | - | - | - | - | - | - |
| 230 | Standard metal cable gland. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 292 | Adapter C-C | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 293 | Adapter D-D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 294 | Adapter E-D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 295 | Adapter E-2D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 351 | Terminal block turned according to cable entry | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● |
| 380 | Separate terminal box for temperature detectors, std. material | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 413 | Extended cable connection, no terminal box. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 418 | Separate terminal box for auxiliaries, standard material. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 466 | Terminal box at N-end. | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● |
| 468 | Cable entry from D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| 469 | Cable entry from N-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| 553 | Terminal box degree of protection IP66. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 554 | Cast iron flange for cable glands drilled and tapped according to order. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 557 | Nickel plated cable glands mounted according to order. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 567 | Separate terminal box material: cast Iron | - | - | - | - | ○ | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| 568 | Separate terminal box for heating elements, std. material | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 624 | Prepared for inch cable glands according to BSPP standard. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 727 | Stainless steel flange for cable glands drilled and tapped according to order. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 730 | Prepared for NPT cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 731 | Two standard metal cable glands. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 734 | Standard cable gland, Ex d IIC, armoured cable. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 735 | Standard cable gland, Ex d IIC, non-armoured cable. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 743 | Non-drilled cast iron flange for cable glands | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 744 | Stainless steel non-drilled flange for cable glands. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 745 | Painted cast iron flange equipped with nickel plated brass cable glands | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 746 | Stainless steel cable flange equipped with standard nickel plated brass cable glands | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Testing** | | | | | | | | | | | | | | | | |
| 145 | Type test report from a catalogue motor, 400V 50Hz. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 146 | Type test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 148 | Routine test report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 149 | Test according to separate test specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 150 | Customer witnessed testing. Specify test procedure with other codes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 222 | Torque/speed test, type test and multi-point load test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 560 | Shaft voltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 561 | Overspeed test,for one motor from specific delivery batch | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 562 | Overvoltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 760 | Vibration level test | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 761 | Vibration spectrum test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 762 | Noise level test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 763 | Noise spectrum test for one motor from specific delivery batch. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 764 | Test for one motor from specific delivery batch with ABB frequency converter available at ABB test field. ABB standard test procedure. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Variable speed drives** | | | | | | | | | | | | | | | | |
| 182 | Mounting of non-listed pulse tacho. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 479 | Mounting of other type of pulse tacho with shaft extension, tacho not included. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 701 | Insulated bearing at N-end. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 704 | EMC cable entry. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 747 | 1024 pulse tacho, Ex d, tD, L&L 841910002 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

# Mechanical design

## Motor frame and drain holes

### Motor frame

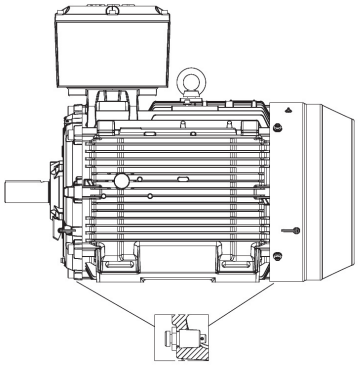
Motors can be supplied for foot mounting, flange mounting, and combinations of these.

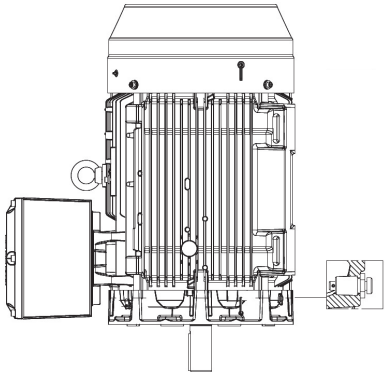
### Drain holes

Flameproof Ex db motors are provided without drain holes and plugs as standard.

It's recommended that motors that will be operated in very humid or wet environments, and especially under intermittent duty, should be provided with drain holes with plugs to ensure that water possibly condensed inside the enclosure can easily be drained. Flameproof drain plugs which can be easily opened and closed are available as an option for motors in frame size 160 and larger. Please refer to the variant code section, variant 448 under heading "Drain holes".

When mounting arrangement differs from foot mounted IM B3, mention variant code 066 when ordering to ensure the drain plug is mounted in the lowest position.





# Mechanical design

## Lifting lugs

All motors are equipped with lifting lugs for safe lifting of the motor. The lugs are designed for lifting the motor only, they may not be used for lifting the motor and the equipment on which it is mounted.

| Frame size | Type of lugs | Horisontal mounting B3, B35 | Vertical mounting V1, V3 |
|---|---|---|---|
| 80-112 | Integrated in casting | 2 pcs close to ter- minal box on top | 2 pcs close to terminal box |
| 132 | Integrated in casting | 1 pcs at D-end, 1 pcs at N-end | 1 pcs at D-end, 1 pcs at N-end |
| 160-180 | Detachable eye bolt | 1 pcs close to terminal box on top | 2 pcs, either at N- end or D-end depending on need |
| 200-250 | Integrated in casting | 1 pcs at D-end, 1 pcs at N-end | 2 pcs at N-end, 2 pcs at D-end |
| 280-450 | Detachable eye bolt | 1 pcs close to terminal box on top | 2 pcs, either at N- end or D-end depending on need |

# Mechanical design

## Heating elements

Heating elements are installed on stator winding coil heads to keep the winding dry and free of corrosion in humid conditions. The power of the heating elements is shown in the table. You can order heating elements with variant code 450 or 451.

| Motor size | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| Motor size | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 60 | 60 | 60 | 2x60 | 2x60 | 2x60 | 2x100 |

Motors for marine applications mounted on open deck may have heating element powers differing from the ones shown in this table.

# Mechanical design

## Bearings

ABB's flameproof motors are normally fitted with single-row deep-groove grease lubricated ball bearings, as shown in the table below.

If the bearing at the D-end is replaced with a roller bearing (NU- or NJ-), higher radial forces can be handled. Roller bearings are suitable for belt-drive applications and can be ordered with variant code 037. Note that the possibility to have roller bearing at D-end is limited on larger flameproof motors due to the higher radial clearance in bearing and possible bending of shaft together with narrow flame path between shaft and inner bearing cover, especially in conjunction with gas group IIC design.

### Standard and alternative designs

| Motor size | Number of poles | Standard design | | Alternative designs | | |
|---|---|---|---|---|---|---|
| | | Deep groove ball bearings | | Roller bearings (037) | Roller bearings (037) | Angular contact ball bearings (058) |
| | | D-end | N-end | D-end, gas group IIB | D-end, gas group IIC | D-end |
| 80 | 2 - 8 | 6205-2Z/C3 | 6204-2Z/C3 | NA | NA | NA |
| 90 | 2 - 8 | 6205-2Z/C3 | 6204-2Z/C3 | NA | NA | NA |
| 100 | 2 - 8 | 6206-2Z/C3 | 6205-2Z/C3 | NA | NA | NA |
| 112 | 2 - 8 | 6206-2Z/C3 | 6206-2Z/C3 | NA | NA | NA |
| 132 | 2 - 8 | 6208-2Z/C3 | 6208-2Z/C3 | NA | NA | NA |
| 160 | 2 - 12 | 6309/C3 | 6309/C3 | NU 309 ECP/C3 | NU 309 ECP/C3 | NA |
| 180 | 2 - 12 | 6310/C3 | 6310/C3 | NU 310 ECP/C3 | NU 310 ECP/C3 | NA |
| 200 | 2 | 6312M/C3 | 6210M/C3 | NU 312 ECP/C3 | NU 312 ECP/C3 | NA |
| | 4 - 12 | 6312/C3 | 6310/C3 | NU 312 ECP/C3 | NU 312 ECP/C3 | NA |
| 225 | 2 | 6313M/C3 | 6312M/C3 | NU 313 ECP/C3 | NU 313 ECP/C3 | NA |
| | 4 - 12 | 6313/C3 | 6312/C3 | NU 313 ECP/C3 | NU 313 ECP/C3 | NA |
| 250 | 2 | 6315M/C3 | 6313M/C3 | NU 315 ECP/C3 | NA | NA |
| | 4 - 12 | 6315/C3 | 6313/C3 | NU 315 ECP/C3 [1)] | NA | NA |
| 280 | 2 | 6316/C3 | 6316/C3 | | NA | 7316 B |
| | 4 - 12 | 6316/C3 | 6316/C3 | NU 316 ECP/C3 [1)] | NA | 7316 B |
| 315 | 2 | 6316/C3 | 6316/C3 | | NA | 7316 B |
| | 4 - 12 | 6319/C3 | 6316/C3 | NU 319 ECP/C3 | NA | 7319 B |
| 355 | 2 | 6316M/C3 | 6316M/C3 | NA | NA | 7316 B |
| | 4 - 12 | 6322/C3 | 6316/C3 | NA | NA | 7322 B |
| 400 | 2 | 6317M/C3 | 6317M/C3 | NA | NA | 7317 B |
| | 4 - 12 | 6324/C3 | 6319/C3 | NA | NA | 7324 B |
| 450 | 4 - 12 | 6326M/C3 | 6322/C3 | NA | NA | 7326 B |

[1)] On request

### Axially-locked bearings

All motors are equipped as standard with an axially locked bearing at the D-end.

### Transport locking

Motors with roller bearings or an angular-contact ball bearing are fitted with a transport lock before dispatch to prevent damage to bearings during transport. A warning label is attached to motors when transport locking is used.

When high axial forces are involved, angular-contact ball bearings should be used. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force to ensure that optimal bearing system design is chosen. The variant codes for ordering angular-contact ball bearings are 058 and 059.

Locking may also be fitted in other cases if severe transport conditions are expected.

### Bearing seals

Table on next page present the standard and alternative and types of bearing seals per motor size.

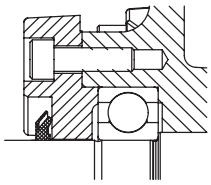
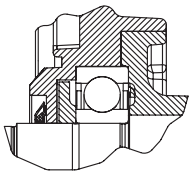
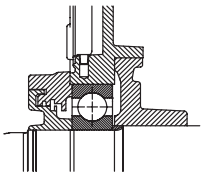
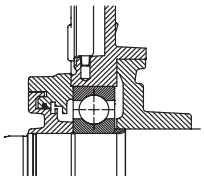
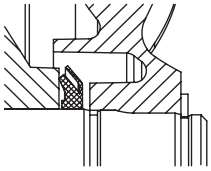
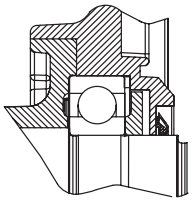
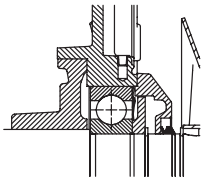
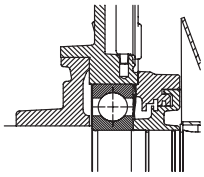
### Bearing seals

| Motor size | Number of poles | Standard design | | Alternative design | |
|---|---|---|---|---|---|
| | | D-end | N-end | Radial seal at D-end (variant code 072) [1] | Labyrinth seal at D-end (variant code 783) [1] |
| 80 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 90 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 100 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 112 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 132 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 160 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 180 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 200 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 225 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 250 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 280 | 2 - 12 | Labyrinth seal | V-ring [2] | NA | Standard |
| 315 | 2 - 12 | Labyrinth seal | V-ring [2] | NA | Standard |
| 355 | 2 - 12 | Labyrinth seal | V-ring [2] | NA | Standard |
| 400 | 2 | Labyrinth seal | Labyrinth seal | NA | Standard |
| 400 | 4 - 12 | Labyrinth seal | V-ring | NA | Standard |
| 450 | 4 - 12 | Labyrinth seal | Labyrinth seal | NA | Standard |

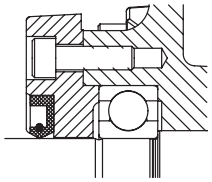
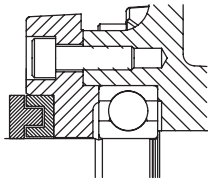
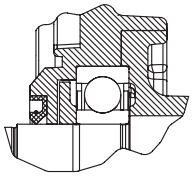
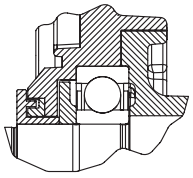
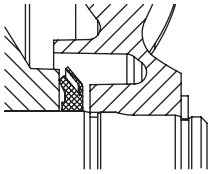
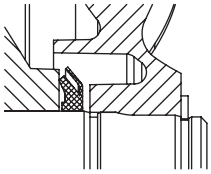
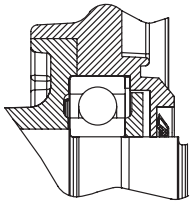
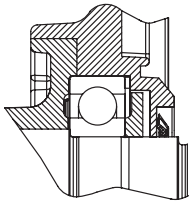
[1] N-end bearing seal of standard design, special N-end bearing seal arrangements on request

[2] V-ring on motors with efficiency class IE2, labyrinth seal on IE3 and IE4 motors

### Standard design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 80-132, gamma/gamma seal | 160-250, gamma/gamma seal | 280-355, 400 4-12 poles, labyrinth/V-ring seal | 400 2 poles, 450 4-12 poles, labyrinth/labyrinth seal |

### Alternative design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 80-132, VC072 radial/gamma seals | 80-132, VC783 labyrinth/gamma seals | 160-250, VC072 radial/gamma seals | 160-250, VC783 labyrinth/gamma seals |

### Bearing life

The nominal life $L_{10h}$ of a bearing is defined according to ISO 281 as the number of operating hours achieved or exceeded by 90 % of identical bearings in a large test series under specified conditions. 50 % of bearings achieve at least five times this lifetime.

The calculated bearing life $L_{10h}$ for power transmission by means of coupling is for horizontally mounted motors in sizes up to 315 ≥ 100,000 hours.

### Lubrication

On delivery, motors in frame size 160 and above are pre-lubricated with high-quality grease.

Before first start-up, see instructions for re-lubrication and recommended grease in the installation, operation, maintenance and safety manual delivered together with the motor, or see the lubrication plate on the motor.

### Motors with bearings greased for life

Motors in frame sizes 80-132 are equipped with bearings greased for life, while this is available as an option for frame sizes 160-250. Bearings are lubricated with high-quality, high-temperature grease. Bearing types are stated on the rating plate. The approximate lifetime of bearings in four-pole motors is about 40 000 duty hours. Lifetime is subject to the load conditions of the application run by the motor.

### Motors with relubrication nipples

In frame sizes 160-450, the bearing system is provided with valve discs to ease lubrication. Motors are lubricated while running. The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1-2 hours after regreasing. This ensures that the construction is tight and bearings remain dust- and dirt-free.

A grease-collection method can be used optionally.

The following tables show lubrication intervals according to the $L_1$ principle for various nominal speeds in 25 °C ambient temperature. These values apply to horizontally mounted motors (B3) with 80 °C bearing temperature and high-quality grease containing lithium-complex soap and mineral or PAO-oil.

### Lubrication intervals in duty hours for ball bearings

| Frame size | Amount of grease g/bearing | Amount of grease g/N-end | Speed 3600 r/min | Speed 3000 r/min | Speed 1800 r/min | Speed 1500 r/min | Speed 1000 r/min | Speed 500-900 r/min |
|---|---|---|---|---|---|---|---|---|
| **Ball bearings** | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | |
| 160 | 13 | 13 | 7100 | 8900 | 14300 | 16300 | 20500 | 21600 |
| 180 | 15 | 15 | 6100 | 7800 | 13100 | 15100 | 19400 | 20500 |
| 200 | 20 | 15 | 4300 | 5900 | 11000 | 13000 | 17300 | 18400 |
| 225 | 23 | 20 | 3600 | 5100 | 10100 | 12000 | 16400 | 17500 |
| 250 | 30 | 23 | 2400 | 3700 | 85000 | 10400 | 14700 | 15800 |
| 280 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 280 | 40 | 40 | - | - | 7800 | 9600 | 13900 | 15000 |
| 315 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 315 | 55 | 40 | - | - | 5900 | 7600 | 11800 | 12900 |
| 355 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 355 | 70 | 40 | - | - | 4000 | 5600 | 9600 | 10 700 |
| 400 | 40 | 40 | 1500 | 2700 | - | - | - | - |
| 400 | 85 | 55 | - | - | 3200 | 4700 | 8600 | 9700 |
| 450 | 95 | 70 | - | - | 2500 | 3900 | 7700 | 8700 |

## Lubrication intervals in duty hours for roller bearings

| Frame size | Amount of grease g/bearing | Amount of grease g/N-end | Output kW | Speed 3600 r/min | Speed 3000 r/min | Output kW | Speed 1800 r/min | Speed 1500 r/min | Output kW | Speed 1000 r/min | Output kW | Speed 500-900 r/min |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Roller bearings** | | | | | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | | | | | |
| 160 | 13 | 13 | all | 3600 | 4500 | all | 7200 | 8100 | all | 10 300 | all | 10 800 |
| 180 | 15 | 15 | | 3000 | 3900 | all | 6600 | 7500 | all | 9700 | all | 10 200 |
| 200 | 20 | 15 | | 2100 | 3000 | all | 5500 | 6500 | all | 8600 | all | 9200 |
| 225 | 23 | 20 | | 1800 | 1600 | all | 5100 | 6000 | all | 8200 | all | 8700 |
| 250 | 30 | 23 | | 1200 | 1900 | all | 4200 | 5200 | all | 7300 | all | 7900 |
| 280 | 40 | 40 | | - | - | all | 4000 | 5300 | all | 7000 | all | 8500 |
| 315 | 55 | 40 | | - | - | all | 2900 | 3800 | all | 5900 | all | 6500 |

# Mechanical design

## Radial forces

### Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated with FR as follows:

$$D = \frac{1.9 \cdot 10^7 \cdot K \cdot P}{n \cdot F_R}$$

| Where: | |
|---|---|
| D: | pulley diameter, mm |
| P: | power requirement, kW |
| n: | motor speed, r/min. |
| K: | belt tension factor, dependent on belt type and type of duty. A common value for V-belts is 2.5 |
| $F_R$: | permissible radial force, refer to tables below. |

### Permissible loading on the shaft

The following table shows permissible radial forces on the shaft in Newtons, assuming zero axial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life $L_{10h}$ of 40 000 hours per motor size.

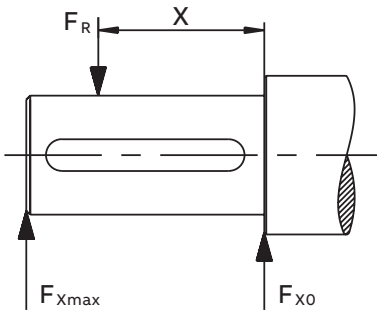
These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft affects permissible forces.

Permissible loads of simultaneous radial and axial forces can be supplied on request.

If the radial force is applied between points X0 and Xmax, the permissible force $F_R$ can be calculated with the following formula:

$$F_R = F_{X0} - \frac{X}{E}(F_{X0} - F_{Xmax})$$

| Where: | |
|---|---|
| E: | length of the shaft extension in the standard version |



## Permissible radial forces

| Motor size | No. of poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings L10h = 40,000h | | | | Roller bearing L10h = 40,000h | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | Mounting arrangement IM B3 | | | |
| | | | Gas group IIB | | Gas group IIC | | Gas group IIB | | Gas group IIC | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 80 | 2 | 40 | 638 | 557 | 638 | 557 | NA | | NA | |
| | 4 | 40 | 804 | 702 | 804 | 702 | NA | | NA | |
| | 6 | 40 | 920 | 804 | 920 | 804 | NA | | NA | |
| | 8 | 40 | 1013 | 884 | 1013 | 884 | NA | | NA | |
| 90 | 2 | 50 | 642 | 546 | 642 | 546 | NA | | NA | |
| | 4 | 50 | 809 | 690 | 809 | 690 | NA | | NA | |
| | 6 | 50 | 926 | 790 | 926 | 690 | NA | | NA | |
| | 8 | 50 | 1019 | 870 | 1019 | 870 | NA | | NA | |
| 100 | 2 | 60 | 886 | 751 | 886 | 751 | NA | | NA | |
| | 4 | 60 | 1117 | 946 | 1117 | 751 | NA | | NA | |
| | 6 | 60 | 1279 | 1083 | 1279 | 1083 | NA | | NA | |
| | 8 | 60 | 1325 | 1122 | 1325 | 1122 | NA | | NA | |
| 112 | 2 | 60 | 884 | 747 | 884 | 747 | NA | | NA | |
| | 4 | 60 | 1114 | 941 | 1114 | 941 | NA | | NA | |
| | 6 | 60 | 1276 | 1078 | 1276 | 1078 | NA | | NA | |
| | 8 | 60 | 1321 | 1116 | 1321 | 1116 | NA | | NA | |
| 132 | 2 | 80 | 1337 | 680 | 1337 | 680 | NA | | NA | |
| | 4 | 80 | 1685 | 740 | 1685 | 740 | NA | | NA | |
| | 6 | 80 | 1930 | 750 | 1930 | 750 | NA | | NA | |
| | 8 | 80 | 1999 | 750 | 1999 | 750 | NA | | NA | |
| 160 ML_ | 2 | 110 | 2530 | 2120 | 2530 | 2120 | 6400 | 1800 | 6400 | 1800 |
| | 4 | 110 | 3180 | 2670 | 3180 | 2670 | 7600 | 1800 | 7600 | 1800 |
| | 6 | 110 | 3650 | 3040 | 3650 | 3040 | 7600 | 1800 | 7600 | 1800 |
| | 8 | 110 | 4020 | 3040 | 4020 | 3040 | 7600 | 1800 | 7600 | 1800 |
| 180 ML_ | 2 | 110 | 2900 | 2440 | 2900 | 2440 | 6970 | 2700 | 6970 | 2700 |
| | 4 | 110 | 3660 | 3080 | 3660 | 3080 | 8500 | 2700 | 8500 | 2700 |
| | 6 | 110 | 4190 | 3520 | 4190 | 3520 | 8500 | 2700 | 8500 | 2700 |
| | 8 | 110 | 4620 | 3880 | 4620 | 3880 | 8500 | 2700 | 8500 | 2700 |
| 200 ML_ | 2 | 110 | 3830 | 3150 | 3830 | 3150 | 9510 | 7000 | 9510 | 4200 |
| | 4 | 110 | 4820 | 3980 | 4820 | 3980 | 11710 | 7000 | 11710 | 4200 |
| | 6 | 110 | 5520 | 4550 | 5520 | 4550 | 13230 | 7000 | 13230 | 4200 |
| | 8 | 110 | 6080 | 5000 | 6080 | 5000 | 14420 | 7000 | 14420 | 4200 |
| 225 SM_ | 2 | 110 | 4350 | 3660 | 4350 | 3660 | 11650 | 7000 | 9300 | 3000 |
| | 4 | 140 | 5490 | 2800 | 5490 | 2800 | 14340 | 7200 | 9300 | 2200 |
| | 6 | 140 | 6280 | 2800 | 6280 | 2800 | 16190 | 7200 | 9300 | 2200 |
| | 8 | 140 | 6920 | 2800 | 6920 | 2800 | 17300 | 7200 | 9300 | 2200 |
| 250 SM_ | 2 | 140 | 5390 | 4350 | 5390 | 4350 | 15420 | 6700 | NA | |
| | 4 | 140 | 6790 | 5480 | 6790 | 5480 | 18980 | 9200 | NA | |
| | 6 | 140 | 7760 | 6270 | 3000 | 2800 | 21000 | 9200 | NA | |
| | 8 | 140 | 8550 | 6900 | 3000 | 2800 | 21000 | 9200 | NA | |
| 280 SM_ | 2 | 140 | 5835 | 4900 | [1] | | 16500 | 6000 | NA | |
| | 4 | 140 | 7360 | 6110 | [1] | | 20100 | 9200 | NA | |
| | 6 | 140 | 8425 | 6980 | [1] | | 22690 | 9200 | NA | |
| | 8 | 140 | 9165 | 7700 | [1] | | 24740 | 9200 | NA | |
| 315 SM_ | 2 | 140 | 5815 | 4960 | [1] | | 16540 | 6000 | NA | |
| | 4 | 170 | 9025 | 7470 | [1] | | 26590 | 9600 | NA | |
| | 6 | 170 | 10310 | 8530 | [1] | | 30030 | 10160 | NA | |
| | 8 | 170 | 11370 | 9410 | [1] | | 32740 | 10105 | NA | |
| 315 ML_ | 2 | 140 | 5855 | 5080 | [1] | | 16705 | 6205 | NA | |
| | 4 | 170 | 8980 | 7590 | [1] | | 26550 | 13705 | NA | |
| | 6 | 170 | 10255 | 8665 | [1] | | 29970 | 13710 | NA | |
| | 8 | 170 | 11335 | 9385 | [1] | | 32730 | 9945 | NA | |
| 315 LK_ | 2 | 140 | 5860 | 5195 | [1] | | 16885 | 6080 | NA | |
| | 4 | 170 | 9185 | 7945 | [1] | | 27225 | 13475 | NA | |
| | 6 | 170 | 10475 | 9060 | [1] | | 30735 | 13500 | NA | |
| 355 SM_ | 2 | 140 | 5790 | 5085 | [1] | | NA | | NA | |
| | 4 | 210 | 11930 | 9890 | [1] | | NA | | NA | |
| | 6 | 210 | 11930 | 9890 | [1] | | NA | | NA | |
| | 8 | 210 | 11930 | 9890 | [1] | | NA | | NA | |
| 355 ML_ | 2 | 140 | 5770 | 5120 | [1] | | NA | | NA | |
| | 4 | 210 | 11980 | 10090 | [1] | | NA | | NA | |
| | 6 | 210 | 11980 | 10090 | [1] | | NA | | NA | |
| | 8 | 210 | 11980 | 10090 | [1] | | NA | | NA | |

| Motor size | No. of poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings L10h = 40,000h | | | | Roller bearing L10h = 40,000h | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | Mounting arrangement IM B3 | | | |
| | | | Gas group IIB | | Gas group IIC | | Gas group IIB | | Gas group IIC | |
| | | | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) |
| 355 LK_ | 2 | 140 | 5500 | 5000 | [1] | | NA | | NA | |
| | 4 | 210 | 12050 | 10450 | [1] | | NA | | NA | |
| | 6 | 210 | 12050 | 10450 | [1] | | NA | | NA | |
| | 8 | 210 | 12050 | 10450 | [1] | | NA | | NA | |
| 400 L_ | 2 | 170 | [1] | | [1] | | NA | | NA | |
| | 4 | 210 | [1] | | [1] | | NA | | NA | |
| | 6 | 210 | [1] | | [1] | | NA | | NA | |
| | 8 | 210 | [1] | | [1] | | NA | | NA | |
| 400 LK_ | 2 | 170 | [1] | | [1] | | NA | | NA | |
| | 4 | 210 | [1] | | [1] | | NA | | NA | |
| | 6 | 210 | [1] | | [1] | | NA | | NA | |
| | 8 | 210 | [1] | | [1] | | NA | | NA | |
| 450 L_ | 4 | 210 | [1] | | [1] | | NA | | NA | |
| | 6 | 210 | [1] | | [1] | | NA | | NA | |
| | 8 | 210 | [1] | | [1] | | NA | | NA | |

[1] Only allowed for direct coupling duty

# Mechanical design

## Axial forces

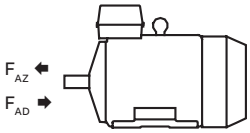
—
01 Mounting arrangement IM B3

02 Mounting arrangement IM V1

The following tables present permissible axial forces on the shaft in Newtons, assuming zero radial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20,000 and 40,000 hours per motor size.

At 60 Hz, the values must be reduced by 10 percent, and for two-speed motors, the higher speed determines permissible axial force. Permissible loads of simultaneous radial and axial forces can be supplied on request.

For axial force $F_{AD}$, it is assumed that the D-bearing is locked with a locking ring.

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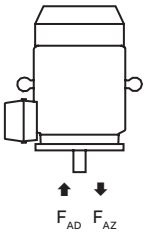



02

## Permissible axial forces

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | Mounting arrangement IM V1 | |
|---|---|---|---|---|---|---|
| | | | Deep groove ball bearings | | Deep groove ball bearings | |
| | | | $L_{10}$ = 40,000 h | | $L_{10}$ = 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 80 | 2 | 40 | 678 | 290 | 711 | 269 |
| | 4 | 40 | 835 | 447 | 888 | 411 |
| | 6 | 40 | 954 | 566 | 998 | 541 |
| | 8 | 40 | 1049 | 661 | 1093 | 636 |
| 90 | 2 | 50 | 676 | 286 | 727 | 252 |
| | 4 | 50 | 834 | 443 | 907 | 402 |
| | 6 | 50 | 950 | 559 | 1028 | 515 |
| | 8 | 50 | 1046 | 656 | 1114 | 614 |
| 100 | 2 | 60 | 969 | 339 | 1053 | 283 |
| | 4 | 60 | 1186 | 556 | 1301 | 489 |
| | 6 | 60 | 1346 | 716 | 1447 | 649 |
| | 8 | 60 | 1477 | 847 | 1576 | 788 |
| 112 | 2 | 60 | 962 | 330 | 1099 | 236 |
| | 4 | 60 | 1179 | 547 | 1331 | 445 |
| | 6 | 60 | 1337 | 705 | 1493 | 602 |
| | 8 | | 1467 | 835 | 1624 | 731 |
| 132 | 2 | 80 | 1447 | 491 | 1577 | 405 |
| | 4 | 80 | 1763 | 807 | 1963 | 680 |
| | 6 | 80 | 1999 | 1043 | 2190 | 917 |
| | 8 | 80 | 2192 | 1236 | 2412 | 1110 |
| 160 ML_ | 2 | 110 | 2050 | 1435 | 2440 | 1155 |
| | 4 | 110 | 2620 | 2005 | 3160 | 1635 |
| | 6 | 110 | 3055 | 2440 | 3590 | 2060 |
| | 8 | 110 | 3410 | 2790 | 3950 | 2430 |
| 180 ML_ | 2 | 110 | 2570 | 1470 | 3075 | 1100 |
| | 4 | 110 | 3230 | 2130 | 3975 | 1630 |
| | 6 | 110 | 3730 | 2630 | 4420 | 2130 |
| | 8 | 110 | 4140 | 3040 | 4890 | 2550 |
| 200 ML_ | 2 | 110 | 3295 | 2030 | 3960 | 1545 |
| | 4 | 110 | 4170 | 2910 | 5030 | 2290 |
| | 6 | 110 | 4800 | 3535 | 5820 | 2780 |
| | 8 | 110 | 5360 | 4100 | 6370 | 3430 |
| 225 SM_ | 2 | 110 | 3710 | 2240 | 4515 | 1650 |
| | 4 | 140 | 4690 | 3225 | 5770 | 2495 |
| | 6 | 140 | 5405 | 3935 | 6660 | 3080 |
| | 8 | 140 | 6010 | 4540 | 7280 | 3700 |
| 250 SM_ | 2 | 140 | 5200 | 2100 | 6175 | 1380 |
| | 4 | 140 | 6400 | 3310 | 7645 | 2410 |
| | 6 | 140 | 7260 | 4160 | 8930 | 3035 |
| | 8 | 140 | 8000 | 4900 | 9690 | 3780 |
| 280 SM_ | 2 | 140 | 4870 | 2870 | 6330 | 1650 |
| | 4 | 140 | 6140 | 4140 | 7870 | 2760 |
| | 6 | 140 | 7040 | 5040 | 9150 | 3515 |
| | 8 | 140 | 7840 | 5840 | 10040 | 4150 |
| 315 SM_ | 2 | 140 | 4780 | 2780 | 6620 | 1270 |
| | 4 | 170 | 7155 | 5155 | 9565 | 3240 |
| | 6 | 170 | 8205 | 6205 | 11230 | 3750 |
| | 8 | 170 | 9180 | 7180 | 11935 | 4780 |
| 315 ML_ | 2 | 140 | 4730 | 2730 | 7210 | 940 |
| | 4 | 170 | 7055 | 5055 | 10300 | 2700 |
| | 6 | 170 | 8075 | 6075 | 12330 | 3070 |
| | 8 | 170 | 9060 | 7070 | 13310 | 4210 |
| 315 LK_ | 2 | 140 | 4620 | 2620 | 7910 | 320 |
| | 4 | 170 | 6980 | 4980 | 10875 | 2300 |
| | 6 | 170 | 7980 | 5980 | 13005 | 2565 |
| | 8 | 170 | 8900 | 6900 | 14100 | 3450 |
| 355 SM_ | 2 | 140 | 1660 | 5460 | 4970 | 2885 |
| | 4 | 210 | 5760 | 9390 | 10890 | 4840 |
| | 6 | 210 | 7055 | 10855 | 12370 | 6235 |
| | 8 | 210 | 8290 | 12090 | 14980 | 7530 |
| 355 ML_ | 2 | 140 | 1570 | 5370 | 5860 | 2360 |
| | 4 | 210 | 5640 | 9440 | 11810 | 5130 |
| | 6 | 210 | 6870 | 10670 | 14718 | 5215 |
| | 8 | 210 | 8100 | 11900 | 15970 | 6540 |

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | Mounting arrangement IM V1 | |
|---|---|---|---|---|---|---|
| | | | Deep groove ball bearings | | Deep groove ball bearings | |
| | | | $L_{10}$ = 40,000 h | | $L_{10}$ = 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 355 LK_ | 2 | 140 | 1440 | 5240 | 6600 | 1630 |
| | 4 | 210 | 5460 | 9260 | 12850 | 4080 |
| | 6 | 210 | 6680 | 10480 | 15450 | 4550 |
| | 8 | 210 | [1] | [1] | [1] | [1] |
| 400 L, | 2 | 170 | 810 | 5810 | 8010 | 730 |
| LK_ | 4 | 210 | 4250 | 10250 | 13680 | 3650 |
| | 6 | 210 | 5410 | 11410 | 16610 | 3840 |
| | 8 | 210 | [1] | [1] | 18480 | 4530 |
| 450 L_ | 2 | 170 | - | - | - | - |
| | 4 | 210 | - | - | - | - |
| | 6 | 210 | 5630 | 11630 | 22090 | 150 |
| | 8 | 210 | 6920 | 12920 | 23600 | 1430 |

[1] On request

# Terminal box

## Standard terminal box

### Degree of protection and mounting options

The degree of protection for the standard terminal box is IP 55. It complies with the requirements of the type of protection ‘d’ flame proof and prevents the transmission of an internal explosion to the surrounding, potentially explosive atmosphere.

By default, terminal boxes are mounted on top of the motor at D-end. Side mounted terminal box is possible in frame sizes 160 and 180. Mounting at N-end is also possible for the larger frame sizes. Please refer to the variant code section for more details.

### Turnability

The standard terminal boxes for motor sizes 80-250 can be turned 4*90° and in sizes 280-450 2*180° after delivery. For sizes 280-450 is also mounting of terminal box with opening towards D or N-end possible using the relevant variant codes when ordering.

### Cable entries

Terminal box is provided as standard with tapped holes for cable glands as specified in the table on next page. No cable glands are included as standard, the entry holes are closed with Ex d approved blanking plugs made of brass according to the table on the next page. One tapped hole for main cables is closed with a plastic plug which is to be used for transport protection only. Different types of cable glands are available as option, suitable for either armoured and non-armoured cables, please refer to the Terminal box alternatives section for more details.

### Cable type and terminations

Terminations are suitable for copper and aluminum cables(Al- cables on request for motor sizes 80 to 250). Cables are connected to terminals by cable lugs, which are not included in the delivery.

### Earthing bolts

The motors are as standard provided with at least one earthing bolt inside the terminal box and another on the frame. The earthing bolt on the frame is located on top close to the terminal box for easy access from either side of the motor. As an option can also earting bolts on the feet be provided, please refer to variant code section.

### Ordering

To ensure the delivery of desired terminations and cable entries for the motor, state the cable type, quantity, size, outer diameter and possibly type of cable glands needed when ordering. Modifying the cable entries on a flame proof terminal box is very difficult afterwards.

See section Variant codes for all options available.

## Standard delivery

Standard delivery if no other information is provided. For other network voltages than voltage code D (see Ordering information section).

| Cable entries for supply cables<br>Motor size | Pole number | Terminal box type | Amount and size of threaded holes | Cable gland | Ex d plug | Max. connectable core cross-section mm² / phase | Number and size of terminal bolts, 6 x |
|---|---|---|---|---|---|---|---|
| **IE2 motors** | | | | | | | |
| 80 - 90 | 2-8 | 25 | 1 x M25x1.5 | - | - | 10 | M5 |
| 100 - 132 | 2-8 | 25 | 2 x M32x1.5 | - | 1 x M32 | 10 | M5 |
| 160 - 180 | 2-8 | 63 | 2 x M40x1.5 | - | 1 x M40 | 1x35 | M6 |
| 200 - 250 | 2-8 | 160 | 2 x M50x1.5 | - | 1 x M50 | 1x70 | M10 |
| 280 SM_ | 2-8 | 210 | 2 x M63x1.5 | - | 1 x M63 | 2x150 | M12 |
| 315 SM_, ML_ | 2-8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SMA - SMC | 2-4 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 SMA, SMB | 6-8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SMC | 6 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 SMC | 8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 ML_, LK_ | 2-8 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 400 | 2-8 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 450 | 6-8 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **IE3 motors** | | | | | | | |
| 80-90 | 2-8 | 25 | 1 x M25x1.5 | - | - | 10 | M5 |
| 100-132 | 2-8 | 25 | 2 x M32x1.5 | - | 1 x M32 | 10 | M5 |
| 160 - 180 | 2-8 | 63 | 2 x M40x1.5 | - | 1 x M40 | 1x35 | M6 |
| 200 - 250 | 2-8 | 160 | 2 x M50x1.5 | - | 1 x M50 | 1x70 | M10 |
| 280 | 2-8 | 210 | 2 x M63x1.5 | - | 1 x M63 | 2x150 | M12 |
| 315 | 2-8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SM_ | 2-4 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 SMA, SMB | 6 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SMC | 6 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 ML_, LK_ | 2-6 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |

| **Auxiliary cable entries** | | | | |
|---|---|---|---|---|
| 80 - 132 | 2-8 | 1 x M20x1.5 | - 1xM20 | 1 x 2,5 mm² per terminal |
| 160-450 | 2-8 | 2 x M20x1.5 | - 1xM20 | 1 x 2,5 mm² per terminal |

| Motor size | Earthing on frame | Earthing in main terminal box |
|---|---|---|
| 80 - 132 | M6 | M6 |
| 160 - 180 | M6 | M6 |
| 200 - 250 | M8 | M8 |
| 280 - 450 | M10 | 2xM10 |

# Terminal box

## Terminal box dimensions

—
01 Motor sizes 80 to 132

02 Motor sizes 160 to 180

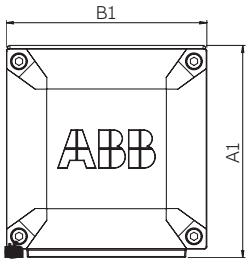
03 Motor sizes 200 to 250

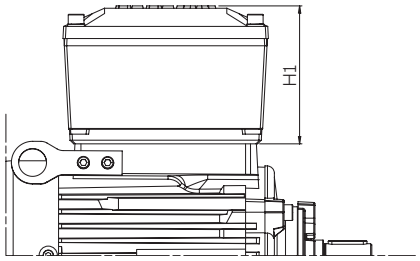
04 Motor sizes 280 to 355

05 Motor sizes 355 to 450

To match the correct terminal box with motor size, find the motor type and correspondent terminal box type on the previous page. The box types and their dimensions are presented on this page.

**Terminal boxes, standard with 6**

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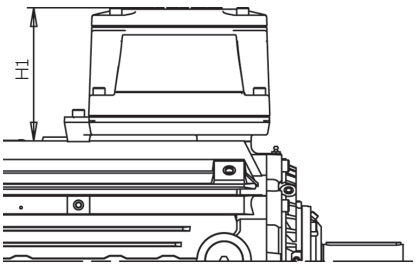


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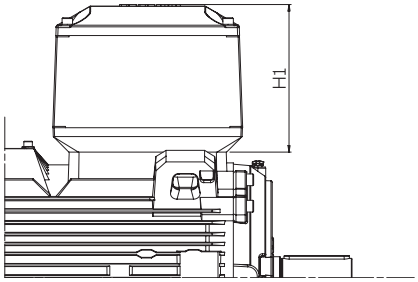
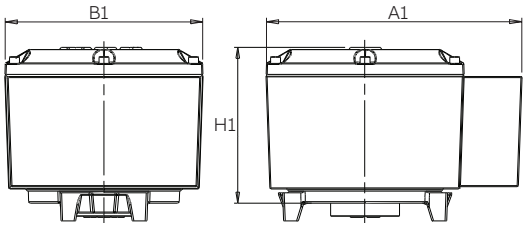
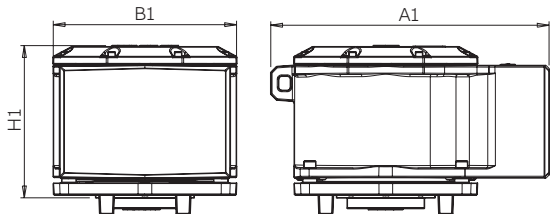
02




—
03




—
04




—
05

| Terminal box types acc. to current capacity | A1 | B1 | H1 |
|---|---|---|---|
| 25 | 192 | 170 | 124 |
| 63 | 256 | 243 | 174 |
| 160 | 339 | 290 | 226 |
| 210 | 465 | 360 | 283 |
| 370 | 465 | 360 | 283 |
| 750 | 707 | 467 | 387 |

# Terminal box

## Terminal boxes and boards

—
01 Terminal box for motor sizes 80-132, type 25

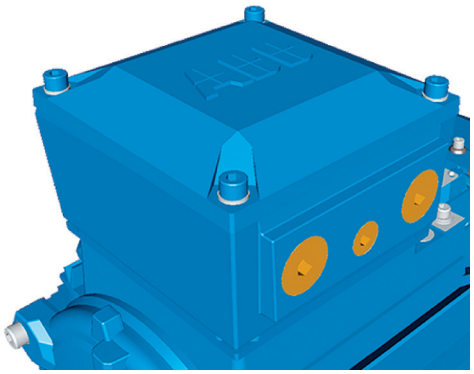
02 Terminal board for motor sizes 80-132, box type 25

03 Terminal board for motor sizes 160-180, type 63. Entries for auxiliaries are located on opposite side of terminal box

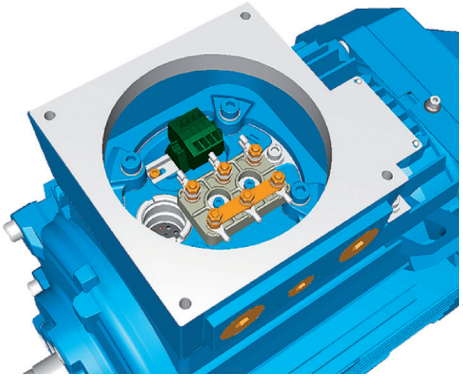
04 Terminal board for motor sizes 160-180, box type 63

The pictures below show standard terminal boxes and the corresponding terminal boards for various motor sizes and terminal box types. To match the correct terminal box with motor size, find the motor type and correspondent terminal box type in table found in section Terminal box – Standard terminal box.

**Motor sizes 80-132**

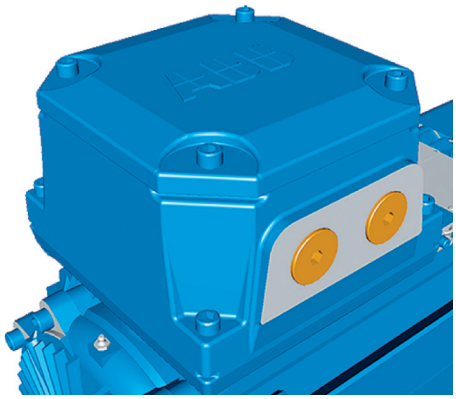


01

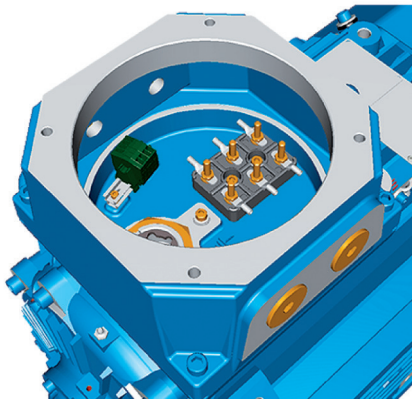


02

**Motor sizes 160-180**



03



04

—
05 Terminal box for motor sizes 200-250, type 160

06 Terminal box for motor sizes 200-250, type 160

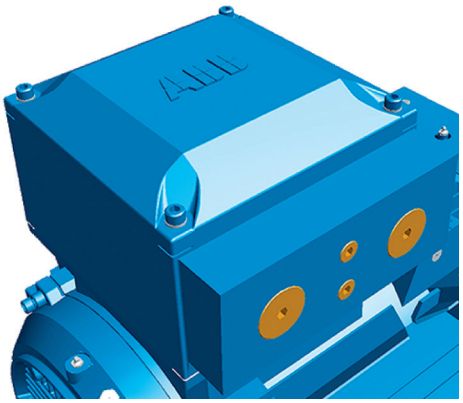
07 Terminal box for motor sizes 280-355, type 210 and 370

08 Terminal board 280-355, box type 210 and 370

09 Terminal box for motor sizes 355-450, type 750

10 Terminal board for motor sizes 355-450, box type 750

## Motor sizes 200-250



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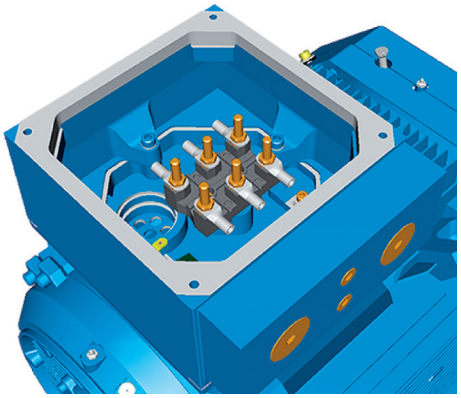
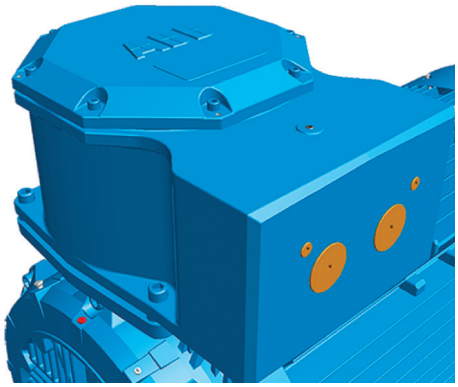
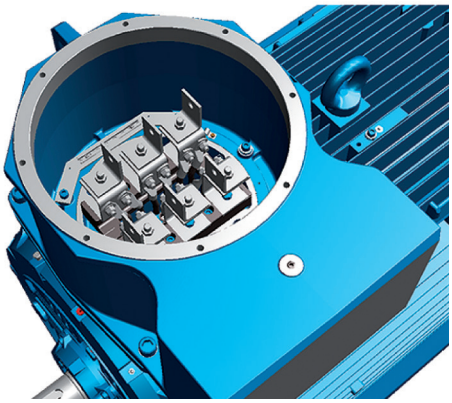


06

## Motor sizes 355-450

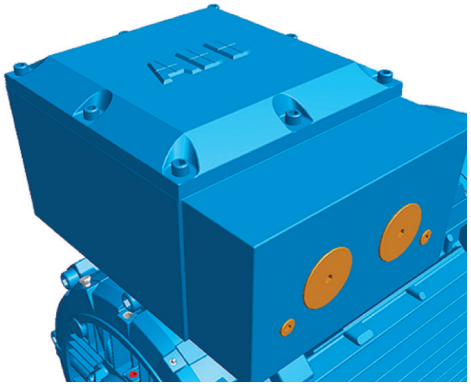


09

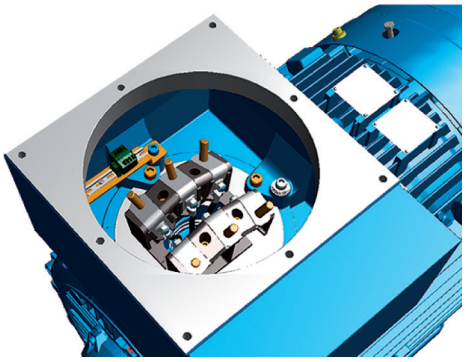


10

## Motor sizes 280-355



07



08

# Terminal box

## Terminal box alternatives

Due to the construction of the Ex d terminal box is it not possible to mount any connection flanges, angle adapters nor cable sealing units like on motors having increased safety Ex e terminal box.

### Cable glands

The motors are delivered as standard with plugged cable entries as described in the previous section. There is a broad selection of different type of cable glands available which are suitable for different types of cable and outer diameter ranges.

| Size of threaded opening for cable gland | | Cable gland Ex d IIC for armoured cable with double sealing, variant code 734 | | Cable gland Ex d IIC for non-armoured cable, variant code 735 |
|---|---|---|---|---|
| **Metric (std)** | **NPT (Variant code 730 added)** | **Cable outer diameter, mm** | **Inner sheath diameter, mm** | **Cable outer diameter, mm** |
| M16 x 1.5 | - | 7-12 | 4.5-8 | - |
| M20 x 1.5 | NPT 1/2” | 10-16 | 6-10 | 4-8.5 |
| M20 x 1.5 *) | NPT 1/2” *) | - | - | 5-12 |
| M25 x 1.5 | NPT 3/4” | 13.5-19 | 10-14 | 9-18 |
| M25 x 1.5 *) | NPT 3/4” *) | 19-25 | 14-18 | - |
| M32 x 1.5 | NPT 1” | 25-30 | 18-23 | 17-26 |
| M40 x 1.5 | NPT 1 1/4” | 30-36 | 23-28 | 22-30 |
| M50 x 1.5 | NPT 1 1/2” | 36-40 | 28-32 | 31-40 |
| M50 x 1.5 *) | NPT 1 1/2” *) | 40-46 | 32-37 | - |
| M63 x 1.5 | NPT 2” | 46-53 | 37-43 | 39-50 |
| M63 x 1.5 *) | NPT 2” *) | 53-60 | 43-50 | - |
| M75 x 1.5 | NPT 2 1/2” | 58-70 | 48-60 | 46-60 |

*) = High capacity version, delivered as standard with the variant code.

### Threaded openings for cable glands with NPT thread (variant code 730)

The motors are delivered as standard with openings for cable glands with metric threads as listed in the section describing the standard terminal box. If glands with NPT threads will be used must variant code 730 be ordered. If nothing else is stated on the ordered will the sizes in tables below be delivered. If cable glands are also needed must either variant 734 or 735 be added.

| Motor frame size | Main cable entries | NPT plug |
|---|---|---|
| 80-112 | 1 x ¾” | - |
| 132 | 2 x ¾” | 1 x ¾” |
| 160-180 | 2 x 1 ¼” | 1 x 1 ¼” |
| 200-250 | 2 x 1 ½” | 1 x 1 ½” |
| 280 | 2 x 2” | 1 x 2” |
| 315 | 2 x 21/2” | 1 x 21/2” |
| 355-450 | 2 x 3” | 1 x 3” |

| Motor frame size | Cable entries for auxiliaries | NPT plug |
|---|---|---|
| 80-112 | 1 x ¾” | - |
| 132 | 1 x ¾” | 1 x ¾” |
| 160-450 | 2 x ¾” | 2 x ¾” |

### Threaded openings for cable glands of nonstandard size

If the standard size of threaded openings for cable glands does not suit the gland size and cable that will be used can openings of nonstandard size also be delivered, either by fitting a reducers to make the openings smaller or by increasing the amount or size of holes. The maximum possible size and amount for each motor frame size is listed below.

| Motor frame size | Main cable entries, metric | Main cable entries, NPT |
|---|---|---|
| 80-132 | 1 x M32 | 1 x 1” |
| 160-180 | 1 or 2 x M50 | 1 or 2 x 1 ½” |
| 200-250 | 1 or 2 x M63 | 1 or 2 x 2” |
| 280-450 | 1 or 2 x M75 | 1 or 2 x 3” |

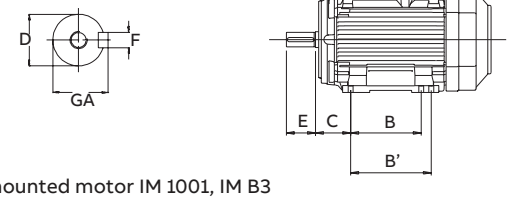
### Auxiliary terminal box

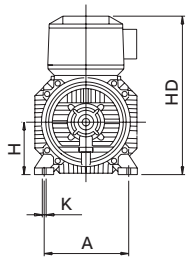
It is possible to equip motors from frame size 132 upwards with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box is made of cast iron with Ex d type of protection. Connection terminals are of spring-loaded type for quick and easy connection. These are suitable for up to 2.5 $mm^2$ wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard. The standard cable entry is 2 x M20 with plugged entries. If cable glands are needed must these be ordered using the variant codes described earlier in this section.

| Related variant codes | |
|---|---|
| 380 | Separate terminal box for temperature detectors |
| 418 | Separate terminal box for auxiliaries |
| 568 | Separate terminal box for heating elements |

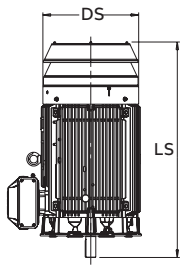
# Dimension drawings

## Flameproof motors, Ex db

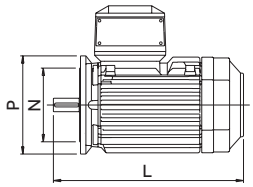


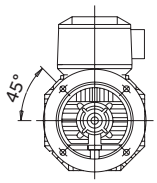

Foot-mounted motor IM 1001, IM B3



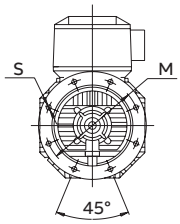

Motor with protection cover




Flange-mounted motor IM 3001, IM B5




Sizes 80 to 200




Sizes 225 to 450

**Flameproof motors Ex db, foot-mounted IM 1001/ IM B3, flange-mounted IM 3001/ IM B5.**

| Motor size | IM 1001, IM B3 AND IM 3001, IM B5 | | | | | | | | | | | IM 1001, IM B3 | | | | | | | IM 3001, IM B5 | | | | Protective roof | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | | GA | | F | | E | | L max | | O [2] | A | B | B' | C | HD | K | H | M | N | P | S | DS | LS | |
| | poles | | poles | | poles | | poles | | poles | | | | | | | | | | | | | | | poles | |
| | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | | | | | | | | | | | | | | 2 | 4-8 |
| 80 | 19 | 19 | 21.5 | 21.5 | 6 | 6 | 40 | 40 | 409 | 409 | 20 | 125 | 100 | 112 | 50 | 296 | 10 | 80 | 165 | 130 | 200 | 12 | 157 | 444 | 444 |
| 90 | 24 | 24 | 27 | 27 | 8 | 8 | 50 | 50 | 440 | 440 | 20 | 140 | 100 | 125 | 56 | 315 | 10 | 90 | 165 | 130 | 200 | 12 | 185 | 475 | 475 |
| 100 | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 501 | 501 | 25 | 160 | 140 | 160 | 63 | 343 | 12 | 100 | 215 | 180 | 250 | 14.5 | 200 | 536 | 536 |
| 112 | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 485 | 485 | 25 | 190 | 140 | – | 70 | 355 | 12 | 112 | 215 | 180 | 250 | 14.5 | 213 | 526 | 526 |
| 132 IE2 | 38 | 38 | 41 | 41 | 10 | 10 | 80 | 80 | 531 | 531 | 30 | 216 | 140 | 178 | 89 | 392 | 12 | 132 | 265 | 230 | 300 | 14.5 | 274 | 582 | 582 |
| 132 IE3 | 38 | 38 | 41 | 41 | 10 | 10 | 80 | 80 | 576 | 576 | 30 | 216 | 140 | 178 | 89 | 392 | 12 | 132 | 265 | 230 | 300 | 14.5 | 274 | 627 | 627 |
| 160 | 42 | 42 | 45 | 45 | 12 | 12 | 110 | 110 | 808 | 808 | 45 | 254 | 210 | 254 | 108 | 495 | 14.5 | 160 | 300 | 250 | 350 | 18.5 | 328 | 852 | 852 |
| 180 | 48 | 48 | 51.5 | 51.5 | 14 | 14 | 110 | 110 | 826 | 826 | 50 | 279 | 241 | 279 | 121 | 535 | 14.5 | 180 | 300 | 250 | 350 | 18.5 | 359 | 876 | 876 |
| 200 | 55 | 55 | 59 | 59 | 16 | 16 | 110 | 110 | 774 | 774 | 70 | 318 | 267 | 305 | 133 | 616 | 18.5 | 200 | 350 | 300 | 400 | 18.5 | 414 | 844 | 844 |
| 200 [3] | 55 | 55 | 59 | 59 | 16 | 16 | 110 | 110 | 824 | 824 | 70 | 318 | 267 | 305 | 133 | 616 | 18.5 | 200 | 350 | 300 | 400 | 18.5 | 414 | 844 | 844 |
| 225 | 55 | 60 | 59 | 64 | 16 | 18 | 110 | 140 | 841 | 871 | 80 | 356 | 286 | 311 | 149 | 663 | 18.5 | 225 | 400 | 350 | 450 | 18.5 | 462 | 921 | 951 |
| 225 [3] | 55 | 60 | 59 | 64 | 16 | 18 | 110 | 140 | 871 | 901 | 80 | 356 | 286 | 311 | 149 | 663 | 18.5 | 225 | 400 | 350 | 450 | 18.5 | 462 | 921 | 951 |
| 250 | 60 | 65 | 64 | 69 | 18 | 18 | 140 | 140 | 875 | 875 | 90 | 406 | 311 | 349 | 168 | 726 | 24 | 250 | 500 | 450 | 550 | 18.5 | 506 | 965 | 965 |
| 250 [3] | 60 | 65 | 64 | 69 | 18 | 18 | 140 | 140 | 895 | 895 | 90 | 406 | 311 | 349 | 168 | 726 | 24 | 250 | 500 | 450 | 550 | 18.5 | 506 | 965 | 965 |
| 280 | 65 | 75 | 69 | 79.5 | 18 | 20 | 140 | 140 | 1090 | 1090 | 100 | 457 | 368 | 419 | 190 | 862 | 24 | 280 | 500 | 450 | 550 | 18 | 555 | 1190 | 1190 |
| 315 SM_ | 65 | 80 | 69 | 85 | 18 | 22 | 140 | 170 | 1176 | 1206 | 115 | 508 | 406 | 457 | 216 | 929 | 28 | 315 | 600 | 550 | 660 | 23 | 624 | 1290 | 1320 |
| 315 ML_ | 65 | 90 | 69 | 95 | 18 | 25 | 140 | 170 | 1287 | 1317 | 115 | 508 | 457 | 508 | 216 | 929 | 28 | 315 | 600 | 550 | 660 | 23 | 624 | 1401 | 1431 |
| 315 LK | 65 | 90 | 69 | 95 | 18 | 25 | 140 | 170 | 1446 | 1475 | 115 | 590 | 508 | 560/ | 216 | 929 | 28 | 315 | 600 | 550 | 660 | 23 | 624 | 1552 | 1589 |
| | | | | | | | | | | | | | | 710 | | | | | | | | | | | |
| 355 SM_ | 70 | 100 | 74.5 | 106 | 20 | 28 | 140 | 210 | 1409 | 1479 | 130 | 610 | 500 | 560 | 254 | 1124 | 35 | 355 | 740 | 680 | 800 | 23 | 590 | 1480 | 1550 |
| 355 ML_ | 70 | 100 | 74.5 | 106 | 20 | 28 | 140 | 210 | 1514 | 1584 | 130 | 610 | 560 | 630 | 254 | 1124 | 35 | 355 | 740 | 680 | 800 | 23 | 590 | 1530 | 1600 |
| 355 LK_ | 70 | 100 | 74.5 | 106 | 20 | 28 | 140 | 210 | 1764 | 1834 | 130 | 610 | 630 | 710 | 254 | 1124 | 35 | 355 | 740 | 680 | 800 | 23 | 590 | 1635 | 1705 |
| 400 L_ | 80 | 110 | 85 | 126 | 22 | 28 | 170 | 210 | 1851 | 1891 | 150 | 710 | 900 | 1000 | 224 | 1211 | 35 | 400 | 940 | 880 | 1000 | 28 | 590 | 1635 | 1705 |
| 400 LK_ | 80 | 100 | 85 | 106 | 22 | 28 | 170 | 210 | 1851 | 1891 | 150 | 686 | 710 | 800 | 280 | 1211 | 35 | 400 | 740 | 680 | 800 | 23 | 700 | 1860 | 1900 |
| 450 | - | 120 [1] | 127 [1] | | - | 32 [1] | - | 210 [1] | 2071 [1] | | 180 | 800 | 1000 | 1120 | 250 | 1328 | 42 | 450 | 1080 | 1000 | 1150 | 28 | On request | | |

[1] Size 450 pole numbers 6-8

[2] Required distance from fan cover air inlet to obstacle behind motor 3) For IE3 version

[3] For IE3 version

| Tolerances: | |
|---|---|
| A, B | ± 0,8 |
| D, DA | ISO k6 < Ø 48mm |
| | ISO m6 > Ø 48mm |
| F, FA | ISO h9 |
| H | -0.5 |
| N | ISO j6 |
| C, CA | ± 0.8 |

| Available B14 and B5 flange alternatives | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Flange size** | **Variant code** | **Flange dimension** | | | | **Motor size 80-132** | | | | |
| | | **P** | **M** | **N** | **S** | **80** | **90** | **100** | **112** | **132** |
| FT100 | 258 | 120 | 100 | 80 | M6 | Std B14 | NA | NA | NA | NA |
| FT115 | 260 | 140 | 115 | 95 | M8 | Opt. | Std B14 | NA | NA | NA |
| FT130 | 229 | 160 | 130 | 110 | M8 | Opt. | NA | Std B14 | Std B14 | NA |
| FT165 | 236 | 200 | 165 | 130 | M10 | NA | NA | Opt. | Opt. | Std B14 |
| FT215 | 246 | 250 | 215 | 180 | M12 | NA | NA | Opt. | Opt. | Opt. |
| FT265 | 256 | 300 | 265 | 230 | M12 | NA | NA | NA | NA | Opt. |
| FF100 | 257 | 120 | 100 | 80 | Ø7 | Opt. | NA | NA | NA | NA |
| FF115 | 259 | 140 | 115 | 95 | Ø10 | Opt. | Opt. | NA | NA | NA |
| FF130 | 228 | 160 | 130 | 110 | Ø10 | Opt. | Opt. | Opt. | Opt. | NA |
| FF165 | 235 | 200 | 165 | 130 | Ø12 | Std B5 | Std B5 | Opt. | Opt. | Opt. |
| FF215 | 245 | 250 | 215 | 180 | Ø14.5 | NA | NA | Std B5 | Std B5 | Opt. |
| FF265 | 255 | 300 | 265 | 230 | Ø14.5 | NA | NA | NA | NA | Std B5 |

Std. B14 = Standard small flange for given frame size

Std. B5 = Standard large flange for given frame size

Opt. = Optional flange for given frame size

NA = Not applicable

In all dimension drawings: The tables give the main dimensions in mm.

For detailed drawings please see our web-pages or contact ABB.

# Certificate examples

01 IECEx Certificate of Conformity

02 EU Declaration of Conformity

03 EU Type Examination Certificate

## IECEx Certificate of Conformity

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**
**IEC Certification System for Explosive Atmospheres**
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx UL 20.0026X** Page 1 of 4

Status: **Current** Issue No: 4

Date of Issue: 2024-04-30

Certificate history:
Issue 3 (2021-12-20)
Issue 2 (2021-08-24)
Issue 1 (2021-04-23)
Issue 0 (2020-06-05)

Applicant: **ABB Oy, IEC LV Motors**
Strömbergin Puistotie 5A
Vaasa FI 65320
**Finland**

Equipment: **Three-phase AC Motors and Generators, Models M3JM/JP/KP/JC/KC/KG/JG 160-450**

Optional accessory:

Type of Protection: **Flameproof "db", Increased Safety "eb", Dust Ignition Protection by Enclosure "tb"**

Marking: Ex db I Mb

Ex db or db eb IIB or IIC T6...T3 (*) Gb

Ex tb IIIA or IIIB or IIIC T100°C...T150°C (*) Db

(*) Depending on motor type and model as specified in manufacturer specifications.

**Please see Annex for additional marking information.**

Approved for issue on behalf of the IECEx Certification Body: **Katy A. Holdredge**

Position: **Senior Staff Engineer**

Signature: (for printed version)

Date: (for printed version) 2024-04-30

1. This certificate and schedule may only be reproduced in full.
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Certificate issued by:
**UL Solutions (US)**
**333 Pfingsten Road**
**Northbrook IL 60062-2096**
**United States of America**

UL Solutions

01

## EU Declaration of Conformity

**The products:** 3-phase induction motors for potentially explosive atmospheres as listed in this document on the pages 2...3 having correspondent name plate markings covered by those as listed.

**The Manufacturer:**

ABB Oy
Motors and Generators
P.O. Box 633
Strömbergin Puistotie 5A
FIN - 65101 Vaasa, Finland

ABB Sp.z.o.o
27 Placydowska Str.
PL-95-070 Aleksandrow Lodzki
Poland

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration described above are in conformity with the relevant Union harmonization legislation:

**Directive 2014/34/EU**
The following harmonized standards are applied in relation to which conformity is declared: EN 60079-0/A11:2013[2], EN 60079-1:2014[2], EN 60079-7:2015, EN 60079-31:2014[2] and relevant parts of the EN 60034 –series of standards.

**Directive 2009/125/EC**
The motors that are marked as IE2, IE3 or IE4 are in conformity with the requirements set in the Commission Regulation (EC) No. 640/2009 and the amending Regulation (EU) No. 4/2014.

**Directive 2011/65/EU**
Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

**Notes:**

Motors shall be installed and maintained according to the relevant standards and instructions of ABB Oy, Motors and Generators. When installed in converter supplied applications, additional requirements must be respected regarding the motor as well as the installation as described in the appropriate dedicated addendum

The conformity of the incorporation into a finished product according to the Directive 2006/42/EC shall be established by the commissioning party when a motor is fitted to the machinery.

**Notified Bodies** (ExNB): LCIE (0081), Av. Du Général Leclerc, 33, 92266 Fontenay-aux-Roses, France,
VTT Expert Services Ltd (0537), Otakaari 7B, 02044 Espoo, Finland
UL International Demko A/S (0539), Borupvang 5A, 2750 Ballerup, Denmark

Signed for and on behalf of: ABB Oy, Motors and Generators

Place and date of issue: Vaasa, Finland, 2019-09-04

Harri Mykkänen
Vice President

3GZF500930-309L

02

## EU-TYPE EXAMINATION CERTIFICATE

[1]

[2] **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate Number: **DEMKO 20 ATEX 2248X Rev. 4**

[4] Product: **Three-phase AC Motors and Generators - M3JM/JP/KP/JC/KC/KG/JG 160 - 450**

[5] Manufacturer: **ABB Oy, IEC LV Motors**

[6] Address: **Strömbergin puistotie 5A, FI 65320 Vaasa, Finland**

[7] This product and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report no. **US/UL/ExTR20.0026/04.**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN IEC 60079-0:2018** **EN 60079-1:2014**
**EN IEC 60079-7:2015/A1:2018** **EN 60079-31:2014**

Where additional criteria beyond those given here have been used, they are listed at item 18 in the Schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the "Specific Conditions of Use" listed under item 17 of this certificate.

[11] This EU-Type Examination Certificate relates only to the technical design of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by the certificate.

[12] The marking of the product shall include the following (marking is provided in the Schedule as a part of item 15, if applicable):

**Ex I M2 Ex db I Mb**

**Ex II 2 G Ex db or db eb IIB or IIC T6...T3 (*) Gb**

**Ex II 2 D Ex tb IIIA or IIIB or IIIC T100°C ... T150°C (*) Db**

(*) = depending on motor type and model as specified in manufacturer specifications.

This is to certify that the sample(s) of the Product described herein ("Certified Product") has been investigated and found in compliance with the Standard(s) indicated on this Certificate, in accordance with the ATEX Product Certification Program Requirements. This certificate and test results obtained apply only to the product sample(s) submitted by the Manufacturer. UL did not select the sample(s) or determine whether the sample(s) provided were representative of other manufactured product. UL has not established Follow-Up Service or other surveillance of the product. The Manufacturer is solely and fully responsible for conformity of all product to all applicable Standards, specifications, requirements or Directives. The test results may not be used, in whole or in part, in any other document without UL's prior written approval.

**Certification Manager**
Thomas Wilson

**Date of issue:** 2020-06-05
**Re-issued:** 2024-04-30

**Notified Body** UL International Demko A/S, Borupvang 5A, 2750 Ballerup, Denmark
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UL Solutions

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Form-ULID-000217 (EXCS:00 IC-F0098-1) – Issue 20.0

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# Motors in brief

## Flameproof motors Ex db, sizes 80 to 180

| Motor size | | | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|---|
| Stator | Material | | Cast iron, EN-GJL-200 or better | | | | | | |
| | Paint color shade | | Blue, Munsell 8B 4.5/3.25 | | | | | | |
| | Corrosion class | | C3 | | | | | | |
| Feet | | | Cast iron, EN-GJL-200 or better, integrated with stator | | | | | | |
| Bearing end shields | Material | | Cast iron, EN-GJL-200 or better | | | | | | |
| | Paint colour shade | | Blue, Munsell 8B 4.5/3.25 | | | | | | |
| | Corrosion class | | C3 | | | | | | |
| Bearings | D-end | 2-12 poles | 6205-2Z/C3 | 6205-2Z/C3 | 6206-2Z/C3 | 6206-2Z/C | 6208-2Z/C3 | 6309/C3 | 6310/C3 |
| | N-end | 2-12 poles | 6204-2Z/C3 | 6204-2Z/C3 | 6205-2Z/C3 | 6206-2Z/C3 | 6208-2Z/C3 | 6309/C3 | 6310/C3 |
| Axially locked bearings | Inner bearing cover | | As standard, locked at D-end | | | | | | |
| Bearing seals | | | Gamma ring | | | | | | |
| Lubrication | | | Permanent grease lubrication | | | | | Regreasable bearings | |
| SPM nipples | | | - | | | | | As standard | |
| Rating plate | Material | | Stainless steel | | | | | | |
| Terminal box | Frame material | | Cast iron, EN-GJL-200 or better | | | | | | |
| | Cover material | | Cast iron, EN-GJL-200 or better | | | | | | |
| | Cover screws material | | Acidproof steel A4-80 | | | | | Steel 8.8, zinc electroplat-ed and chromated. | |
| Connections | Cable entries | | 1 x M25 + 1 x M20 plugged | | 2 x M32 + 1 x M20 plugged | | | 2 x M40 + 2 x M20 plugged | |
| | Terminals | | 6 terminals for connection with cable lugs (not included) | | | | | | |
| Fan | Material | | Polyamide. Reinforced with glass fibre. | | | | | Polypropylene. Reinforced with glass fibre. | |
| Fan cover | Material | | Steel | | | | Hot dip galvanized steel | | |
| | Paint color shade | | Munsell blue 8B 4.5/3.25 | | | | | | |
| | Corrosion class | | C3 | | | | | | |
| Stator winding | Material | | Copper | | | | | | |
| | Insulation | | Insulation class F | | | | | | |
| | Winding protection | | 3 pcs thermistors as standard | | | | | | |
| Rotor winding | Material | | Pressure die-cast aluminum | | | | | | |
| Balancing | | | Half-key balancing | | | | | | |
| Keyway | | | Closed | | | | | | |
| Heating elements | On request | | 25 W | | | | | | |
| Drain holes | | | - | | | | | Optional | |
| External earthing bolt | | | As standard | | | | | | |
| Enclosure | | | IP 55 | | | | | | |
| Cooling method | | | IC 411 | | | | | | |

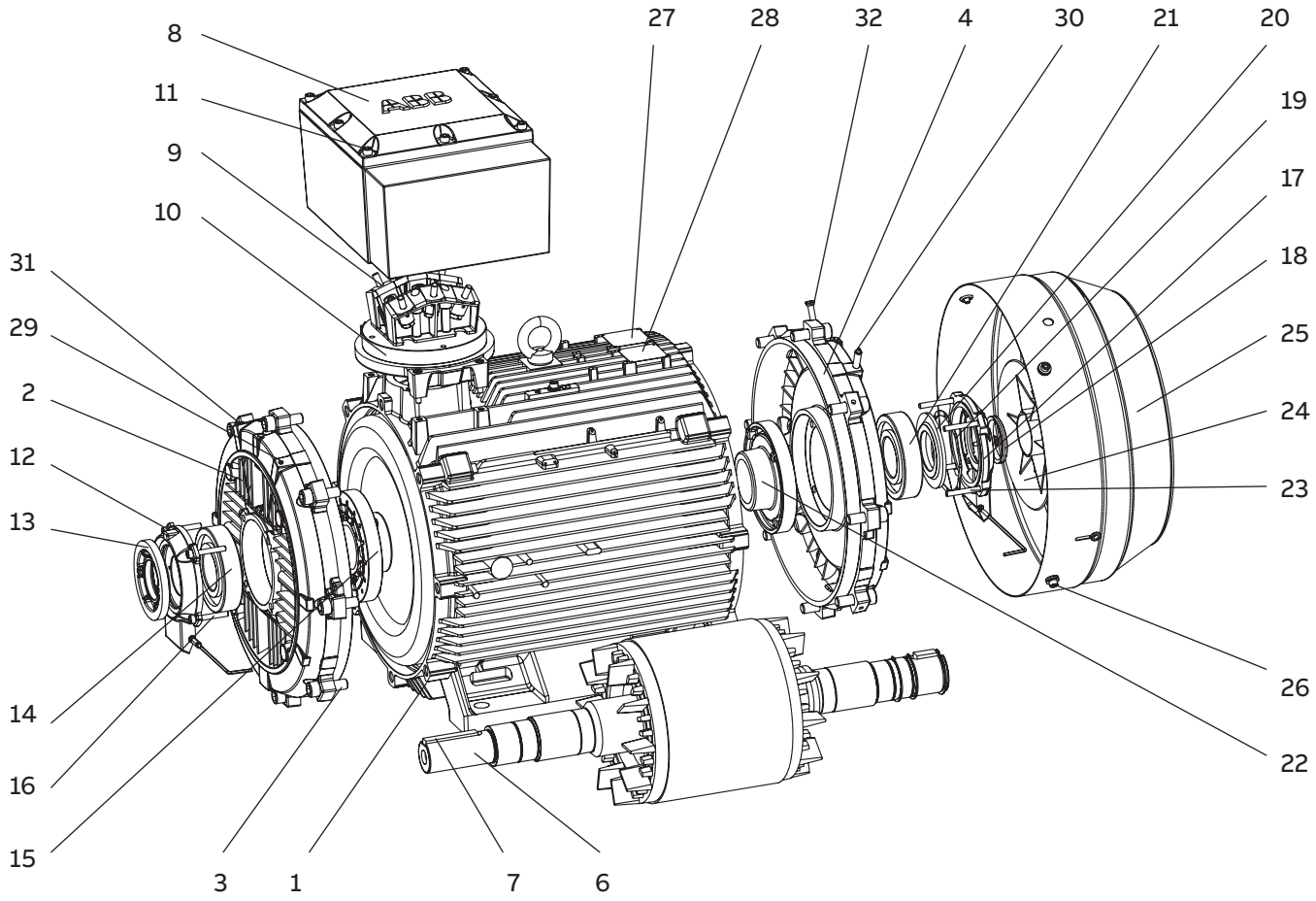
# Motors in brief

## Flameproof motors Ex db, sizes 200 to 450

| Motor size | | | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stator | Material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint color shade | | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | | C3 | | | | | | | |
| Feet | Material | | Cast iron, EN-GJL-200 or better, integrated with stator | | | | | | | |
| Bearing end shields | Material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint color shade | | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | | C3 | | | | | | | |
| Bearings | D-end | 2-pole | 6312M/C3 | 6313M/C3 | 6315M/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317M/C3 | - |
| | | 4-12-pole | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6319/C3 | 6322/C3 | 6324/C3 | 6326M/C3 |
| | N-end | 2-pole | 6310M/C3 | 6312M/C3 | 6313M/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317M/C3 | - |
| | | 4-12-pole | 6310/C3 | 6312/C3 | 6313/C3 | 6316/C3 | 6316/C3 | 6316/C3 | 6319/C3 | 6322/C3 |
| Axially locked bearings | Inner bearing cover | | As standard, locked at D-end | | | | | | | |
| Bearing seals | | | Gamma ring | | | V-ring or labyrinth seal | | | | |
| Lubrication | | | Regreasable bearings | | | | | | | |
| SPM nipples | | | As standard | | | | | | | |
| Rating plate | Material | | Stainless steel | | | | | | | |
| Terminal box | Frame material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover screws material | | Steel 8.8, zinc electroplated and chromated | | | | | | | |
| Connections | Cable-entries | | 2 x M50 + 2 x M20 plugged | | | 2 x M63 + 2 x M20 plugged | 2 x M75 + 2 x M20 plugged | | | |
| | Terminals | | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | | Polypropylene. Reinforced with glass fibre. | | | | | Polypropylene reinforced with glass fibre or aluminum. | | |
| Fan cover | Material | | Hot dip galvanized steel | | | | | | | |
| | Paint color shade | | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | | C3 | | | | | | | |
| Stator winding | Material | | Copper | | | | | | | |
| | Insulation | | Insulation class F | | | | | | | |
| | Winding protection | | 3 pcs thermistors as standard | | | | | | | |
| Rotor winding | Material | | Pressure die-cast aluminum | | | | | | | |
| Balancing | | | Half key balancing | | | | | | | |
| Keyway | | | Closed Open | | | Open | | | | |
| Heating elements | On request | | 25 W | 60 W | | | 120 W | | | 200 W |
| Drain holes | | | Optional | | | | | | | |
| External earthing bolt | | | As standard | | | | | | | |
| Enclosure | | | IP 55 | | | | | | | |
| Cooling method | | | IC 411 | | | | | | | |

# Motor construction

## Cast iron flameproof motors, Ex db




1 Stator frame
2 End shield, D-end
3 Screws for end shield, D-end
4 End shield, N-end
5 Screws for end shield, N-end
6 Rotor with shaft
7 Key, D-end
8 Terminal box
9 Terminal board
10 Intermediate flange
11 Screws for terminal box cover
12 Outer bearing cover, D-end
13 Valve disc with labyrinth seal, D-end
14 Bearing, D-end
15 Inner bearing cover, D-end
16 Screws for bearing cover
17 Outer bearing cover, N-end
18 Seal, N-end
19 Wave spring (280-315)
Coil spring (355-450)
20 Valve disc, N-end
21 Bearing, N-end
22 Inner bearing cover, N-end
23 Screws for bearing cover
24 Fan
25 Fan cover
26 Screws for fan cover
27 Rating plate
28 Lubrication plate
29 Grease nipple, D-end
30 Grease nipple, N-end
31 SPM nipple, D-end
32 SPM nipple, N-end

# Flameproof motors Ex db eb IIB/IIC T4 Gb


| | |
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# Ordering information

## Explanation of the product code

| Motor type | Motor size | Product code | Mounting arrangement code, Voltage and frequency code, Generation code | Variant codes |
|---|---|---|---|---|
| M3KP | 160MLA | 3GKP 161 | 410 - ADH | 002, etc. |
| | | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14 | |

| Positions 1 to 4 | |
|---|---|
| 3GKP: | Totally enclosed flameproof Ex de motor with cast iron frame |

| Positions 5 and 6 | |
|---|---|
| IEC size | |
| 08: | 80 |
| 09: | 90 |
| 10: | 100 |
| 11: | 112 |
| 13: | 132 |
| 16: | 160 |
| 18: | 180 |
| 20: | 200 |
| 22: | 225 |
| 25: | 250 |
| 28: | 280 |
| 31: | 315 |
| 35: | 355 |
| 40: | 400 |
| 45: | 450 |

| Position 7 | |
|---|---|
| Speed (Pole pairs) | |
| 1:00 | 2 poles |
| 2: | 4 poles |
| 3: | 6 poles |
| 4: | 8 poles |
| 5: | 10 poles |
| 6: | 12 poles |
| 7: | ≥ 12 poles |
| 8: | Two-speed motors |
| 9: | Multi-speed motors |

| Positions 8 to 10 | |
|---|---|
| 8: | Frame lenght |
| 9: | Stator package length |
| 10: | Speed for two-speed induction, Permanent Magnet, SynRM and High Speed motors |

| Position 11 |
|---|
| - (Dash) |

| Position 12 | |
|---|---|
| Mounting arrangement | |
| A: | Foot-mounted, top-mounted terminal box |
| B: | Flange-mounted, large flange with clearance holes |
| C: | Flange-mounted, small flange with tapped holes |

| Position 13 | |
|---|---|
| Voltage and frequency | |
| Single-speed motors | |
| C: | 400VY 50Hz, 460VY 60Hz |
| D: | 400 VΔ, 415 VΔ, 690 VY 50 Hz |
| E: | 500 VΔ 50 Hz |
| F: | 500 VY 50 Hz |
| P: | 400VD 50Hz, 460VD 60Hz |
| S: | 230 VΔ, 400 VY, 415 VY 50 Hz |

| Position 14 | |
|---|---|
| Generation code | |
| Generation code is followed by variant codes according to the hazardous area, seen below and on corresponding pages with variant codes: | |
| 461 | Ex d(e) design, Group IIC |

# Rating plates

—
01 Sample rating plate for IE4 Flameproof Ex eb db motors

—
01

1 ABB logo

2 Manufacturing place

3 CE mark on Ecodesign approved motors UKCA mark on UK approved motors

4 Manufacturing standard

5 Product description

6 Manufacturing year

7 Factory order reference number

8 Serial number

9 Insulation class, IP protection class

10 Voltage, Frequency, output, speed, current, power factory, duty

11 Product code

12 Bearing type

13 Weight

# Technical data

## IE4 Ex db eb cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 75 | M3KP 280SMB 2 | 3GKP281220-**M | 2981 | 95,6 | 95,6 | 95 | 0,86 | 130 | 7,7 | 240 | 2,2 | 3,2 | 0,677 | 665 | 77 |
| 90 | M3KP 280SMC 2 | 3GKP281230-**M | 2982 | 95,8 | 95,8 | 95,2 | 0,88 | 153 | 8,7 | 288 | 2,7 | 3,5 | 0,822 | 725 | 77 |
| 110 | M3KP 315SMB 2 | 3GKP311220-**M | 2983 | 96 | 96 | 95,4 | 0,87 | 189 | 7,2 | 352 | 1,7 | 2,9 | 1,22 | 940 | 77 |
| 132 | M3KP 315SMC 2 | 3GKP311230-**M | 2985 | 96,2 | 96,2 | 95,8 | 0,87 | 225 | 8,6 | 422 | 2,3 | 3,3 | 1,44 | 1025 | 77 |
| 160 | M3KP 315MLA 2 | 3GKP311410-**M | 2983 | 96,3 | 96,4 | 96,2 | 0,89 | 267 | 8 | 512 | 2,2 | 2,8 | 1,7 | 1190 | 77 |
| 200 | M3KP 355SMA 2 | 3GKP351210-**M | 2985 | 96,5 | 96,4 | 95,9 | 0,89 | 335 | 8,2 | 640 | 1,9 | 3,5 | 2,73 | 1600 | 83 |
| 250 | M3KP 355SMB 2 | 3GKP351220-**M | 2984 | 96,5 | 96,5 | 96,1 | 0,89 | 415 | 8,1 | 800 | 2,2 | 3,3 | 3,1 | 1680 | 83 |
| 315 | M3KP 355SMC 2 | 3GKP351230-**M | 2985 | 96,5 | 96,4 | 95,9 | 0,88 | 533 | 7,3 | 1008 | 2,4 | 3,1 | 3,38 | 1750 | 83 |
| 355 | M3KP 355MLA 2 | 3GKP351410-**M | 2983 | 96,5 | 96,5 | 96,1 | 0,89 | 595 | 7,8 | 1137 | 2,4 | 2,8 | 3,74 | 2000 | 83 |
| 400 | M3KP 355MLB 2 | 3GKP351420-**M | 2982 | 96,5 | 96,4 | 95,8 | 0,87 | 683 | 7 | 1281 | 2,6 | 2,8 | 3,9 | 2000 | 83 |
| 450 | M3KP 355MLC 2 | 3GKP351430-**M | 2984 | 96,5 | 96,5 | 96 | 0,9 | 746 | 8,8 | 1440 | 2,7 | 3,8 | 3,95 | 2080 | 83 |
| 500 | M3KP 355LKA 2 | 3GKP351810-**M | 2983 | 96,5 | 96,5 | 96,1 | 0,9 | 823 | 8,7 | 1601 | 2,3 | 3,9 | 4,51 | 2320 | 83 |
| 560 | M3KP 400LA 2 | 3GKP401510-**M | 2988 | 96,5 | 96,4 | 95,8 | 0,89 | 939 | 8,4 | 1790 | 2,3 | 3,4 | 7,27 | 2950 | 82 |
| 560 | M3KP 400LKA 2 | 3GKP401810-**M | 2988 | 96,5 | 96,4 | 95,8 | 0,89 | 939 | 8,4 | 1790 | 2,3 | 3,4 | 7,27 | 2950 | 82 |
| 560 | M3KP 355LKB 2 | 3GKP351820-**M | 2983 | 96,5 | 96,4 | 95,9 | 0,9 | 922 | 8,7 | 1793 | 2,6 | 4,1 | 4,93 | 2460 | 83 |
| 630 | M3KP 400LB 2 | 3GKP401520-**M | 2988 | 96,5 | 96,4 | 95,9 | 0,89 | 1052 | 8,5 | 2013 | 2,4 | 3,4 | 7,81 | 2950 | 82 |
| 630 | M3KP 400LKB 2 | 3GKP401820-**M | 2988 | 96,5 | 96,4 | 95,9 | 0,89 | 1052 | 8,5 | 2013 | 2,4 | 3,4 | 7,81 | 2950 | 82 |
| 710 | M3KP 400LC 2 | 3GKP401530-**M | 2988 | 96,5 | 96,5 | 96 | 0,89 | 1185 | 7,3 | 2269 | 2,8 | 3,1 | 8,9 | 3050 | 82 |
| 710 | M3KP 400LKC 2 | 3GKP401830-**M | 2988 | 96,5 | 96,5 | 96 | 0,89 | 1185 | 7,3 | 2269 | 2,8 | 3,1 | 8,9 | 3050 | 82 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3KP 280SMD 2 | 3GKP281240-**M | 2980 | 96 | 96,2 | 95,8 | 0,86 | 192 | 8,3 | 352 | 2,7 | 3,4 | 0,822 | 725 | 77 |
| 132 | M3KP 280MLA 2 | 3GKP281410-**M | 2980 | 96,2 | 96,2 | 95,6 | 0,88 | 224 | 8,5 | 423 | 2,9 | 3,4 | 0,941 | 840 | 81 |
| 160 | M3KP 280MLB 2 | 3GKP281420-**M | 2970 | 96,3 | 96,7 | 96,7 | 0,9 | 265 | 6,9 | 514 | 2,3 | 2,5 | 1,06 | 890 | 81 |
| 200 | M3KP 315MLB 2 | 3GKP311420-**M | 2982 | 96,5 | 96,7 | 96,6 | 0,89 | 333 | 6,5 | 640 | 2,1 | 2,8 | 1,78 | 1220 | 77 |
| 250 | M3KP 315LKB 2 | 3GKP311820-**M | 2981 | 96,5 | 96,7 | 96,7 | 0,9 | 412 | 7,2 | 801 | 2,8 | 2,9 | 2,33 | 1540 | 77 |

# Technical data

## IE4 Ex db eb cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 75 | M3KP 280SMB 4 | 3GKP282220-**M | 1488 | 96 | 96,2 | 95,8 | 0,85 | 132 | 8,1 | 481 | 3,3 | 3,2 | 1,41 | 840 | 72 |
| 90 | M3KP 280SMC 4 | 3GKP282230-**M | 1487 | 96,1 | 96,2 | 95,7 | 0,84 | 161 | 7,7 | 578 | 3,5 | 3,3 | 1,41 | 840 | 72 |
| 110 | M3KP 315SMC 4 | 3GKP312230-**M | 1491 | 96,3 | 96,4 | 96 | 0,84 | 194 | 7,9 | 705 | 2,9 | 3,4 | 2,33 | 1000 | 68 |
| 132 | M3KP 315SMD 4 | 3GKP312240-**M | 1491 | 96,4 | 96,5 | 96,2 | 0,84 | 234 | 7,8 | 846 | 3 | 3,4 | 2,52 | 1065 | 68 |
| 160 | M3KP 315MLB 4 | 3GKP312420-**M | 1490 | 96,6 | 96,7 | 96,5 | 0,85 | 278 | 7,7 | 1026 | 3,2 | 3,3 | 3,04 | 1220 | 68 |
| 200 | M3KP 355SMA 4 | 3GKP352210-**M | 1492 | 96,7 | 96,7 | 96,4 | 0,86 | 346 | 7,1 | 1280 | 2,6 | 2,9 | 5,11 | 1610 | 74 |
| 250 | M3KP 355SMB 4 | 3GKP352220-**M | 1492 | 96,7 | 96,7 | 96,4 | 0,85 | 435 | 7,5 | 1600 | 3 | 3,1 | 6 | 1780 | 74 |
| 315 | M3KP 355SMC 4 | 3GKP352230-**M | 1491 | 96,7 | 96,7 | 96,4 | 0,84 | 555 | 7 | 2017 | 3,2 | 3 | 6,56 | 1820 | 74 |
| 355 | M3KP 355MLA 4 | 3GKP352410-**M | 1492 | 96,7 | 96,8 | 96,5 | 0,85 | 617 | 7,7 | 2273 | 3,3 | 3,1 | 7,44 | 2140 | 78 |
| 400 | M3KP 355MLB 4 | 3GKP352420-**M | 1490 | 96,7 | 96,8 | 96,6 | 0,86 | 691 | 8,2 | 2563 | 3,2 | 3 | 7,44 | 2140 | 78 |
| 450 | M3KP 355MLC 4 | 3GKP352430-**M | 1489 | 96,7 | 96,9 | 96,7 | 0,86 | 782 | 7,9 | 2885 | 3,1 | 2,9 | 7,44 | 2140 | 78 |
| 500 | M3KP 355LKA 4 | 3GKP352810-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,86 | 867 | 7 | 3202 | 3,7 | 3,1 | 9,35 | 2500 | 78 |
| 560 | M3KP 400LA 4 | 3GKP402510-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,85 | 985 | 7 | 3586 | 3,1 | 3,1 | 13,6 | 3200 | 78 |
| 560 | M3KP 400LKA 4 | 3GKP402810-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,85 | 985 | 7 | 3586 | 3,1 | 3,1 | 13,6 | 3200 | 78 |
| 630 | M3KP 400LB 4 | 3GKP402520-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,86 | 1093 | 8,6 | 4033 | 3 | 3,2 | 13,6 | 3300 | 78 |
| 630 | M3KP 400LKB 4 | 3GKP402820-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,86 | 1093 | 8,6 | 4033 | 3 | 3,2 | 13,6 | 3300 | 78 |
| 710 | M3KP 400LC 4 | 3GKP402530-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,85 | 1245 | 7,7 | 4545 | 2,9 | 3,2 | 14,6 | 3300 | 78 |
| 710 | M3KP 400LKC 4 | 3GKP402830-**M | 1492 | 96,7 | 96,7 | 96,3 | 0,85 | 1245 | 7,7 | 4545 | 2,9 | 3,2 | 14,6 | 3300 | 78 |
| 780 | M3KP 450LA 4 | 3GKP452510-**M | 1492 | 96,7 | 96,6 | 96 | 0,85 | 1360 | 6,5 | 4991 | 1,4 | 3,1 | 21,3 | 4050 | 85 |
| 850 | M3KP 450LB 4 | 3GKP452520-**M | 1493 | 96,7 | 96,6 | 96 | 0,85 | 1490 | 6,7 | 5437 | 1,5 | 3,3 | 24,5 | 4050 | 85 |
| 950 | M3KP 450LC 4 | 3GKP452530-**M | 1492 | 96,7 | 96,6 | 96,2 | 0,86 | 1652 | 6,5 | 6079 | 1,4 | 3,1 | 28,4 | 4350 | 85 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3KP 280MLB 4 | 3GKP282420-**M | 1489 | 96,3 | 96,3 | 95,7 | 0,81 | 203 | 8,3 | 705 | 4,3 | 3,8 | 1,7 | 890 | 75 |
| 132 | M3KP 280MLC 4 | 3GKP282430-**M | 1489 | 96,4 | 96,4 | 95,9 | 0,81 | 244 | 8,2 | 847 | 4,4 | 3,8 | 1,87 | 890 | 75 |
| 200 | M3KP 315LKB 4 | 3GKP312820-**M | 1491 | 96,7 | 96,9 | 96,7 | 0,86 | 345 | 7,6 | 1281 | 2,9 | 3,1 | 3,81 | 1480 | 74 |
| 250 | M3KP 315LKC 4 | 3GKP312830-**M | 1491 | 96,7 | 96,9 | 96,8 | 0,86 | 432 | 7,9 | 1602 | 2,7 | 3,2 | 3,91 | 1600 | 74 |
| 315 | M3KP 315LKE 4 | 3GKP312850-**M | 1489 | 96,7 | 97 | 96,9 | 0,84 | 560 | 7,8 | 2020 | 3,1 | 3 | 4,15 | 1640 | 74 |

# Technical data

## IE4 Ex db eb cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 45 | M3KP 280SMB 6 | 3GKP283220-**M | 992 | 94,8 | 94,9 | 94,4 | 0,84 | 81,3 | 7,7 | 433 | 2,9 | 2,8 | 2 | 680 | 65 |
| 55 | M3KP 280SMC 6 | 3GKP283230-**M | 991 | 95,1 | 95,3 | 94,9 | 0,84 | 99,3 | 7,5 | 530 | 3 | 2,8 | 2,26 | 725 | 65 |
| 75 | M3KP 315SMC 6 | 3GKP313230-**M | 994 | 95,4 | 95,5 | 95,1 | 0,82 | 137 | 7,5 | 720 | 2,6 | 2,9 | 4,35 | 1000 | 67 |
| 90 | M3KP 315SMD 6 | 3GKP313240-**M | 994 | 95,6 | 95,7 | 95,3 | 0,8 | 169 | 7,5 | 864 | 2,8 | 3 | 4,57 | 1040 | 67 |
| 110 | M3KP 315MLB 6 | 3GKP313420-**M | 994 | 95,8 | 95,9 | 95,6 | 0,81 | 202 | 7,3 | 1057 | 2,7 | 2,8 | 5,5 | 1200 | 68 |
| 132 | M3KP 315LKA 6 | 3GKP313810-**M | 994 | 96 | 96,1 | 95,8 | 0,81 | 243 | 7,4 | 1268 | 2,9 | 2,9 | 6,54 | 1410 | 68 |
| 160 | M3KP 355SMB 6 | 3GKP353220-**M | 995 | 96,2 | 96,3 | 95,9 | 0,82 | 292 | 7,7 | 1535 | 2,6 | 2,8 | 8,65 | 1680 | 73 |
| 200 | M3KP 355SMC 6 | 3GKP353230-**M | 995 | 96,3 | 96,3 | 96 | 0,81 | 367 | 7,1 | 1919 | 2,7 | 2,9 | 10,1 | 1820 | 73 |
| 250 | M3KP 355MLB 6 | 3GKP353420-**M | 995 | 96,5 | 96,6 | 96,4 | 0,82 | 455 | 7,7 | 2400 | 2,8 | 2,8 | 12 | 2180 | 73 |
| 315 | M3KP 355LKA 6 | 3GKP353810-**M | 994 | 96,6 | 96,7 | 96,4 | 0,82 | 574 | 6,7 | 3025 | 2,8 | 2,7 | 13,8 | 2500 | 76 |
| 355 | M3KP 355LKB 6 | 3GKP353820-**M | 995 | 96,6 | 96,5 | 96 | 0,79 | 667 | 7,4 | 3407 | 3,3 | 3,1 | 14,7 | 2600 | 76 |
| 400 | M3KP 400LA 6 | 3GKP403510-**M | 995 | 96,6 | 96,7 | 96,3 | 0,81 | 734 | 7,3 | 3840 | 2,8 | 3,1 | 15,8 | 2900 | 76 |
| 400 | M3KP 400LKA 6 | 3GKP403810-**M | 995 | 96,6 | 96,7 | 96,3 | 0,81 | 734 | 7,3 | 3840 | 2,8 | 3,1 | 15,8 | 2900 | 76 |
| 450 | M3KP 400LB 6 | 3GKP403520-**M | 996 | 96,6 | 96,4 | 95,6 | 0,81 | 825 | 8,5 | 4316 | 3,4 | 3,5 | 20,7 | 3300 | 76 |
| 450 | M3KP 400LKB 6 | 3GKP403820-**M | 996 | 96,6 | 96,4 | 95,6 | 0,81 | 825 | 8,5 | 4316 | 3,4 | 3,5 | 20,7 | 3300 | 76 |
| 500 | M3KP 400LC 6 | 3GKP403530-**M | 995 | 96,6 | 96,5 | 95,8 | 0,82 | 912 | 8 | 4798 | 3,2 | 3,3 | 20,7 | 3300 | 76 |
| 500 | M3KP 400LKC 6 | 3GKP403830-**M | 995 | 96,6 | 96,5 | 95,8 | 0,82 | 912 | 8 | 4798 | 3,2 | 3,3 | 20,7 | 3300 | 76 |
| 560 | M3KP 400LD 6 | 3GKP403540-**M | 994 | 96,6 | 96,6 | 96,2 | 0,85 | 982 | 6,8 | 5380 | 2,8 | 2,9 | 22,3 | 3400 | 77 |
| 560 | M3KP 400LKD 6 | 3GKP403840-**M | 994 | 96,6 | 96,6 | 96,2 | 0,85 | 982 | 6,8 | 5380 | 2,8 | 2,9 | 22,3 | 3400 | 77 |
| 610 | M3KP 450LA 6 | 3GKP453510-**M | 996 | 96,6 | 96,5 | 95,8 | 0,81 | 1126 | 7,5 | 5849 | 1,7 | 3,4 | 32,2 | 4150 | 81 |
| 680 | M3KP 450LB 6 | 3GKP453520-**M | 995 | 96,6 | 96,6 | 96,1 | 0,84 | 1200 | 6,9 | 6524 | 1,5 | 3 | 38,2 | 4500 | 81 |
| 760 | M3KP 450LC 6 | 3GKP453530-**M | 995 | 96,6 | 96,6 | 96,1 | 0,83 | 1358 | 7 | 7293 | 1,5 | 3,2 | 42,9 | 4800 | 81 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 75 | M3KP 280SMD 6 | 3GKP283240-**M | 991 | 95,4 | 95,6 | 95,3 | 0,81 | 140 | 7,2 | 723 | 3,1 | 2,7 | 2,25 | 730 | 65 |
| 160 | M3KP 315LKC 6 | 3GKP313830-**M | 994 | 96,2 | 96,3 | 96 | 0,81 | 296 | 7,1 | 1537 | 3,2 | 3 | 7,71 | 1600 | 68 |
| 200 | M3KP 315LKE 6 | 3GKP313850-**M | 994 | 96,3 | 96,4 | 96,1 | 0,81 | 368 | 7,5 | 1921 | 2,9 | 2,9 | 7,71 | 1600 | 68 |

# Technical data

## IE3 Ex db eb cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3KP 80MD 2 | 3GKP081340-**K | 2872 | 80,7 | 81,1 | 79,4 | 0,87 | 1,51 | 6,2 | 2,43 | 2,88 | 3,43 | 0,0012 | 39 | 57 |
| 1.1 | M3KP 80MG 2 | 3GKP081370-**K | 2862 | 82,7 | 83,7 | 82,8 | 0,87 | 2,1 | 6,3 | 3,65 | 3,03 | 3,5 | 0,0014 | 40 | 60 |
| 1.5 | M3KP 90SLB 2 | 3GKP091020-**K | 2892 | 84,2 | 85,3 | 84,5 | 0,89 | 2,7 | 7,3 | 4,8 | 3,4 | 3,7 | 0,0031 | 50 | 69 |
| 2.2 | M3KP 90LC 2 | 3GKP091530-**K | 2900 | 85,9 | 86,7 | 85,7 | 0,89 | 4 | 9,1 | 7,27 | 3,35 | 4,09 | 0,0044 | 54 | 64 |
| 3 | M3KP 100LKA 2 | 3GKP101810-**K | 2907 | 87,1 | 87,6 | 86,5 | 0,89 | 5,4 | 8,8 | 9,9 | 3,25 | 4,32 | 0,0086 | 70 | 68 |
| 4 | M3KP 112MG 2 | 3GKP111370-**K | 2882 | 88,1 | 89,7 | 90,3 | 0,93 | 7 | 8,1 | 13,3 | 2,8 | 3,6 | 0,0132 | 75 | 70 |
| 5.5 | M3KP 132SMF 2 | 3GKP131260-**K | 2902 | 89,2 | 89,9 | 89,4 | 0,9 | 9,7 | 7,3 | 18,2 | 2,72 | 3,6 | 0,0218 | 115 | 67 |
| 7.5 | M3KP 132SMG 2 | 3GKP131270-**K | 2907 | 90,1 | 91 | 91 | 0,9 | 13,2 | 8,1 | 24,7 | 2,66 | 3,74 | 0,0218 | 115 | 70 |
| 11 | M3KP 160MLA 2 | 3GKP161410-**K | 2943 | 91,2 | 91,7 | 91,3 | 0,92 | 18,7 | 8,1 | 35,6 | 2,7 | 3,4 | 0,052 | 219 | 69 |
| 15 | M3KP 160MLB 2 | 3GKP161420-**K | 2943 | 91,9 | 92,4 | 92,1 | 0,91 | 25,4 | 8,4 | 48,6 | 3,1 | 3,4 | 0,062 | 226 | 69 |
| 18.5 | M3KP 160MLC 2 | 3GKP161430-**K | 2942 | 92,4 | 93 | 92,8 | 0,93 | 30,8 | 8,3 | 60 | 3,1 | 3,6 | 0,072 | 250 | 69 |
| 22 | M3KP 180MLA 2 | 3GKP181410-**K | 2957 | 92,7 | 93,3 | 93 | 0,91 | 37,4 | 8,1 | 71 | 2,6 | 3,2 | 0,116 | 301 | 69 |
| 30 | M3KP 200MLA 2 | 3GKP201410-**K | 2958 | 93,3 | 93,7 | 93,6 | 0,9 | 51 | 7,8 | 96,8 | 2,8 | 3,1 | 0,196 | 338 | 72 |
| 37 | M3KP 200MLB 2 | 3GKP201420-**K | 2960 | 93,7 | 94,1 | 93,9 | 0,91 | 62,2 | 8,8 | 119 | 3,1 | 3,4 | 0,217 | 350 | 72 |
| 45 | M3KP 225SMA 2 | 3GKP221210-**K | 2972 | 94 | 94,2 | 93,8 | 0,89 | 76,8 | 7,8 | 144 | 3,1 | 3 | 0,323 | 457 | 74 |
| 55 | M3KP 250SMA 2 | 3GKP251210-**K | 2975 | 94,3 | 94,5 | 94,1 | 0,89 | 93,6 | 8 | 176 | 2,8 | 3,3 | 0,579 | 509 | 75 |
| 75 | M3KP 280SMB 2 | 3GKP281220-**K | 2980 | 94,7 | 94,7 | 94 | 0,87 | 129 | 7,8 | 240 | 2,5 | 3,3 | 0,9 | 686 | 77 |
| 90 | M3KP 280SMC 2 | 3GKP281230-**K | 2981 | 95 | 94,8 | 94,1 | 0,88 | 153 | 8 | 288 | 2,95 | 3,1 | 1,15 | 756 | 77 |
| 110 | M3KP 315SMB 2 | 3GKP311220-**K | 2982 | 95,2 | 95,2 | 94,3 | 0,88 | 189 | 6,7 | 352 | 1,9 | 2,6 | 1,4 | 961 | 77 |
| 132 | M3KP 315SMC 2 | 3GKP311230-**K | 2986 | 95,4 | 95,5 | 95,1 | 0,88 | 226 | 7,9 | 422 | 2,4 | 3 | 1,7 | 1036 | 77 |
| 160 | M3KP 315MLA 2 | 3GKP311410-**K | 2983 | 95,6 | 95,9 | 95,6 | 0,9 | 268 | 7,3 | 512 | 2,2 | 2,7 | 2,1 | 1206 | 77 |
| 200 | M3KP 355SMA 2 | 3GKP351210-**K | 2985 | 95,8 | 95,5 | 94,5 | 0,89 | 336 | 7,6 | 640 | 2 | 3,1 | 3 | 1621 | 83 |
| 250 | M3KP 355SMB 2 | 3GKP351220-**K | 2983 | 95,8 | 96 | 95,5 | 0,9 | 415 | 7,6 | 800 | 2,2 | 3 | 3,4 | 1718 | 83 |
| 315 | M3KP 355SMC 2 | 3GKP351230-**K | 2984 | 95,8 | 95,8 | 95,1 | 0,89 | 533 | 7,8 | 1008 | 2,3 | 2,8 | 3,6 | 1793 | 83 |
| 355 | M3KP 355MLA 2 | 3GKP351410-**K | 2981 | 95,8 | 96,1 | 95,7 | 0,9 | 595 | 7,5 | 1137 | 2,3 | 2,6 | 4,1 | 2028 | 83 |
| 400 | M3KP 355MLB 2 | 3GKP351420-**K | 2982 | 95,8 | 95,6 | 94,7 | 0,88 | 677 | 7,1 | 1280 | 2,3 | 2,9 | 4,1 | 2030 | 83 |
| 450 | M3KP 355MLC 2 | 3GKP351430-**K | 2983 | 95,8 | 95,8 | 95 | 0,9 | 743 | 7,9 | 1440 | 2,2 | 2,9 | 4,3 | 2110 | 83 |
| 500 | M3KP 355LKA 2 | 3GKP351810-**K | 2982 | 95,8 | 95,8 | 95,3 | 0,9 | 827 | 7,5 | 1601 | 2 | 3,9 | 4,8 | 2350 | 83 |
| 560 | M3KP 400LA 2 | 3GKP401510-**K | 2988 | 95,8 | 95,8 | 94,9 | 0,89 | 934 | 7,8 | 1789 | 2,46 | 3,67 | 7,9 | 3070 | 82 |
| 630 | M3KP 400LB 2 | 3GKP401520-**K | 2987 | 95,8 | 95,5 | 94,8 | 0,89 | 1049 | 7,6 | 2014 | 2,56 | 3,7 | 8,2 | 3170 | 82 |
| 710 | M3KP 400LC 2 | 3GKP401530-**K | 2987 | 95,8 | 95,7 | 94,9 | 0,89 | 1178 | 7,2 | 2270 | 2,56 | 3,4 | 9,3 | 3420 | 82 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3KP 315MLB 2 | 3GKP311420-**K | 2983 | 96,4 | 96,7 | 96,6 | 0,9 | 333 | 6,8 | 640 | 1,9 | 2,6 | 2,2 | 1231 | 77 |
| 250 | M3KP 315LKB 2 | 3GKP311820-**K | 2982 | 95,8 | 96,2 | 96,2 | 0,91 | 413 | 7,9 | 800 | 2,5 | 2,7 | 2,9 | 1550 | 77 |

# Technical data

## IE3 Ex db eb cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.55 | M3KP 80MLD 4 | 3GKP082440-**K | 1439 | 80,8 | 82,2 | 81,4 | 0,81 | 1,18 | 6,3 | 3,6 | 2,3 | 3,29 | 0,0028 | 40 | 45 |
| 0.75 | M3KP 80MLG 4 | 3GKP082470-**K | 1445 | 82,5 | 83,5 | 82,2 | 0,79 | 1,62 | 6,9 | 4,97 | 2,6 | 3,76 | 0,0033 | 41 | 57 |
| 1.1 | M3KP 90SLC 4 | 3GKP092030-**K | 1444 | 84,1 | 84,6 | 83,2 | 0,79 | 2,3 | 7,2 | 7,28 | 3,77 | 3,68 | 0,0067 | 52 | 56 |
| 1.5 | M3KP 90LD 4 | 3GKP092540-**K | 1439 | 85,3 | 86,4 | 85,9 | 0,78 | 3,1 | 7,8 | 9,95 | 3,35 | 4,47 | 0,0072 | 53 | 56 |
| 2.2 | M3KP 100LKA 4 | 3GKP102810-**K | 1452 | 86,7 | 87,8 | 87,7 | 0,83 | 4,2 | 8,9 | 14,46 | 3,4 | 4,1 | 0,0146 | 70 | 56 |
| 3 | M3KP 100LKB 4 | 3GKP102820-**K | 1452 | 87,7 | 89 | 89 | 0,83 | 5,8 | 9 | 19,7 | 3,2 | 4 | 0,0146 | 70 | 58 |
| 4 | M3KP 112MG 4 | 3GKP112370-**K | 1454 | 88,6 | 89,1 | 88,6 | 0,75 | 8,7 | 7,5 | 26,3 | 3,1 | 3,7 | 0,0176 | 71 | 59 |
| 5.5 | M3KP 132SMF 4 | 3GKP132260-**K | 1462 | 89,6 | 90,6 | 90,6 | 0,81 | 10,8 | 7,3 | 35,87 | 2,41 | 3,39 | 0,0401 | 110 | 67 |
| 7.5 | M3KP 132SMG 4 | 3GKP132270-**K | 1457 | 90,4 | 91,4 | 91,5 | 0,81 | 14,8 | 7,3 | 49,1 | 2,39 | 3,38 | 0,0401 | 110 | 64 |
| 11 | M3KP 160MLA 4 | 3GKP162410-**K | 1473 | 91,4 | 91,8 | 91,3 | 0,84 | 20,4 | 7,7 | 71,3 | 2,6 | 2,9 | 0,108 | 234 | 62 |
| 15 | M3KP 160MLB 4 | 3GKP162420-**K | 1474 | 92,1 | 92,7 | 92,4 | 0,84 | 27,8 | 7,9 | 97,1 | 2,8 | 3,3 | 0,125 | 253 | 62 |
| 18.5 | M3KP 180MLA 4 | 3GKP182410-**K | 1481 | 92,6 | 92,9 | 92,3 | 0,82 | 34,9 | 7,6 | 119 | 3 | 3,1 | 0,217 | 294 | 62 |
| 22 | M3KP 180MLB 4 | 3GKP182420-**K | 1480 | 93 | 93,5 | 93,2 | 0,82 | 41,5 | 8,2 | 141 | 2,8 | 3,1 | 0,217 | 290 | 62 |
| 30 | M3KP 200MLA 4 | 3GKP202410-**K | 1484 | 93,6 | 93,8 | 93,2 | 0,84 | 54,6 | 8,3 | 193 | 3 | 3,3 | 0,366 | 347 | 63 |
| 37 | M3KP 225SMA 4 | 3GKP222210-**K | 1482 | 93,9 | 94,6 | 94,5 | 0,86 | 65,4 | 7,7 | 238 | 2,8 | 3,1 | 0,536 | 448 | 66 |
| 45 | M3KP 225SMB 4 | 3GKP222220-**K | 1482 | 94,2 | 94,7 | 94,6 | 0,85 | 80,2 | 7,9 | 289 | 3,1 | 3,2 | 0,536 | 451 | 66 |
| 55 | M3KP 250SMA 4 | 3GKP252210-**K | 1485 | 94,6 | 95,2 | 95 | 0,85 | 97,8 | 7,9 | 353 | 3 | 3,3 | 0,933 | 494 | 67 |
| 75 | M3KP 280SMB 4 | 3GKP282220-**K | 1486 | 95 | 95,4 | 95,3 | 0,85 | 134 | 7,4 | 482 | 2,5 | 2,8 | 1,5 | 686 | 72 |
| 90 | M3KP 280SMC 4 | 3GKP282230-**K | 1487 | 95,2 | 95,5 | 95,1 | 0,85 | 161 | 7,9 | 578 | 2,9 | 3 | 1,85 | 747 | 72 |
| 110 | M3KP 315SMC 4 | 3GKP312230-**K | 1491 | 95,4 | 95,7 | 95,2 | 0,85 | 194 | 7,8 | 704 | 2,4 | 3,1 | 2,9 | 1013 | 68 |
| 132 | M3KP 315SMD 4 | 3GKP312240-**K | 1490 | 95,6 | 95,8 | 95,4 | 0,85 | 234 | 7,9 | 846 | 2,6 | 3,2 | 3,2 | 1075 | 68 |
| 160 | M3KP 315MLB 4 | 3GKP312420-**K | 1490 | 95,8 | 96 | 95,6 | 0,86 | 278 | 7,9 | 1026 | 2,7 | 3 | 3,9 | 1228 | 68 |
| 200 | M3KP 355SMA 4 | 3GKP352210-**K | 1491 | 96 | 96,1 | 95,7 | 0,87 | 345 | 7,3 | 1282 | 2,1 | 2,7 | 5,9 | 1634 | 74 |
| 250 | M3KP 355SMB 4 | 3GKP352220-**K | 1491 | 96 | 96,1 | 95,9 | 0,87 | 433 | 7,8 | 1601 | 2,5 | 2,9 | 6,9 | 1790 | 74 |
| 315 | M3KP 355SMC 4 | 3GKP352230-**K | 1490 | 96 | 96,1 | 95,9 | 0,85 | 554 | 7,4 | 2017 | 2,4 | 2,9 | 7,2 | 1838 | 74 |
| 355 | M3KP 355MLA 4 | 3GKP352410-**K | 1491 | 96 | 96,3 | 95,9 | 0,87 | 616 | 7,9 | 2274 | 2,7 | 2,9 | 8,4 | 2173 | 78 |
| 400 | M3KP 355MLB 4 | 3GKP352420-**K | 1489 | 96 | 96 | 95,5 | 0,85 | 705 | 6,8 | 2565 | 2,3 | 2,6 | 8,4 | 2170 | 78 |
| 450 | M3KP 355MLC 4 | 3GKP352430-**K | 1490 | 96 | 96,1 | 95,6 | 0,86 | 780 | 6,9 | 2884 | 2,3 | 2,9 | 8,4 | 2170 | 78 |
| 500 | M3KP 355LKA 4 | 3GKP352810-**K | 1490 | 96 | 96 | 95,3 | 0,86 | 865 | 6,8 | 3204 | 2 | 3 | 10 | 2530 | 78 |
| 560 | M3KP 400LA 4 | 3GKP402510-**K | 1491 | 96 | 96 | 95,4 | 0,85 | 982 | 7,4 | 3586 | 2,4 | 2,8 | 15 | 3040 | 78 |
| 630 | M3KP 400LB 4 | 3GKP402520-**K | 1491 | 96 | 96 | 95,4 | 0,86 | 1077 | 7,6 | 4034 | 2,2 | 2,9 | 16 | 3420 | 78 |
| 710 | M3KP 400LC 4 | 3GKP402530-**K | 1491 | 96 | 96 | 95,5 | 0,85 | 1227 | 7,6 | 4547 | 2,4 | 3 | 17 | 3520 | 78 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3KP 315LKB 4 | 3GKP312820-**K | 1490 | 96,6 | 96,8 | 96,7 | 0,87 | 346 | 7,6 | 1282 | 2,5 | 2,9 | 5 | 1530 | 74 |
| 250 | M3KP 315LKC 4 | 3GKP312830-**K | 1490 | 96 | 96,2 | 96,1 | 0,87 | 432 | 7,8 | 1601 | 2,3 | 3 | 5,5 | 1610 | 74 |

# Technical data

## IE3 Ex db eb cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3KP 90SLD 6 | 3GKP093040-**K | 940 | 78,9 | 80,3 | 79,2 | 0,75 | 1,8 | 4,4 | 7,57 | 2,1 | 2,8 | 0,0056 | 49 | 44 |
| 1.1 | M3KP 90LF 6 | 3GKP093560-**K | 944 | 81 | 81,7 | 80,1 | 0,75 | 2,66 | 4,7 | 11,1 | 2,1 | 2,8 | 0,0068 | 52 | 44 |
| 1.5 | M3KP 100LE 6 | 3GKP103550-**K | 960 | 82,5 | 82,5 | 80,1 | 0,68 | 3,8 | 5,4 | 14,9 | 2,7 | 3,4 | 0,012 | 64 | 49 |
| 2.2 | M3KP 112MJ 6 | 3GKP113390-**K | 962 | 84,3 | 85,5 | 84,7 | 0,68 | 5,3 | 6 | 21,8 | 2,4 | 3,5 | 0,0196 | 72 | 66 |
| 3 | M3KP 132SMD 6 | 3GKP133240-**K | 977 | 85,6 | 85,9 | 84,3 | 0,69 | 6,9 | 5,9 | 29 | 1,9 | 3,3 | 0,0416 | 111 | 57 |
| 4 | M3KP 132SMG 6 | 3GKP133270-**K | 974 | 86,8 | 87,4 | 86,6 | 0,69 | 9,3 | 5,6 | 38,7 | 1,8 | 2,84 | 0,0416 | 112 | 57 |
| 5.5 | M3KP 132SMH 6 | 3GKP133280-**K | 966 | 88 | 88,9 | 88,7 | 0,73 | 12,1 | 5 | 54,1 | 1,83 | 2,7 | 0,0654 | 109 | 57 |
| 7.5 | M3KP 160MLA 6 | 3GKP163410-**K | 980 | 89,1 | 89,4 | 88,2 | 0,78 | 15,2 | 7,9 | 73 | 1,7 | 2,8 | 0,114 | 219 | 59 |
| 11 | M3KP 160MLB 6 | 3GKP163420-**K | 979 | 90,3 | 90,4 | 89,1 | 0,74 | 23,5 | 8,5 | 107 | 2,2 | 3,9 | 0,131 | 253 | 59 |
| 15 | M3KP 180MLA 6 | 3GKP183410-**K | 981 | 91,2 | 91,9 | 91,6 | 0,77 | 30,4 | 5,5 | 146 | 1,7 | 2,7 | 0,225 | 290 | 59 |
| 18.5 | M3KP 200MLA 6 | 3GKP203410-**K | 990 | 91,7 | 91,8 | 90,8 | 0,77 | 37,3 | 7,5 | 178 | 2,6 | 3,2 | 0,448 | 320 | 63 |
| 22 | M3KP 200MLB 6 | 3GKP203420-**K | 990 | 92,2 | 92,3 | 91,3 | 0,79 | 43 | 7,8 | 212 | 2,6 | 3,2 | 0,531 | 343 | 63 |
| 30 | M3KP 225SMA 6 | 3GKP223210-**K | 989 | 92,9 | 93,1 | 92,5 | 0,81 | 56,8 | 7,9 | 289 | 2,8 | 3,1 | 0,813 | 440 | 63 |
| 37 | M3KP 250SMA 6 | 3GKP253210-**K | 991 | 93,3 | 93,6 | 93,1 | 0,83 | 68 | 7,7 | 356 | 2,7 | 2,9 | 1,49 | 529 | 63 |
| 45 | M3KP 280SMB 6 | 3GKP283220-**K | 992 | 93,7 | 94,1 | 93,5 | 0,85 | 80,9 | 7,5 | 434 | 2,4 | 2,6 | 2,2 | 697 | 65 |
| 55 | M3KP 280SMC 6 | 3GKP283230-**K | 990 | 94,1 | 94,4 | 94,1 | 0,85 | 99,4 | 6,8 | 506 | 2,4 | 2,6 | 2,85 | 737 | 65 |
| 75 | M3KP 315SMC 6 | 3GKP313230-**K | 994 | 94,6 | 94,8 | 94,4 | 0,83 | 138 | 7 | 721 | 2,2 | 2,8 | 4,9 | 1009 | 67 |
| 90 | M3KP 315SMD 6 | 3GKP313240-**K | 994 | 94,9 | 95,1 | 94,7 | 0,81 | 170 | 7,2 | 864 | 2,4 | 2,9 | 4,9 | 1043 | 67 |
| 110 | M3KP 315MLB 6 | 3GKP313420-**K | 994 | 95,1 | 95,3 | 95,1 | 0,83 | 202 | 6,9 | 1058 | 2,3 | 2,7 | 6,3 | 1208 | 68 |
| 132 | M3KP 315LKA 6 | 3GKP313810-**K | 993 | 95,4 | 95,6 | 95,4 | 0,82 | 243 | 6,9 | 1269 | 2,4 | 2,7 | 7,3 | 1420 | 68 |
| 160 | M3KP 355SMB 6 | 3GKP353220-**K | 995 | 95,6 | 95,6 | 95 | 0,82 | 294 | 7 | 1536 | 2,1 | 2,7 | 9,7 | 1698 | 73 |
| 200 | M3KP 355SMC 6 | 3GKP353230-**K | 995 | 95,8 | 96 | 95,6 | 0,82 | 367 | 7,3 | 1920 | 2,3 | 2,8 | 11,3 | 1841 | 73 |
| 250 | M3KP 355MLB 6 | 3GKP353420-**K | 995 | 95,8 | 96 | 95,9 | 0,83 | 456 | 7,1 | 2399 | 2,3 | 2,7 | 13,5 | 2185 | 73 |
| 315 | M3KP 355LKA 6 | 3GKP353810-**K | 994 | 95,8 | 96 | 95,6 | 0,83 | 576 | 6,9 | 3026 | 2,3 | 2,6 | 15,5 | 2510 | 76 |
| 355 | M3KP 355LKB 6 | 3GKP353820-**K | 995 | 95,8 | 95,9 | 95,3 | 0,81 | 668 | 7,7 | 3407 | 2,7 | 2,9 | 16,5 | 2610 | 76 |
| 400 | M3KP 400LA 6 | 3GKP403510-**K | 993 | 95,8 | 95,8 | 95,1 | 0,82 | 731 | 7,1 | 3846 | 2,3 | 2,7 | 17 | 3020 | 76 |
| 450 | M3KP 400LB 6 | 3GKP403520-**K | 994 | 95,8 | 95,8 | 95,2 | 0,82 | 819 | 7,4 | 4323 | 2,4 | 2,5 | 20,5 | 3270 | 76 |
| 500 | M3KP 400LC 6 | 3GKP403530-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3420 | 76 |
| 500 | M3KP 400LKC 6 | 3GKP403830-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3420 | 76 |
| 560 | M3KP 400LD 6 | 3GKP403540-**K | 993 | 95,8 | 95,8 | 95,2 | 0,85 | 984 | 7,4 | 5386 | 2,4 | 2,8 | 24 | 3520 | 77 |
| 610 | M3KP 450LA 6 | 3GKP453510-**K | 994 | 95,8 | 95,8 | 95,3 | 0,83 | 1098 | 7,1 | 5860 | 1,4 | 2,9 | 31 | 4150 | 81 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 160 | M3KP 315LKC 6 | 3GKP313830-**K | 994 | 95,6 | 95,8 | 95,7 | 0,82 | 297 | 7,4 | 1537 | 2,7 | 2,9 | 9,2 | 1610 | 68 |

# Technical data

## IE3 Ex db eb cast iron motors, 800 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_nA$ | $I_S/I_N$ | $T_N$ Nm | $T_I/T_N$ | $T_b/T_N$ | | | |
| **800 r/min = 8 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3KP 100LKA 8 | 3GKP104810-**K | 710 | 75 | 74,5 | 70,5 | 0,65 | 2,13 | 4,4 | 10 | 2,35 | 2,8 | 0,00855 | 60 | 53 |
| 1.1 | M3KP 100LKB 8 | 3GKP104820-**K | 703 | 77,7 | 77,7 | 74,7 | 0,65 | 3,08 | 4,4 | 14,9 | 2,7 | 2,9 | 0,0128 | 68 | 53 |
| 1.5 | M3KP 112MC 8 | 3GKP114330-**K | 717 | 79,7 | 80,1 | 78,8 | 0,62 | 4,12 | 4,3 | 19,9 | 1,8 | 2,6 | 0,0194 | 72 | 55 |
| 2.2 | M3KP 132SMA 8 | 3GKP134210-**K | 725 | 81,9 | 82,3 | 80,2 | 0,64 | 5,8 | 5,2 | 28,9 | 2 | 3 | 0,0291 | 96 | 57 |
| 3 | M3KP 132SMG 8 | 3GKP134270-**K | 723 | 83,5 | 84,1 | 82,8 | 0,66 | 7,5 | 4,8 | 39,6 | 1,8 | 2,8 | 0,0375 | 106 | 57 |
| 4 | M3KP 160MLA 8 | 3GKP164410-**K | 734 | 84,8 | 85,1 | 83,2 | 0,65 | 10,3 | 4,5 | 52 | 1,8 | 2,3 | 0,091 | 212 | 59 |
| 5.5 | M3KP 160MLB 8 | 3GKP164420-**K | 732 | 86,2 | 87,1 | 86,1 | 0,69 | 13 | 5 | 71,7 | 2 | 2,35 | 0,091 | 213 | 59 |
| 7.5 | M3KP 160MLC 8 | 3GKP164430-**K | 733 | 87,3 | 88,2 | 87,2 | 0,69 | 17,6 | 5,1 | 97,7 | 2 | 2,4 | 0,12 | 232 | 59 |
| 11 | M3KP 180MLA 8 | 3GKP184410-**K | 731 | 88,6 | 89,2 | 88,4 | 0,7 | 25,3 | 5 | 143,6 | 2,1 | 2,1 | 0,2 | 275 | 59 |
| 15 | M3KP 200MLA 8 | 3GKP204410-**K | 737 | 89,6 | 90,5 | 90,1 | 0,74 | 32,5 | 5,2 | 194 | 2,1 | 2,4 | 0,45 | 319 | 60 |
| 18.5 | M3KP 225SMA 8 | 3GKP224210-**K | 736 | 90,1 | 90,8 | 90,2 | 0,74 | 39,8 | 5,2 | 240 | 2 | 2,25 | 0,669 | 422 | 63 |
| 22 | M3KP 225SMB 8 | 3GKP224220-**K | 736 | 90,6 | 91,6 | 91,5 | 0,73 | 47,5 | 5,3 | 285 | 2,26 | 2,47 | 0,722 | 435 | 63 |
| 30 | M3KP 250SMA 8 | 3GKP254210-**K | 741 | 91,3 | 91,7 | 91 | 0,71 | 67 | 5,6 | 386 | 2,7 | 2,7 | 1,4 | 512 | 63 |
| 37 | M3KP 280SMA 8 | 3GKP284210-**K | 741 | 91,8 | 92 | 91,3 | 0,79 | 72,6 | 7,3 | 476 | 1,7 | 3 | 1,85 | 625 | 65 |
| 45 | M3KP 280SMB 8 | 3GKP284220-**K | 741 | 92,2 | 92,3 | 91,7 | 0,78 | 89,2 | 7,6 | 579 | 1,8 | 3,1 | 2,2 | 665 | 65 |
| 55 | M3KP 315SMA 8 | 3GKP314210-**K | 742 | 92,5 | 93,1 | 92,5 | 0,8 | 106 | 7,1 | 707 | 1,6 | 2,7 | 3,2 | 850 | 62 |
| 75 | M3KP 315SMB 8 | 3GKP314220-**K | 741 | 93,1 | 93,2 | 93,1 | 0,82 | 146 | 7,1 | 966 | 1,7 | 2,7 | 4,1 | 950 | 62 |
| 90 | M3KP 315SMC 8 | 3GKP314230-**K | 741 | 93,4 | 93,7 | 93,4 | 0,82 | 170 | 7,4 | 1159 | 1,8 | 2,7 | 4,9 | 1020 | 64 |
| 110 | M3KP 315MLA 8 | 3GKP314410-**K | 740 | 93,7 | 94 | 94,1 | 0,83 | 211 | 7,3 | 1419 | 1,8 | 2,7 | 5,8 | 1170 | 72 |
| 132 | M3KP 355SMA 8 | 3GKP354210-**K | 744 | 94 | 93,9 | 93,4 | 0,79 | 256 | 7,5 | 1694 | 1,5 | 2,6 | 7,9 | 1550 | 69 |
| 160 | M3KP 355SMB 8 | 3GKP354220-**K | 744 | 94,3 | 94,3 | 93,8 | 0,79 | 293 | 7,6 | 2053 | 1,6 | 2,6 | 9,7 | 1710 | 69 |
| 200 | M3KP 355SMC 8 | 3GKP354230-**K | 742 | 94,6 | 95 | 94,8 | 0,79 | 385 | 7,4 | 2576 | 1,6 | 2,6 | 11,3 | 1850 | 69 |
| 250 | M3KP 355MLB 8 | 3GKP354420-**K | 743 | 94,6 | 94,7 | 94,1 | 0,8 | 472 | 7,5 | 3213 | 1,6 | 2,7 | 13,5 | 2210 | 72 |
| 315 | M3KP 400LA 8 | 3GKP404510-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 3020 | 71 |
| 315 | M3KP 400LKA 8 | 3GKP404810-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 3020 | 71 |
| 355 | M3KP 400LB 8 | 3GKP404520-**K | 743 | 94,6 | 94,9 | 94,6 | 0,83 | 641 | 6,8 | 4562 | 1,2 | 2,5 | 21 | 3320 | 71 |
| 400 | M3KP 400LC 8 | 3GKP404530-**K | 744 | 94,6 | 94,9 | 94,3 | 0,81 | 735 | 6 | 5134 | 1,3 | 2,7 | 24 | 3520 | 71 |
| 430 | M3KP 450LA 8 | 3GKP454510-**K | 744 | 94,6 | 94,9 | 94,5 | 0,82 | 789 | 6,2 | 5519 | 1 | 2,6 | 26 | 3750 | 80 |
| 470 | M3KP 450LB 8 | 3GKP454520-**K | 744 | 94,6 | 94,9 | 94,3 | 0,8 | 861 | 6,6 | 6032 | 1,1 | 2,7 | 29 | 4000 | 80 |
| 530 | M3KP 450LC 8 | 3GKP454530-**K | 745 | 94,6 | 94,7 | 94,2 | 0,81 | 982 | 7,3 | 6793 | 1,3 | 3 | 35 | 4350 | 80 |
| 600 | M3KP 450LD 8 | 3GKP454540-**K | 745 | 94,6 | 94,6 | 94 | 0,8 | 1124 | 7,9 | 7690 | 1,4 | 3,3 | 41 | 4800 | 80 |

# Variant codes

## Flameproof cast iron motors, Ex db eb IIB/IIC T4 Gb

Variant codes specify additional options and features to the standard motor. The desired features are listed as three-digit variant codes in the motor order. Note also that there are variants that cannot be used together.

Most of the variant codes apply to IE2 and IE3 motors. However, confirm the availability of variants for IE3 motors with your ABB sales office before making an order.

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| **Administration** | | | | | | | | | | | | | | | | |
| 529 | Customer witnessed visual inspection of complete order line. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 530 | Two-year extension on standard warranty | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 531 | Sea freight packing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 533 | Wooden sea freight packing | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 590 | Mounting of customer supplied part other than coupling. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 648 | Rating plate in special language | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 999 | Case specific design requiring a quotation | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Balancing** | | | | | | | | | | | | | | | | |
| 417 | Vibration acc. to Grade B (IEC 60034-14). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 423 | Balanced without key. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 424 | Full-key balancing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Bearings and Lubrication** | | | | | | | | | | | | | | | | |
| 036 | Transport lock for bearings. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 037 | Roller bearing at D-end. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| 040 | Heat-resistant grease | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 041 | Bearings regreasable via grease nipples. | - | - | - | - | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 058 | Angular contact bearing at D-end, shaft force away from bearing. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 107 | Pt100 2-wire in bearings. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 128 | Double PT100, 2-wire in bearings | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 129 | Double PT100, 3-wire in bearings | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 130 | Pt100 3-wire in bearings. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 194 | 2Z bearings greased for life at both ends. | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | - | - | - | - | - |
| 433 | Outlet grease collector | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 506 | Nipples for vibration measurement : SKF Marlin Quick Connect stud CMSS-2600-3 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 593 | Bearings grease suitable for food and beverage industry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 654 | Provision for vibration sensors (M8x1) | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 795 | Lubrication information plate | - | - | - | - | - | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| 796 | Grease nipples JIS B 1575 PT 1/8 Type A | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 797 | Stainless steel SPM nipples | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 798 | Stainless steel grease nipples | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 799 | Grease nipples flat type DIN 3404, thread M10x1 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 800 | Grease nipples JIS B 1575 PT 1/8" pin type | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 828 | SPM compatible nipple for vibration measurement at D-end only. | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| **Branch standard designs** | | | | | | | | | | | | | | | | |
| 178 | Stainless steel / acid proof bolts. | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 204 | Jacking bolts for foot mounted motors. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ |
| 209 | Non-standard voltage or frequency, (special winding). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 396 | Motor designed for minimum ambient temperature -20 °C to -40 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 397 | Motor designed for minimum ambient temperature -40 °C to -55 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 398 | Motor designed for minimum ambient temperature -20 °C to -40 °C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 399 | Motor designed for minimum ambient temperature -40 °C to -55 °C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 425 | Corrosion protected stator and rotor core. | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 524 | Special run-out tolerances on flange and shaft for close coupled pump applications. | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 786 | Special design shaft upwards (V3, V35, V6) for outdoor mounting. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| **Cooling system** | | | | | | | | | | | | | | | | |
| 044 | Unidirectional fan for reduced noise level. Rotation clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | - |
| 045 | Unidirectional fan for reduced noise level. Rotation counter clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | - |
| 068 | Light alloy metal fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 183 | Separate motor cooling (fan axial, N-end). | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 206 | Steel fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 514 | Separate motor cooling (fan on top) | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 791 | Stainless steel fan cover | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Coupling** | | | | | | | | | | | | | | | | |
| 035 | Assembly of customer supplied coupling-half. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Documentation** | | | | | | | | | | | | | | | | |
| 141 | Binding 2D main dimension drawing. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 370 | Motor model drawing in 3D | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 374 | Binding 2D motor detailed drawing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 536 | Photos of manufactured motors | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 537 | Advanced data sheet | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 722 | Rotor dimension drawing (incl. torsional stiffness). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 777 | Premium documentation package | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Drain holes** | | | | | | | | | | | | | | | | |
| 448 | Draining holes with metal plugs. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Earthing Bolt** | | | | | | | | | | | | | | | | |
| 525 | External earthing bolts on motor feet | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Hazardous Environments** | | | | | | | | | | | | | | | | |
| 334 | Ex t, Dust group III B T125C Db, IP6X (non-conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 336 | Ex t, Dust group III C T125 Db, IP6X (conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 461 | Ex d(e) design, Group II C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 464 | Alleinschutz' design. Certification of flame proof motor and protection device together. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - |
| 516 | Temperature detectors approved to be connected to an Ex i circuit | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 813 | Thermistor-based surface temperature protection T4 for frequency converter duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 814 | Ex t (DIP) motors, temperature class T 150C. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 816 | Pt-100-based surface temperature protection T4 for frequency convertor duty. 3-wire system. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Heating elements** | | | | | | | | | | | | | | | | |
| 450 | Heating element, 100-120 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 451 | Heating element, 200 - 240 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Insulation system** | | | | | | | | | | | | | | | | |
| 014 | Winding insulation class H. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 405 | Special winding insulation for frequency converter supply. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Marine** | | | | | | | | | | | | | | | | |
| 024 | Fulfilling Bureau Veritas (BV) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 025 | Fulfilling DNV requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 026 | Fulfilling Lloyds Register of Shipping (LR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 027 | Fulfilling American Bureau of Shipping (ABS) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 050 | Fulfilling Registro Italiano Navale (RINA) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 096 | Fulfilling Lloyds Register of Shipping (LR) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 186 | Fulfilling DNV requirements, without certificate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 481 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 483 | Fulfilling China Classification Societies (CCS) requirements (Beijing), with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | - | - | ● | ● | ● | ● | ● |
| 484 | Fulfilling Korea Register of Shipping (KR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 491 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, without certificate. | ● | ● | ● | ● | ● | - | - | - | - | - | ● | ● | ● | ● | ● |
| 492 | Fulfilling Registro Italiano Navale (RINA) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 493 | Fulfilling China Classification Societies (CCS) requirements (Beijing), without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 494 | Fulfilling Korea Register of Shipping (KR) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 496 | Fulfilling Bureau Veritas (BV) requirements, without certificate(non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 675 | Fulfilling American Bureau of Shipping (ABS) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mounting arrangements** | | | | | | | | | | | | | | | | |
| 008 | IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3). | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 009 | IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 047 | IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5). | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 066 | Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 229 | Flange FT 130. | ● | ● | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - |
| 235 | Flange FF 165. | ○ | ○ | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 236 | Flange FT 165. | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 245 | Flange FF 215. | - | - | ○ | ○ | ● | - | - | - | - | - | - | - | - | - | - |
| 246 | Flange FT 215. | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 256 | Flange FT 265. | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - |
| 257 | Flange FF 100. | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 259 | Flange FF 115. | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 260 | Flange FT 115. | ● | ○ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 305 | Additional lifting lugs. | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Painting** | | | | | | | | | | | | | | | | |
| 105 | Paint thickness report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 114 | Special paint color, standard grade | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 115 | Painting system C4,durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 168 | Primer paint only. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 303 | Painted insulation layer on inside of the terminal boxes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 710 | Norsok M-501 rev. 7 Coating system no. 2B | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 711 | Painting system C5, durability High | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 712 | Painting system C5-M according to Petrobras specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 713 | Painting system according Total Egina specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 717 | Painting system C4, durability High | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 719 | Painting system CX | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 754 | Painting system C5, durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 755 | Norsok M-501 revision 6, Coating system no. 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Protection** | | | | | | | | | | | | | | | | |
| 005 | Protective roof | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 072 | Radial seal at D-end. Not possible for 2-pole , 280 and 315 frames | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| 073 | Sealed against oil at D-end. | ● | ● | ● | ● | ● | - | - | - | - | - | ● | ● | - | - | - |
| 158 | Degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 239 | Opendeck saltwater execution | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 240 | Opendeck fresh water execution | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 249 | Open deck execution for counter clockwise application, IP56 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 250 | Degree of protection IP66 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 401 | Protective roof, horizontal motor. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 403 | Degree of protection IP56. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 434 | Degree of protection IP56, open deck. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 783 | Labyrinth sealing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| **Rating & instruction plates** | | | | | | | | | | | | | | | | |
| 002 | Restamping voltage, frequency and output, continuous duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 004 | Additional text on std rating plate (max 12 digits on free text line). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 095 | Restamping output (maintained voltage, frequency), intermittent duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 126 | Tag plate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 135 | Mounting of additional identification plate, stainless. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 139 | Additional identification plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 159 | Additional plate with text "Made in ...." | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 160 | Additional rating plate affixed. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 161 | Additional rating plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 163 | Frequency converter rating plate. Rating data according to quotation. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 181 | Rating plate with ABB standard loadability values for VSD operation. Other auxiliaries for VSD operation to be selected as necessary. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 332 | Baldor Catalogue # | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 333 | Not for use in the USA | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 528 | Rating plate sticker | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Shaft & rotor** | | | | | | | | | | | | | | | | |
| 069 | Two shaft extensions according to catalog drawings. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 070 | Special shaft extension at D-End, standard shaft material | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 155 | Cylindrical shaft extension, D-end, without key-way. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 164 | Shaft extension with closed keyway | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | - |
| 165 | Shaft extension with open keyway | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| 410 | Shaft material stainless steel | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 591 | Special shaft extension according to customer specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 600 | Special shaft extension at N-end, standard shaft material. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 630 | Shaft material certificate 3.1/3.2 according to EN10204:2004 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Standards and Regulations** | | | | | | | | | | | | | | | | |
| 331 | Motor not for sale for use in EU or UK. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 381 | Frame agreement betw. ABB and Shell according to Shell DEP 33.66.05.31-GEN February 2018 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 421 | VIK design (Verband der Industriellen Energie- und Kraftwirtschaft e.V.). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 523 | Neste Rotterdam design. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 540 | Fulfilling energy efficiency requirements for China | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 541 | Inmetro certification | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 544 | Australian HE MEPS | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 551 | IA certificate of conformity for South Africa | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 558 | Saudi Arabian MEPS (SASO) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 586 | Fulfilling UK Conformity Assessment (UKCA) requirements. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 599 | EQM – Emirates Quality Mark | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 682 | CCC Ex certificate for China | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 758 | Saudi Aramco design. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 803 | PESO/CCoE certificate for India | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 811 | JIP-33 standard design | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 827 | Petrobras N-2919 Specification design | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 841 | Shell DEP 33.66.05.31-GEN February 2022 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| **Stator winding temperature sensors** | | | | | | | | | | | | | | | | |
| 121 | Bimetal detectors, break type (NCC), (3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 122 | Bimetal detectors, break type (NCC), (3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 123 | Bimetal detectors, break type (NCC), (3 in series), 170 ºC, in stator winding | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 125 | Bimetal detectors, break type (NCC), (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 127 | Bimetal detectors, break type (NCC), (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 328 | PTC - thermistors (3 in series), 120ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 435 | PTC - thermistors (3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 439 | PTC - thermistors (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 441 | PTC - thermistors (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 445 | Pt100 2-wire in stator winding, 1 per phase | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 446 | Pt100 2-wire in stator winding, 2 per phase | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 502 | Pt100 3-wire in stator winding, 1 per phase | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 503 | Pt100 3-wire in stator winding, 2 per phase | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 511 | PTC thermistors (2 x 3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Terminal box** | | | | | | | | | | | | | | | | |
| 019 | Larger than standard terminal box. | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - |
| 021 | Terminal box LHS (seen from D-end). | - | - | - | - | - | ● | ● | - | - | - | - | - | - | - | - |
| 022 | Cable entry LHS (seen from D-end). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 157 | Terminal box degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 180 | Terminal box RHS (seen from D-end). | - | - | - | - | - | ● | ● | - | - | - | - | - | - | - | - |
| 230 | Standard metal cable gland. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 292 | Adapter C-C | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - |
| 293 | Adapter D-D | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | - |
| 294 | Adapter E-D | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 295 | Adapter E-2D | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - |
| 351 | Terminal block turned according to cable entry | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 380 | Separate terminal box for temperature detectors, std. material | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 413 | Extended cable connection, no terminal box. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 418 | Separate terminal box for auxiliaries, standard material. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 466 | Terminal box at N-end. | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● |
| 468 | Cable entry from D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 469 | Cable entry from N-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 553 | Terminal box degree of protection IP66. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 554 | Cast iron flange for cable glands drilled and tapped according to order. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 557 | Nickel plated cable glands mounted according to order. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 567 | Separate terminal box material: cast Iron | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 568 | Separate terminal box for heating elements, std. material | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 624 | Prepared for inch cable glands according to BSPP standard. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 727 | Stainless steel flange for cable glands drilled and tapped according to order. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 730 | Prepared for NPT cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 731 | Two standard metal cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 734 | Standard cable gland, Ex d IIC, armoured cable. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 735 | Standard cable gland, Ex d IIC, non-armoured cable. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 743 | Non-drilled cast iron flange for cable glands | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 744 | Stainless steel non-drilled flange for cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 745 | Painted cast iron flange equipped with nickel plated brass cable glands | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 746 | Stainless steel cable flange equipped with standard nickel plated brass cable glands | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Testing** | | | | | | | | | | | | | | | | |
| 145 | Type test report from a catalogue motor, 400V 50Hz. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 146 | Type test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 148 | Routine test report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 149 | Test according to separate test specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 150 | Customer witnessed testing. Specify test procedure with other codes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 222 | Torque/speed test, type test and multi-point load test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 560 | Shaft voltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 561 | Overspeed test,for one motor from specific delivery batch | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 562 | Overvoltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 760 | Vibration level test | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 761 | Vibration spectrum test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 762 | Noise level test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 763 | Noise spectrum test for one motor from specific delivery batch. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 764 | Test for one motor from specific delivery batch with ABB frequency converter available at ABB test field. ABB standard test procedure. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Variable speed drives** | | | | | | | | | | | | | | | | |
| 182 | Mounting of non-listed pulse tacho. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 479 | Mounting of other type of pulse tacho with shaft extension, tacho not included. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 701 | Insulated bearing at N-end. | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 704 | EMC cable entry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 747 | 1024 pulse tacho, Ex d, tD, L&L 841910002 | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

# Mechanical design

## Motor frame and drain holes

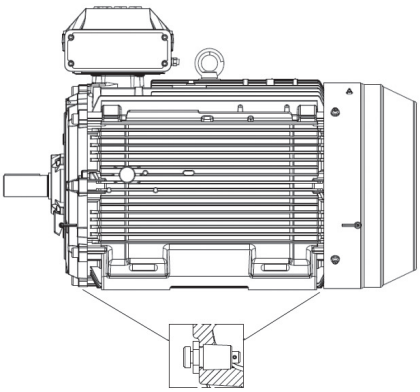
Motors can be supplied for foot mounting, flange mounting, and combinations of these.

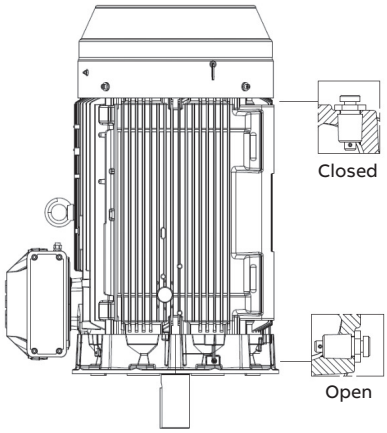
**Drain holes**

Flameproof Ex db eb motors are provided without drain holes and plugs as standard.

It's recommended that motors that will be operated in very humid or wet environments, and especially under intermittent duty, should be provided with drain holes with plugs to ensure that water possibly condensed inside the enclosure can easily be drained. Flameproof drain plugs which can be easily opened and closed are available as an option for motors in frame size 160 and larger. Please refer to the variant code section, variant 448 under heading "Drain holes".

When mounting arrangement differs from foot mounted IM B3, mention variant code 066 when ordering to ensure the drain plug is mounted in the lowest position.





# Mechanical design

## Lifting lugs

All motors are equipped with lifting lugs for safe lifting of the motor. The lugs are designed for lifting the motor only, they may not be used for lifting the motor and the equipment on which it is mounted.

| Frame size | Type of lugs | Horisontal mounting B3, B35 | Vertical mounting V1, V3 |
|---|---|---|---|
| 80-112 | Integrated in casting | 2 pcs close to ter- minal box on top | 2 pcs close to terminal box |
| 132 | Integrated in casting | 1 pcs at D-end, 1 pcs at N-end | 1 pcs at D-end, 1 pcs at N-end |
| 160-180 | Detachable eye bolt | 1 pcs close to terminal box on top | 2 pcs, either at N- end or D-end depending on need |
| 200-250 | Integrated in casting | 1 pcs at D-end, 1 pcs at N-end | 2 pcs at N-end, 2 pcs at D-end |
| 280-450 | Detachable eye bolt | 1 pcs close to terminal box on top | 2 pcs, either at N- end or D-end depending on need |

# Mechanical design

## Heating elements

Heating elements are installed on stator winding coil heads to keep the winding dry and free of corrosion in humid conditions. The power of the heating elements is shown in the table. You can order heating elements with variant code 450 or 451.

| Motor size | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| Motor size | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 60 | 60 | 60 | 2x60 | 2x60 | 2x60 | 2x100 |

Motors for marine applications mounted on open deck may have heating element powers differing from the ones shown in this table.

# Mechanical design

## Bearings

ABB's flameproof motors are normally fitted with single-row deep-groove grease lubricated ball bearings, as shown in the table below.

If the bearing at the D-end is replaced with a roller bearing (NU- or NJ-), higher radial forces can be handled. Roller bearings are suitable for belt-drive applications and can be ordered with variant code 037. Note that the possibility to have roller bearing at D-end is limited on larger flameproof motors due to the higher radial clearance in bearing and possible bending of shaft together with narrow flame path between shaft and inner bearing cover, especially in conjunction with gas group IIC design.

### Standard and alternative designs

| Motor size | Number of poles | Standard design | | Alternative designs | | |
|---|---|---|---|---|---|---|
| | | Deep groove ball bearings | | Roller bearings (037) | Roller bearings (037) | Angular contact ball bearings (058) |
| | | D-end | N-end | D-end, gas group IIB | D-end, gas group IIC | D-end |
| 80 | 2 - 8 | 6205-2Z/C3 | 6204-2Z/C3 | NA | NA | NA |
| 90 | 2 - 8 | 6205-2Z/C3 | 6204-2Z/C3 | NA | NA | NA |
| 100 | 2 - 8 | 6206-2Z/C3 | 6205-2Z/C3 | NA | NA | NA |
| 112 | 2 - 8 | 6206-2Z/C3 | 6206-2Z/C3 | NA | NA | NA |
| 132 | 2 - 8 | 6208-2Z/C3 | 6208-2Z/C3 | NA | NA | NA |
| 160 | 2 - 12 | 6309/C3 | 6309/C3 | NU 309 ECP/C3 | NU 309 ECP/C3 | NA |
| 180 | 2 - 12 | 6310/C3 | 6310/C3 | NU 310 ECP/C3 | NU 310 ECP/C3 | NA |
| 200 | 2 | 6312M/C3 | 6210M/C3 | NU 312 ECP/C3 | NU 312 ECP/C3 | NA |
| | 4 - 12 | 6312/C3 | 6310/C3 | NU 312 ECP/C3 | NU 312 ECP/C3 | NA |
| 225 | 2 | 6313M/C3 | 6312M/C3 | NU 313 ECP/C3 | NU 313 ECP/C3 | NA |
| | 4 - 12 | 6313/C3 | 6312/C3 | NU 313 ECP/C3 | NU 313 ECP/C3 | NA |
| 250 | 2 | 6315M/C3 | 6313M/C3 | NU 315 ECP/C3 | NA | NA |
| | 4 - 12 | 6315/C3 | 6313/C3 | NU 315 ECP/C3 [1)] | NA | NA |
| 280 | 2 | 6316/C3 | 6316/C3 | | NA | 7316 B |
| | 4 - 12 | 6316/C3 | 6316/C3 | NU 316 ECP/C3 [1)] | NA | 7316 B |
| 315 | 2 | 6316/C3 | 6316/C3 | | NA | 7316 B |
| | 4 - 12 | 6319/C3 | 6316/C3 | NU 319 ECP/C3 | NA | 7319 B |
| 355 | 2 | 6316M/C3 | 6316M/C3 | NA | NA | 7316 B |
| | 4 - 12 | 6322/C3 | 6316/C3 | NA | NA | 7322 B |
| 400 | 2 | 6317M/C3 | 6317M/C3 | NA | NA | 7317 B |
| | 4 - 12 | 6324/C3 | 6319/C3 | NA | NA | 7324 B |
| 450 | 4 - 12 | 6326M/C3 | 6322/C3 | NA | NA | 7326 B |

[1)] On request

### Axially-locked bearings

All motors are equipped as standard with an axially locked bearing at the D-end.

### Transport locking

Motors with roller bearings or an angular-contact ball bearing are fitted with a transport lock before dispatch to prevent damage to bearings during transport. A warning label is attached to motors when transport locking is used.

When high axial forces are involved, angular-contact ball bearings should be used. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force to ensure that optimal bearing system design is chosen. The variant codes for ordering angular-contact ball bearings are 058 and 059.

Locking may also be fitted in other cases if severe transport conditions are expected.

### Bearing seals

Table on next page present the standard and alternative and types of bearing seals per motor size.

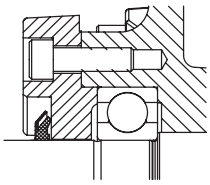
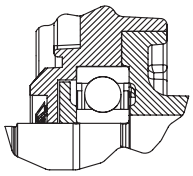
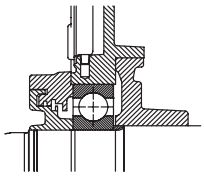
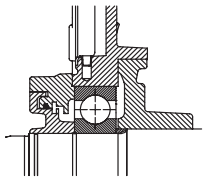
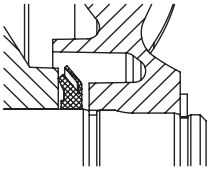
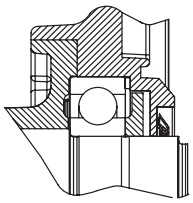
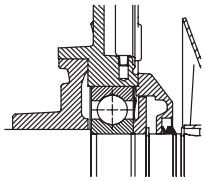
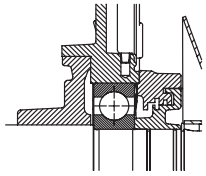
### Bearing seals

| Motor size | Number of poles | Standard design | | Alternative design | |
|---|---|---|---|---|---|
| | | D-end | N-end | Radial seal at D-end (variant code 072) [1] | Labyrinth seal at D-end (variant code 783) [1] |
| 80 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 90 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 100 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 112 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 132 | 2 - 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 160 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 180 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 200 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 225 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 250 | 2 - 12 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 280 | 2 - 12 | Labyrinth seal | V-ring [2] | NA | Standard |
| 315 | 2 - 12 | Labyrinth seal | V-ring [2] | NA | Standard |
| 355 | 2 - 12 | Labyrinth seal | V-ring [2] | NA | Standard |
| 400 | 2 | Labyrinth seal | Labyrinth seal | NA | Standard |
| 400 | 4 - 12 | Labyrinth seal | V-ring | NA | Standard |
| 450 | 4 - 12 | Labyrinth seal | Labyrinth seal | NA | Standard |

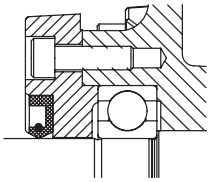
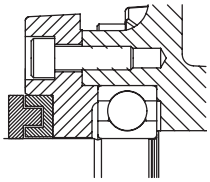
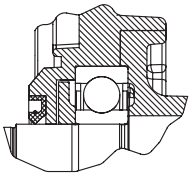
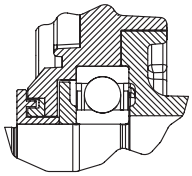
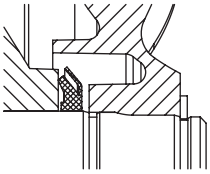
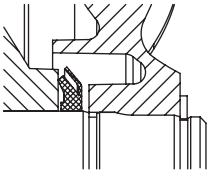
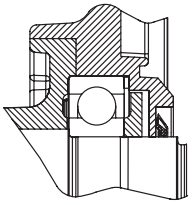
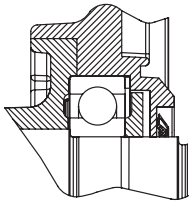
[1] N-end bearing seal of standard design, special N-end bearing seal arrangements on request

[2] V-ring on motors with efficiency class IE2, labyrinth seal on IE3 and IE4 motors

### Standard design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 80-132, gamma/gamma seal | 160-250, gamma/gamma seal | 280-355, 400 4-12 poles, labyrinth/V-ring seal | 400 2 poles, 450 4-12 poles, labyrinth/labyrinth seal |

### Alternative design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 80-132, VC072 radial/gamma seals | 80-132, VC783 labyrinth/gamma seals | 160-250, VC072 radial/gamma seals | 160-250, VC783 labyrinth/gamma seals |

### Bearing life

The nominal life $L_{10h}$ of a bearing is defined according to ISO 281 as the number of operating hours achieved or exceeded by 90 % of identical bearings in a large test series under specified conditions. 50 % of bearings achieve at least five times this lifetime.

The calculated bearing life $L_{10h}$ for power transmission by means of coupling is for horizontally mounted motors in sizes up to 315 ≥ 100,000 hours.

### Lubrication

On delivery, motors in frame size 160 and above are pre-lubricated with high-quality grease.

Before first start-up, see instructions for re-lubrication and recommended grease in the installation, operation, maintenance and safety manual delivered together with the motor, or see the lubrication plate on the motor.

### Motors with bearings greased for life

Motors in frame sizes 80-132 are equipped with bearings greased for life, while this is available as an option for frame sizes 160-250. Bearings are lubricated with high-quality, high-temperature grease. Bearing types are stated on the rating plate. The approximate lifetime of bearings in four-pole motors is about 40 000 duty hours. Lifetime is subject to the load conditions of the application run by the motor.

### Motors with relubrication nipples

In frame sizes 160-450, the bearing system is provided with valve discs to ease lubrication. Motors are lubricated while running. The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1-2 hours after regreasing. This ensures that the construction is tight and bearings remain dust- and dirt-free.

A grease-collection method can be used optionally.

The following tables show lubrication intervals according to the $L_1$ principle for various nominal speeds in 25 °C ambient temperature. These values apply to horizontally mounted motors (B3) with 80 °C bearing temperature and high-quality grease containing lithium-complex soap and mineral or PAO-oil.

## Lubrication intervals in duty hours for ball bearings

| Frame size | Amount of grease g/ bearing | Amount of grease g/N-end | Speed 3600 r/min | Speed 3000 r/min | Speed 1800 r/min | Speed 1500 r/min | Speed 1000 r/min | Speed 500-900 r/min |
|---|---|---|---|---|---|---|---|---|
| **Ball bearings** | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | |
| 160 | 13 | 13 | 7100 | 8900 | 14300 | 16300 | 20500 | 21600 |
| 180 | 15 | 15 | 6100 | 7800 | 13100 | 15100 | 19400 | 20500 |
| 200 | 20 | 15 | 4300 | 5900 | 11000 | 13000 | 17300 | 18400 |
| 225 | 23 | 20 | 3600 | 5100 | 10100 | 12000 | 16400 | 17500 |
| 250 | 30 | 23 | 2400 | 3700 | 85000 | 10400 | 14700 | 15800 |
| 280 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 280 | 40 | 40 | - | - | 7800 | 9600 | 13900 | 15000 |
| 315 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 315 | 55 | 40 | - | - | 5900 | 7600 | 11800 | 12900 |
| 355 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 355 | 70 | 40 | - | - | 4000 | 5600 | 9600 | 10 700 |
| 400 | 40 | 40 | 1500 | 2700 | - | - | - | - |
| 400 | 85 | 55 | - | - | 3200 | 4700 | 8600 | 9700 |
| 450 | 95 | 70 | - | - | 2500 | 3900 | 7700 | 8700 |

## Lubrication intervals in duty hours for roller bearings

| Frame size | Amount of grease g/ bearing | Amount of grease g/N-end | Output kW | Speed 3600 r/min | Speed 3000 r/min | Output kW | Speed 1800 r/min | Speed 1500 r/ min | Output kW | Speed 1000 r/min | Output kW | Speed 500-900 r/ min |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Roller bearings** | | | | | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | | | | | |
| 160 | 13 | 13 | all | 3600 | 4500 | all | 7200 | 8100 | all | 10 300 | all | 10 800 |
| 180 | 15 | 15 | | 3000 | 3900 | all | 6600 | 7500 | all | 9700 | all | 10 200 |
| 200 | 20 | 15 | | 2100 | 3000 | all | 5500 | 6500 | all | 8600 | all | 9200 |
| 225 | 23 | 20 | | 1800 | 1600 | all | 5100 | 6000 | all | 8200 | all | 8700 |
| 250 | 30 | 23 | | 1200 | 1900 | all | 4200 | 5200 | all | 7300 | all | 7900 |
| 280 | 40 | 40 | | - | - | all | 4000 | 5300 | all | 7000 | all | 8500 |
| 315 | 55 | 40 | | - | - | all | 2900 | 3800 | all | 5900 | all | 6500 |

# Mechanical design

## Radial forces

### Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated with FR as follows:

$$D = \frac{1.9 \cdot 10^7 \cdot K \cdot P}{n \cdot F_R}$$

| Where: | |
|---|---|
| D: | pulley diameter, mm |
| P: | power requirement, kW |
| n: | motor speed, r/min. |
| K: | belt tension factor, dependent on belt type and type of duty. A common value for V-belts is 2.5 |
| $F_R$: | permissible radial force, refer to tables below. |

### Permissible loading on the shaft

The following table shows permissible radial forces on the shaft in Newtons, assuming zero axial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life $L_{10h}$ of 40 000 hours per motor size.

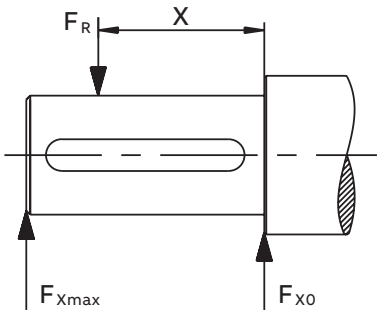
These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft affects permissible forces.

Permissible loads of simultaneous radial and axial forces can be supplied on request.

If the radial force is applied between points X0 and Xmax, the permissible force $F_R$ can be calculated with the following formula:

$$F_R = F_{X0} - \frac{X}{E}(F_{X0} - F_{Xmax})$$

| Where: | |
|---|---|
| E: | length of the shaft extension in the standard version |



## Permissible radial forces

| Motor size | No. of poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings L10h = 40,000h | | | | Roller bearing L10h = 40,000h | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | Mounting arrangement IM B3 | | | |
| | | | Gas group IIB | | Gas group IIC | | Gas group IIB | | Gas group IIC | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 80 | 2 | 40 | 638 | 557 | 638 | 557 | NA | | NA | |
| | 4 | 40 | 804 | 702 | 804 | 702 | NA | | NA | |
| | 6 | 40 | 920 | 804 | 920 | 804 | NA | | NA | |
| | 8 | 40 | 1013 | 884 | 1013 | 884 | NA | | NA | |
| 90 | 2 | 50 | 642 | 546 | 642 | 546 | NA | | NA | |
| | 4 | 50 | 809 | 690 | 809 | 690 | NA | | NA | |
| | 6 | 50 | 926 | 790 | 926 | 690 | NA | | NA | |
| | 8 | 50 | 1019 | 870 | 1019 | 870 | NA | | NA | |
| 100 | 2 | 60 | 886 | 751 | 886 | 751 | NA | | NA | |
| | 4 | 60 | 1117 | 946 | 1117 | 751 | NA | | NA | |
| | 6 | 60 | 1279 | 1083 | 1279 | 1083 | NA | | NA | |
| | 8 | 60 | 1325 | 1122 | 1325 | 1122 | NA | | NA | |
| 112 | 2 | 60 | 884 | 747 | 884 | 747 | NA | | NA | |
| | 4 | 60 | 1114 | 941 | 1114 | 941 | NA | | NA | |
| | 6 | 60 | 1276 | 1078 | 1276 | 1078 | NA | | NA | |
| | 8 | 60 | 1321 | 1116 | 1321 | 1116 | NA | | NA | |
| 132 | 2 | 80 | 1337 | 680 | 1337 | 680 | NA | | NA | |
| | 4 | 80 | 1685 | 740 | 1685 | 740 | NA | | NA | |
| | 6 | 80 | 1930 | 750 | 1930 | 750 | NA | | NA | |
| | 8 | 80 | 1999 | 750 | 1999 | 750 | NA | | NA | |
| 160 ML_ | 2 | 110 | 2530 | 2120 | 2530 | 2120 | 6400 | 1800 | 6400 | 1800 |
| | 4 | 110 | 3180 | 2670 | 3180 | 2670 | 7600 | 1800 | 7600 | 1800 |
| | 6 | 110 | 3650 | 3040 | 3650 | 3040 | 7600 | 1800 | 7600 | 1800 |
| | 8 | 110 | 4020 | 3040 | 4020 | 3040 | 7600 | 1800 | 7600 | 1800 |
| 180 ML_ | 2 | 110 | 2900 | 2440 | 2900 | 2440 | 6970 | 2700 | 6970 | 2700 |
| | 4 | 110 | 3660 | 3080 | 3660 | 3080 | 8500 | 2700 | 8500 | 2700 |
| | 6 | 110 | 4190 | 3520 | 4190 | 3520 | 8500 | 2700 | 8500 | 2700 |
| | 8 | 110 | 4620 | 3880 | 4620 | 3880 | 8500 | 2700 | 8500 | 2700 |
| 200 ML_ | 2 | 110 | 3830 | 3150 | 3830 | 3150 | 9510 | 7000 | 9510 | 4200 |
| | 4 | 110 | 4820 | 3980 | 4820 | 3980 | 11710 | 7000 | 11710 | 4200 |
| | 6 | 110 | 5520 | 4550 | 5520 | 4550 | 13230 | 7000 | 13230 | 4200 |
| | 8 | 110 | 6080 | 5000 | 6080 | 5000 | 14420 | 7000 | 14420 | 4200 |
| 225 SM_ | 2 | 110 | 4350 | 3660 | 4350 | 3660 | 11650 | 7000 | 9300 | 3000 |
| | 4 | 140 | 5490 | 2800 | 5490 | 2800 | 14340 | 7200 | 9300 | 2200 |
| | 6 | 140 | 6280 | 2800 | 6280 | 2800 | 16190 | 7200 | 9300 | 2200 |
| | 8 | 140 | 6920 | 2800 | 6920 | 2800 | 17300 | 7200 | 9300 | 2200 |
| 250 SM_ | 2 | 140 | 5390 | 4350 | 5390 | 4350 | 15420 | 6700 | NA | |
| | 4 | 140 | 6790 | 5480 | 6790 | 5480 | 18980 | 9200 | NA | |
| | 6 | 140 | 7760 | 6270 | 3000 | 2800 | 21000 | 9200 | NA | |
| | 8 | 140 | 8550 | 6900 | 3000 | 2800 | 21000 | 9200 | NA | |
| 280 SM_ | 2 | 140 | 5835 | 4900 | [1] | | 16500 | 6000 | NA | |
| | 4 | 140 | 7360 | 6110 | [1] | | 20100 | 9200 | NA | |
| | 6 | 140 | 8425 | 6980 | [1] | | 22690 | 9200 | NA | |
| | 8 | 140 | 9165 | 7700 | [1] | | 24740 | 9200 | NA | |
| 315 SM_ | 2 | 140 | 5815 | 4960 | [1] | | 16540 | 6000 | NA | |
| | 4 | 170 | 9025 | 7470 | [1] | | 26590 | 9600 | NA | |
| | 6 | 170 | 10310 | 8530 | [1] | | 30030 | 10160 | NA | |
| | 8 | 170 | 11370 | 9410 | [1] | | 32740 | 10105 | NA | |
| 315 ML_ | 2 | 140 | 5855 | 5080 | [1] | | 16705 | 6205 | NA | |
| | 4 | 170 | 8980 | 7590 | [1] | | 26550 | 13705 | NA | |
| | 6 | 170 | 10255 | 8665 | [1] | | 29970 | 13710 | NA | |
| | 8 | 170 | 11335 | 9385 | [1] | | 32730 | 9945 | NA | |
| 315 LK_ | 2 | 140 | 5860 | 5195 | [1] | | 16885 | 6080 | NA | |
| | 4 | 170 | 9185 | 7945 | [1] | | 27225 | 13475 | NA | |
| | 6 | 170 | 10475 | 9060 | [1] | | 30735 | 13500 | NA | |
| 355 SM_ | 2 | 140 | 5790 | 5085 | [1] | | NA | | NA | |
| | 4 | 210 | 11930 | 9890 | [1] | | NA | | NA | |
| | 6 | 210 | 11930 | 9890 | [1] | | NA | | NA | |
| | 8 | 210 | 11930 | 9890 | [1] | | NA | | NA | |
| 355 ML_ | 2 | 140 | 5770 | 5120 | [1] | | NA | | NA | |
| | 4 | 210 | 11980 | 10090 | [1] | | NA | | NA | |
| | 6 | 210 | 11980 | 10090 | [1] | | NA | | NA | |
| | 8 | 210 | 11980 | 10090 | [1] | | NA | | NA | |

| Motor size | No. of poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings L10h = 40,000h | | | | Roller bearing L10h = 40,000h | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | Mounting arrangement IM B3 | | | |
| | | | Gas group IIB | | Gas group IIC | | Gas group IIB | | Gas group IIC | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 355 LK_ | 2 | 140 | 5500 | 5000 | [1] | | NA | | NA | |
| | 4 | 210 | 12050 | 10450 | [1] | | NA | | NA | |
| | 6 | 210 | 12050 | 10450 | [1] | | NA | | NA | |
| | 8 | 210 | 12050 | 10450 | [1] | | NA | | NA | |
| 400 L_ | 2 | 170 | [1] | | [1] | | NA | | NA | |
| | 4 | 210 | [1] | | [1] | | NA | | NA | |
| | 6 | 210 | [1] | | [1] | | NA | | NA | |
| | 8 | 210 | [1] | | [1] | | NA | | NA | |
| 400 LK_ | 2 | 170 | [1] | | [1] | | NA | | NA | |
| | 4 | 210 | [1] | | [1] | | NA | | NA | |
| | 6 | 210 | [1] | | [1] | | NA | | NA | |
| | 8 | 210 | [1] | | [1] | | NA | | NA | |
| 450 L_ | 4 | 210 | [1] | | [1] | | NA | | NA | |
| | 6 | 210 | [1] | | [1] | | NA | | NA | |
| | 8 | 210 | [1] | | [1] | | NA | | NA | |

[1] Only allowed for direct coupling duty

# Mechanical design

## Axial forces

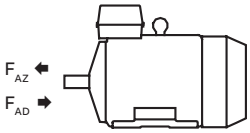
—
01 Mounting arrangement IM B3

02 Mounting arrangement IM V1

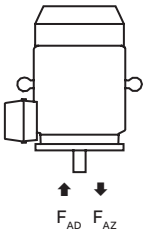
The following tables present permissible axial forces on the shaft in Newtons, assuming zero radial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20,000 and 40,000 hours per motor size.

At 60 Hz, the values must be reduced by 10 percent, and for two-speed motors, the higher speed determines permissible axial force. Permissible loads of simultaneous radial and axial forces can be supplied on request.

For axial force $F_{AD}$, it is assumed that the D-bearing is locked with a locking ring.




01




02

## Permissible axial forces

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | Mounting arrangement IM V1 | |
|---|---|---|---|---|---|---|
| | | | Deep groove ball bearings | | Deep groove ball bearings | |
| | | | $L_{10}$ = 40,000 h | | $L_{10}$ = 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 80 | 2 | 40 | 678 | 290 | 711 | 269 |
| | 4 | 40 | 835 | 447 | 888 | 411 |
| | 6 | 40 | 954 | 566 | 998 | 541 |
| | 8 | 40 | 1049 | 661 | 1093 | 636 |
| 90 | 2 | 50 | 676 | 286 | 727 | 252 |
| | 4 | 50 | 834 | 443 | 907 | 402 |
| | 6 | 50 | 950 | 559 | 1028 | 515 |
| | 8 | 50 | 1046 | 656 | 1114 | 614 |
| 100 | 2 | 60 | 969 | 339 | 1053 | 283 |
| | 4 | 60 | 1186 | 556 | 1301 | 489 |
| | 6 | 60 | 1346 | 716 | 1447 | 649 |
| | 8 | 60 | 1477 | 847 | 1576 | 788 |
| 112 | 2 | 60 | 962 | 330 | 1099 | 236 |
| | 4 | 60 | 1179 | 547 | 1331 | 445 |
| | 6 | 60 | 1337 | 705 | 1493 | 602 |
| | 8 | | 1467 | 835 | 1624 | 731 |
| 132 | 2 | 80 | 1447 | 491 | 1577 | 405 |
| | 4 | 80 | 1763 | 807 | 1963 | 680 |
| | 6 | 80 | 1999 | 1043 | 2190 | 917 |
| | 8 | 80 | 2192 | 1236 | 2412 | 1110 |
| 160 ML_ | 2 | 110 | 2050 | 1435 | 2440 | 1155 |
| | 4 | 110 | 2620 | 2005 | 3160 | 1635 |
| | 6 | 110 | 3055 | 2440 | 3590 | 2060 |
| | 8 | 110 | 3410 | 2790 | 3950 | 2430 |
| 180 ML_ | 2 | 110 | 2570 | 1470 | 3075 | 1100 |
| | 4 | 110 | 3230 | 2130 | 3975 | 1630 |
| | 6 | 110 | 3730 | 2630 | 4420 | 2130 |
| | 8 | 110 | 4140 | 3040 | 4890 | 2550 |
| 200 ML_ | 2 | 110 | 3295 | 2030 | 3960 | 1545 |
| | 4 | 110 | 4170 | 2910 | 5030 | 2290 |
| | 6 | 110 | 4800 | 3535 | 5820 | 2780 |
| | 8 | 110 | 5360 | 4100 | 6370 | 3430 |
| 225 SM_ | 2 | 110 | 3710 | 2240 | 4515 | 1650 |
| | 4 | 140 | 4690 | 3225 | 5770 | 2495 |
| | 6 | 140 | 5405 | 3935 | 6660 | 3080 |
| | 8 | 140 | 6010 | 4540 | 7280 | 3700 |
| 250 SM_ | 2 | 140 | 5200 | 2100 | 6175 | 1380 |
| | 4 | 140 | 6400 | 3310 | 7645 | 2410 |
| | 6 | 140 | 7260 | 4160 | 8930 | 3035 |
| | 8 | 140 | 8000 | 4900 | 9690 | 3780 |
| 280 SM_ | 2 | 140 | 4870 | 2870 | 6330 | 1650 |
| | 4 | 140 | 6140 | 4140 | 7870 | 2760 |
| | 6 | 140 | 7040 | 5040 | 9150 | 3515 |
| | 8 | 140 | 7840 | 5840 | 10040 | 4150 |
| 315 SM_ | 2 | 140 | 4780 | 2780 | 6620 | 1270 |
| | 4 | 170 | 7155 | 5155 | 9565 | 3240 |
| | 6 | 170 | 8205 | 6205 | 11230 | 3750 |
| | 8 | 170 | 9180 | 7180 | 11935 | 4780 |
| 315 ML_ | 2 | 140 | 4730 | 2730 | 7210 | 940 |
| | 4 | 170 | 7055 | 5055 | 10300 | 2700 |
| | 6 | 170 | 8075 | 6075 | 12330 | 3070 |
| | 8 | 170 | 9060 | 7070 | 13310 | 4210 |
| 315 LK_ | 2 | 140 | 4620 | 2620 | 7910 | 320 |
| | 4 | 170 | 6980 | 4980 | 10875 | 2300 |
| | 6 | 170 | 7980 | 5980 | 13005 | 2565 |
| | 8 | 170 | 8900 | 6900 | 14100 | 3450 |
| 355 SM_ | 2 | 140 | 1660 | 5460 | 4970 | 2885 |
| | 4 | 210 | 5760 | 9390 | 10890 | 4840 |
| | 6 | 210 | 7055 | 10855 | 12370 | 6235 |
| | 8 | 210 | 8290 | 12090 | 14980 | 7530 |
| 355 ML_ | 2 | 140 | 1570 | 5370 | 5860 | 2360 |
| | 4 | 210 | 5640 | 9440 | 11810 | 5130 |
| | 6 | 210 | 6870 | 10670 | 14718 | 5215 |
| | 8 | 210 | 8100 | 11900 | 15970 | 6540 |

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | Mounting arrangement IM V1 | |
|---|---|---|---|---|---|---|
| | | | Deep groove ball bearings | | Deep groove ball bearings | |
| | | | $L_{10}$ = 40,000 h | | $L_{10}$ = 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 355 LK_ | 2 | 140 | 1440 | 5240 | 6600 | 1630 |
| | 4 | 210 | 5460 | 9260 | 12850 | 4080 |
| | 6 | 210 | 6680 | 10480 | 15450 | 4550 |
| | 8 | 210 | [1] | [1] | [1] | [1] |
| 400 L, | 2 | 170 | 810 | 5810 | 8010 | 730 |
| LK_ | 4 | 210 | 4250 | 10250 | 13680 | 3650 |
| | 6 | 210 | 5410 | 11410 | 16610 | 3840 |
| | 8 | 210 | [1] | [1] | 18480 | 4530 |
| 450 L_ | 2 | 170 | - | - | - | - |
| | 4 | 210 | - | - | - | - |
| | 6 | 210 | 5630 | 11630 | 22090 | 150 |
| | 8 | 210 | 6920 | 12920 | 23600 | 1430 |

[1] On request

# Terminal box

## Standard terminal box

### Protection and mounting options

The degree of protection for the standard terminal box is IP 55.It complies with the requirements of the protection method ‘e’ protection level ‘c’ increased safety and prevents all ignition sources such as sparks, excessive over heating etc. The features of the terminal box are: No self loosening terminals, compliance with creepage and clearance distances as defined in standard for increased safety ‘ec’ protection.

By default, terminal boxes are mounted on top of the motor at D-end. Side mounted terminal box is possible in frame sizes 160 and 400. Mounting at N-end is also possible for the larger frame sizes. Please refer to the variant code section for more details.

### Turnability

The standard terminal boxes for motor sizes 80-250 can be turned 4*90° and in sizes 280-450 2*180° after delivery. For sizes 280-450 is also mounting of terminal box with opening towards D or N-end possible using the relevant variant codes when ordering.

### Cable entries

Terminal box is provided as standard with tapped holes for cable glands, no cable glands are included as standard. The entry holes are closed with Ex eb approved blanking plugs made of nickel-plated brass, one of the main entries is closed with a plastic plug as transport and storage protection. Very large motors have an angle adapter between the terminal box and gland plate. Please refer to the table on next page for further information about amount and size of threaded holes, plugs provided as standard.

Different types of cable glands are available as option, suitable for either armoured and non-armoured cables, please refer to the Terminal box alternatives section for more details.

### Cable type and terminations

Terminations are suitable for copper and aluminum cables(Al- cables on request for motor sizes 80 to 250). Cables are connected to terminals by cable lugs, which are not included in the delivery.

### Earthing bolts

The motors are as standard provided with at least one earthing bolt inside the terminal box and another on the frame. The earthing bolt on the frame is located on top close to the terminal box for easy access from either side of the motor. As an option can also earting bolts on the feet be provided, please refer to variant code section.

### Ordering

To ensure the delivery of desired terminations and cable entries for the motor, state the cable type, quantity, size, outer diameter and possibly type of cable glands needed when ordering.

See section Variant codes for all options available.

## Standard delivery

Standard delivery if no other information is provided. For other network voltages than voltage code D (see Ordering information section).

| Cable entries for supply cables<br>Motor size | Pole number | Terminal box type | Amount and size of threaded holes | Cable gland | Ex d plug | Max. connectable core cross-section mm² /phase | Number and size of terminal bolts, 6 x |
|---|---|---|---|---|---|---|---|
| **IE2 motors** | | | | | | | |
| 80 - 90 | 2-8 | 25 | 1 x M25x1.5 | - | - | 10 | M5 |
| 100 - 132 | 2-8 | 25 | 2 x M32x1.5 | - | 1 x M32 | 10 | M5 |
| 160 - 180 | 2-8 | 63 | 2 x M40x1.5 | - | 1 x M40 | 1x35 | M6 |
| 200 - 250 | 2-8 | 160 | 2 x M50x1.5 | - | 1 x M50 | 1x70 | M10 |
| 280 SM_ | 2-8 | 210 | 2 x M63x1.5 | - | 1 x M63 | 2x150 | M12 |
| 315 SM_, ML_ | 2-8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SMA - SMC | 2-4 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 SMA, SMB | 6-8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SMC | 6 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 SMC | 8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 ML_, LK_ | 2-8 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 400 | 2-8 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 450 | 6-8 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **IE3 motors** | | | | | | | |
| 80-90 | 2-8 | 25 | 1 x M25x1.5 | - | - | 10 | M5 |
| 100-132 | 2-8 | 25 | 2 x M32x1.5 | - | 1 x M32 | 10 | M5 |
| 160 - 180 | 2-8 | 63 | 2 x M40x1.5 | - | 1 x M40 | 1x35 | M6 |
| 200 - 250 | 2-8 | 160 | 2 x M50x1.5 | - | 1 x M50 | 1x70 | M10 |
| 280 | 2-8 | 210 | 2 x M63x1.5 | - | 1 x M63 | 2x150 | M12 |
| 315 | 2-8 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SM_ | 2-4 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 SMA, SMB | 6 | 370 | 2 x M75x1.5 | - | 1 x M75 | 2x240 | M12 |
| 355 SMC | 6 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |
| 355 ML_, LK_ | 2-6 | 750 | 2 x M75x1.5 | - | 1 x M75 | 4x240 | M12 |

| | | | | |
|---|---|---|---|---|
| **Auxiliary cable entries** | | | | |
| 80 - 132 | 2-8 | 1 x M20x1.5 | - 1xM20 | 1 x 2,5 mm² per terminal |
| 160-450 | 2-8 | 2 x M20x1.5 | - 1xM20 | 1 x 2,5 mm² per terminal |

| Motor size | Earthing on frame | Earthing in main terminal box |
|---|---|---|
| 80 - 132 | M6 | M6 |
| 160 - 180 | M6 | M6 |
| 200 - 250 | M8 | M8 |
| 280 - 450 | M10 | 2xM10 |

# Terminal box

## Terminal box dimensions

—
01 Motor sizes 80 to 132

02 Motor sizes 80 to 132

03 Motor sizes 160 to 180

04 Motor sizes 200 to 250

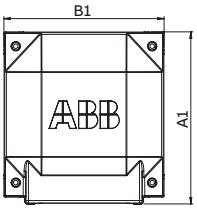
05 Motor sizes 280 to 315

06 Motor sizes 355 to 400

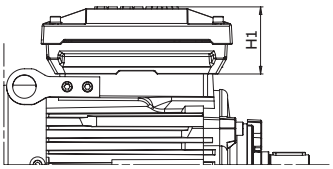
07 Motor sizes 450

To match the correct terminal box with motor size, find the motor type and correspondent terminal box type on the previous page. The box types and their dimensions are presented on this page.

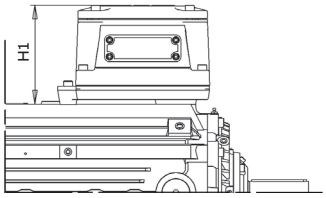
### Terminal boxes, standard with 6 terminals



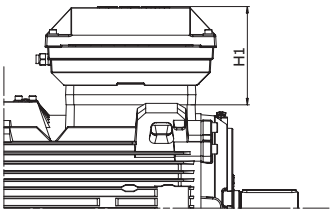

01



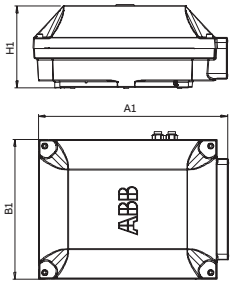

02




03

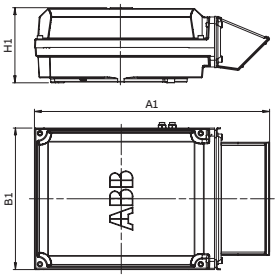



04

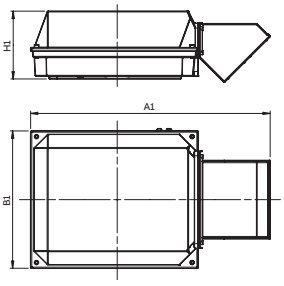



05

| Terminal box types acc. to current capacity | A1 mm | B1 mm | H1 mm | Gland plate opening |
|---|---|---|---|---|
| 25 | 208 | 180 | 74 | B |
| 63 | 243 | 243 | 178 | 2x B |
| 160 | 352 | 319 | 186 | B |
| 210 | 416 | 306 | 186 | C |
| 370 | 451 | 347 | 200 | D |
| 750 with E-D adapter | 686 | 413 | 219 | D |
| 750 without E-D adapter | 523 | 413 | 219 | E |
| 1200 with E-2D adapter | 1000 | 578 | 285 | 2x D |
| 1200 without E-2D adapter | 697 | 578 | 285 | E |

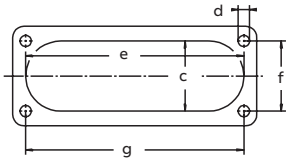



06




07

### Dimensions of opening for gland plate




| Gland plate opening | c mm | e mm | f mm | g mm | d thread |
|---|---|---|---|---|---|
| B | 32 | 115 | 30 | 120 | M6 |
| C | 65 | 193 | 62 | 193 | M8 |
| D | 100 | 300 | 80 | 292 | M10 |
| E | 115 | 370 | 100 | 360 | M12 |

# Terminal box

## Terminal boxes and boards

—
01 Terminal box for motor sizes 80 to 132

02 Terminal box for motor sizes 160 to 180

03 Terminal box for motor sizes 200 to 250

04 Terminal box for motor sizes 280 to 315

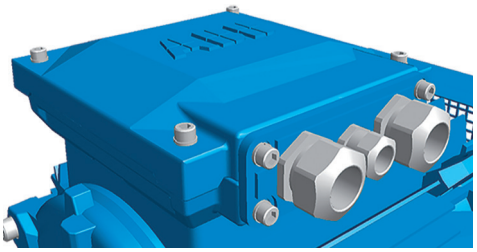
05 Terminal box for motor sizes 355 and 400. Size 400 and 355ML 2-4 pole does have 45° adapter as shown in picture 06

06 Terminal box for motor size 450 with 45° adapter

The pictures below show standard terminal boxes and the corresponding terminal boards for various motor sizes.

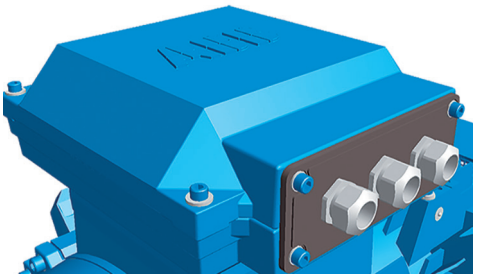
Cable glands are not delivered as standard.

### Terminal boxes

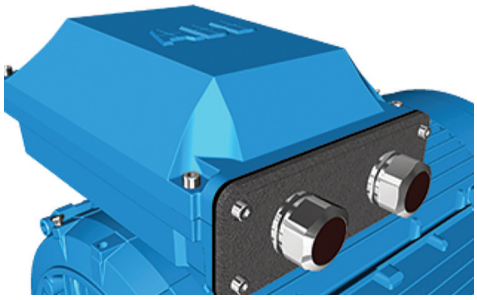


01

02

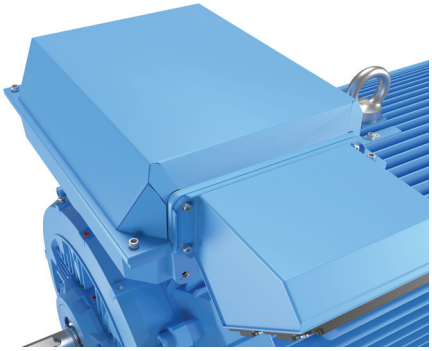


03



04

05



06

## Terminal boards

—
07 Terminal board for motor sizes 80 to 132

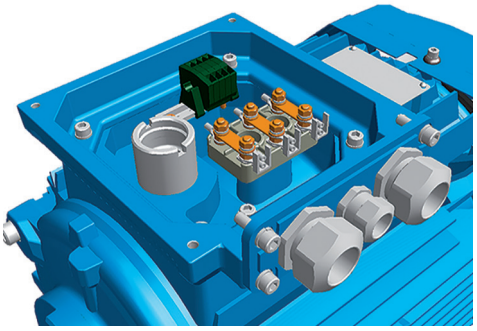
08 Terminal board for motor sizes 160 to 180

09 Terminal board for motor sizes 200 to 250

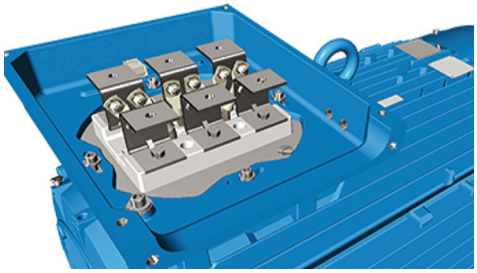
10 Terminal board for motor sizes 280 to 315

11 Terminal board for motor sizes 355 to 400

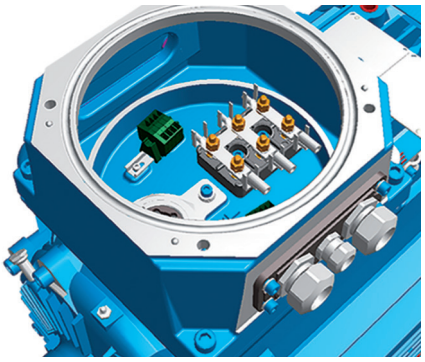
12 Terminal board for motor size 450



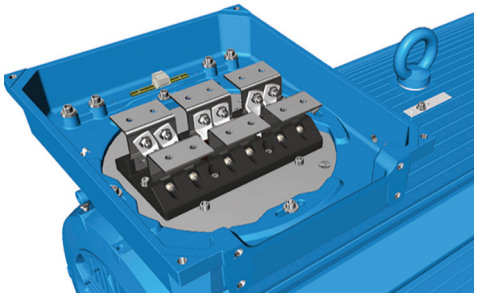
07



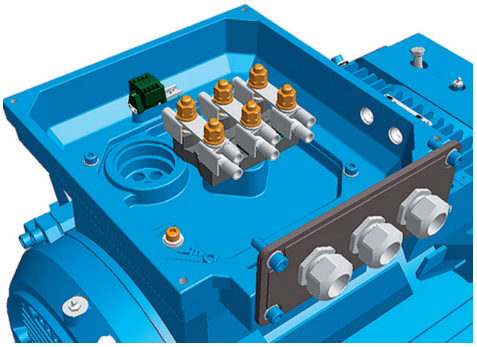
11



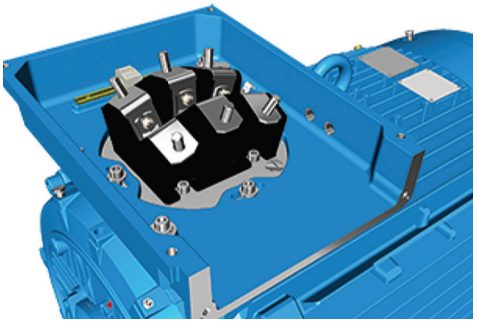
08



12



09



10

# Terminal box

## Terminal box alternatives

### Optional cable termination parts

There is a broad selection of cable termination accessories available to allow a safe and reliable termination of one or several supply cables. The most common options are explained in this chapter.

### How to order

- Check first that the terminal box itself allows mounting of the desired cable and cores (refer to table showing standard delivery for each motor size). If very large cable are used might it be necessary to use a larger terminal box and larger terminal board than standard.
- Select the right cable gland(s) or cable sealing end unit based on the diameter of the cables(s) and suitability for cable type.
- Select appropriate adapter or flange to allow mounting on opening in terminal box.
- Note that turning the terminal box might be prevented by use of some adapters

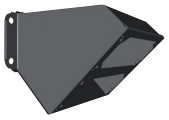
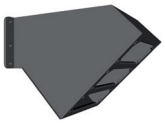
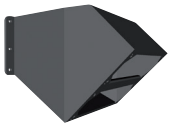
### Ordering example

**Ordering example for M3KP motors**

| | |
|---|---|
| Motor and supply cables | 110kW, 4-pole, 400V 50Hz, IE3. Cables needed: 1 pcs outer diameter 42mm steel wire armoured cable, single cross section 120 mm2. Cables coming from below. |
| Motor | M3KP 315SMC 4, B3 |
| Adapter (to allow entry of cables coming from below) | Variant code 293 (adaptor D-D) |
| Cable glands Ex d/ Ex e suitable for armoured cables (an M50 gland will suit this cable) | Variant code 734 (specify cable dimensions) |
| Gland plate made of steel drilled and tapped with 1 pcs M50 hole (non-std size) | Variant code 554 (1 pcs M50 x 1.5 threaded hole to be specified) |

### Optional adapters

To allow easy termination of cables entering the terminal box from above or below, an angle adapter is recommended. These can be used to allow the mounting of several cable sealing end units or gland plates. For exact suitability on a certain motor size, refer to the ‘terminal box opening’ column in section Standard terminal box.

| Adapater | | | |  |  |  |
|---|---|---|---|---|---|---|
| Variant code | 292 | 293 | 294 | 295 | 296 | 444 |
| Opening to terminal box | C | D | E | E | E | E |
| Flange or opening for end unit | C | D | D | 2 x D | 3 x D | 2 x E |
| Material | Cast iron | Cast iron | Cast iron | Steel | Steel | Steel |
| Notes | | | | Included as standard delivery for some types. | Only possible on type 1200 terminal box. | Only possible on type 1200 terminal box. |

## Cable glands

The motors are delivered as standard with plugged cable entries as described in the previous section. There is a broad selection of different type of cable glands available which are suitable for different types of cable and outer diameter ranges. As it is very difficult to change the amount and size of cable glands afterwards, is it extremely important that these are selected carefully.

| **Size of threaded opening for cable gland** | **NPT (Variant code 730 added)** | **Cable gland Ex d IIC for armoured cable with double sealing (Variant code 734)** | | **Cable gland Ex d IIC for non-armoured cable (Variant code 735)** |
|---|---|---|---|---|
| **Metric (std)** | | **Cable outer diameter, mm** | **Inner sheath diameter, mm** | **Cable outer diameter, mm** |
| M16 x 1.5 | 4-12 | 4-8 | 7-12 | 4.5-8 |
| M20 x 1.5 | 4-12 | 4-12 | 10-16 | 6-10 |
| M25 x 1.5 | - | - | 13.5-19 | 10-14 |
| M25 x 1.5 * | 10-18 | 10-18 | 19-25 | 14-18 |
| M32 x 1.5 | 14-24 | 14-24 | 25-30 | 18-23 |
| M40 x 1.5 | 22-32 | 22-32 | 30-36 | 23-28 |
| M50 x 1.5 | - | - | 36-40 | 28-32 |
| M50 x 1.5 * | 26-35 | 26-35 | 40-46 | 32-37 |
| M63 x 1.5 | - | - | 46-53 | 37-43 |
| M63 x 1.5 * | 35-45 | 35-45 | 53-60 | 43-50 |
| M75 x 1.5 | 46-62 | 46-62 | 58-70 | 48-60 |
| M90 x 1.5 | - | | 78-90 | 68-80 |
| M100 x 1.5 | - | | 88-100 | 78-90 |

* = High capacity version, delivered as standard with the variant code.

### Threaded openings for cable glands with NPT thread (variant code 730)

The motors are delivered as standard with openings for cable glands with metric threads as listed in the section describing the standard terminal box. If glands with NPT threads will be used must variant code 730 be ordered. If nothing else is stated on the ordered will the sizes in tables below be delivered. If cable glands are also needed must either variant 734 or 735 be added.

| Motor frame size | Main cable entries | NPT plug |
|---|---|---|
| 80-112 | 1 x ¾” | - |
| 132 | 2 x ¾” | 1 x ¾” |
| 160-180 | 2 x 1 ¼” | 1 x 1 ¼” |
| 200-250 | 2 x 1 ½” | 1 x 1 ½” |
| 280 | 2 x 2” | 1 x 2” |
| 315 | 2 x 21/2” | 1 x 21/2” |
| 355-450 | 2 x 3” | 1 x 3” |

| Motor frame size | Cable entries for auxiliaries | NPT plug |
|---|---|---|
| 80-112 | 1 x ¾” | - |
| 132 | 1 x ¾” | 1 x ¾” |
| 160-450 | 2 x ¾” | 2 x ¾” |

### Threaded openings for cable glands of nonstandard size

If the standard size of threaded openings for cable glands does not suit the gland size and cable that will be used can openings of nonstandard size also be delivered, either by fitting a reducers to make the openings smaller or by increasing the amount or size of holes. The maximum possible size and amount for each gland plate size is listed below. Threaded openings of non-standard size can be ordered using variant codes 554 and 555.

| Gland plate size | Maximum amount and size of threaded holes |
|---|---|
| B | 2 x M40 |
| C | 2 x M63 |
| D | 2 x M90 or 3 x M75 |
| E | 2 x M90 or 4 x M75 |

### Gland plates of non-standard material

The standard material used in gland plates is steel. Gland plates made of stainless steel are optional, either with cable glands or blind without threaded holes. Please refer to the variant code section for more information.

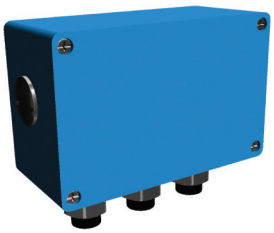
## Auxiliary terminal box

It is possible to equip motors from frame size 132 upwards with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box is made of aluminum, except frame sizes 160-250 where cast iron boxes are used.

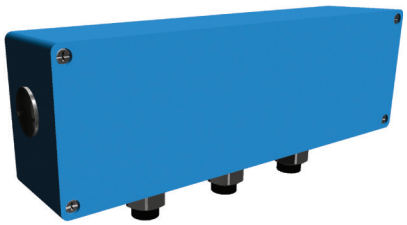
Connection terminals are of spring-loaded type for quick and easy connection. These are suitable for up to 2.5 $mm^2$ wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard.

The standard cable entry is 2 x M20 with plugged entries. If cable glands are needed must these be ordered using the variant codes described earlier in this section.

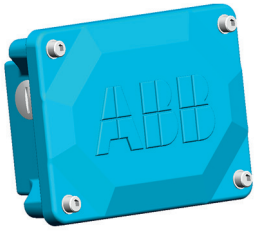
| Related variant codes | |
|---|---|
| 380 | Separate terminal box for temperature detectors |
| 418 | Separate terminal box for auxiliaries |
| 567 | Separate terminal box material: cast Iron |
| 568 | Separate terminal box for heating elements |



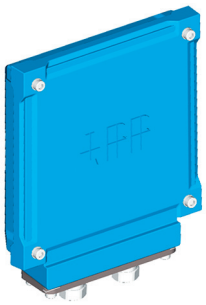
Small auxiliary aluminum terminal box for motor sizes 280-450 (variant codes 418, 568, 380, 569). The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 125 mm, max 12 strips. Earthing size M4.



Large auxiliary aluminum terminal box for motor sizes 280-450. The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 250 mm, max 30 strips. Earthing size M4.



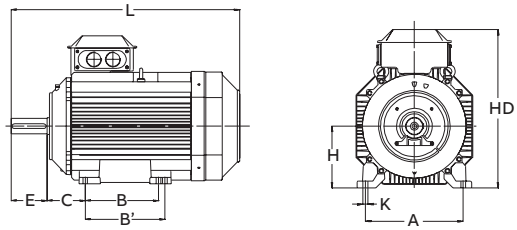

Auxiliary cast iron terminal box for motor size 160-250 (variant code 418). 111 x 162 mm.



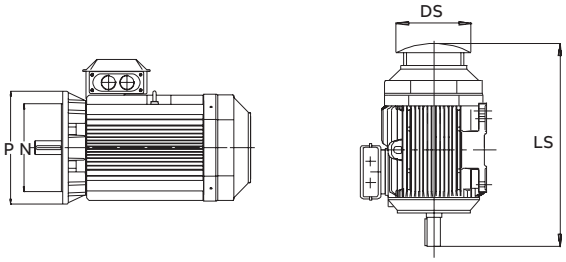
Auxiliary cast iron terminal box for motor sizes 280-450 (variant code 567). 208 x 180 mm.

# Dimension drawings

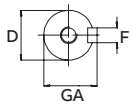
## Flameproof motors, Ex db eb

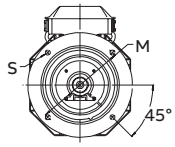



Foot-mounted motor IM 1001, IM B3

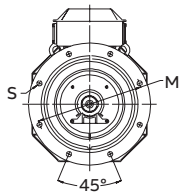



Flange-mounted motor IM 3001, IM B5

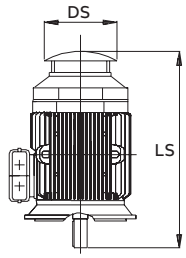



Sizes 80 to 200




Sizes 225 to 450




Protective roof, variant code 005

| Motor size | IM 1001, IM B3 AND IM 3001, IM B5 | | | | | | | | | | | IM 1001, IM B3 | | | | | | | IM 3001, IM B5 | | | | Protective roof | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | | GA | | F | | E | | L max | | O [1] | A | B | B' | C | HD | K | H | M | N | P | S | DS | LS | |
| | poles | | poles | | poles | | poles | | poles | | | | | | | | | | | | | | | poles | |
| | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | | | | | | | | | | | | | | 2 | 4-8 |
| 80 | 19 | 19 | 21.5 | 21.5 | 6 | 6 | 40 | 40 | 409 | 409 | 20 | 125 | 100 | 112 | 50 | 250 | 10 | 80 | 165 | 130 | 200 | 12 | 157 | 444 | 444 |
| 90 | 24 | 24 | 27 | 27 | 8 | 8 | 50 | 50 | 440 | 440 | 20 | 140 | 100 | 125 | 56 | 269 | 10 | 90 | 165 | 130 | 200 | 12 | 185 | 475 | 475 |
| 100 | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 501 | 501 | 25 | 160 | 140 | 160 | 63 | 297 | 12 | 100 | 215 | 180 | 250 | 14.5 | 200 | 536 | 536 |
| 112 | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 485 | 485 | 25 | 190 | 140 | – | 70 | 309 | 12 | 112 | 215 | 180 | 250 | 14.5 | 213 | 526 | 526 |
| 132 IE2 | 38 | 38 | 41 | 41 | 10 | 10 | 80 | 80 | 531 | 531 | 30 | 216 | 140 | 178 | 89 | 346 | 12 | 132 | 265 | 230 | 300 | 14.5 | 274 | 582 | 582 |
| 132 IE3 | 38 | 38 | 41 | 41 | 10 | 10 | 80 | 80 | 576 | 576 | | 216 | 140 | 178 | 89 | 346 | 12 | 132 | 265 | 230 | 300 | 14.5 | 274 | 627 | 627 |
| 160 | 42 | 42 | 45 | 45 | 12 | 12 | 110 | 110 | 808 | 808 | 45 | 254 | 210 | 254 | 108 | 499 | 14.5 | 160 | 300 | 250 | 350 | 18.5 | 328 | 852 | 852 |
| 180 | 48 | 48 | 51.5 | 51.5 | 14 | 14 | 110 | 110 | 826 | 826 | 50 | 279 | 241 | 279 | 121 | 539 | 14.6 | 180 | 300 | 250 | 350 | 18.5 | 359 | 876 | 876 |
| 200 | 55 | 55 | 59 | 59 | 16 | 16 | 110 | 110 | 774 | 774 | 70 | 318 | 267 | 305 | 133 | 573 | 18.5 | 200 | 350 | 300 | 400 | 18.5 | 414 | 844 | 844 |
| 200 [2] | 55 | 55 | 59 | 59 | 16 | 16 | 110 | 110 | 824 | 824 | 70 | 318 | 267 | 305 | 133 | 573 | 18.5 | 200 | 350 | 300 | 400 | 18.5 | 414 | 844 | 844 |
| 225 | 55 | 60 | 59 | 64 | 16 | 18 | 110 | 140 | 841 | 871 | 80 | 356 | 286 | 311 | 149 | 620 | 18.6 | 225 | 400 | 350 | 450 | 18.5 | 462 | 921 | 951 |
| 225 [2] | 55 | 60 | 59 | 64 | 16 | 18 | 110 | 140 | 871 | 901 | 80 | 356 | 286 | 311 | 149 | 620 | 18.6 | 225 | 400 | 350 | 450 | 18.5 | 462 | 921 | 951 |
| 250 | 60 | 65 | 64 | 69 | 18 | 18 | 140 | 140 | 875 | 875 | 90 | 406 | 311 | 349 | 168 | 683 | 24 | 250 | 500 | 450 | 550 | 18.5 | 506 | 965 | 965 |
| 250 [2] | 60 | 65 | 64 | 69 | 18 | 18 | 140 | 140 | 895 | 895 | 90 | 406 | 311 | 349 | 168 | 683 | 24 | 250 | 500 | 450 | 550 | 18.5 | 506 | 965 | 965 |
| 280 | 65 | 75 | 69 | 79.5 | 18 | 20 | 140 | 140 | 1090 | 1090 | 100 | 457 | 368 | 419 | 190 | 768 | 24 | 280 | 500 | 450 | 550 | 18 | 555 | 1192 | 1192 |
| 315 SM_ | 65 | 80 | 69 | 85 | 18 | 22 | 140 | 170 | 1176 | 1206 | 115 | 508 | 406 | 457 | 216 | 858 | 30 | 315 | 600 | 550 | 660 | 23 | 624 | 1293 | 1323 |
| 315 ML_ | 65 | 90 | 69 | 95 | 18 | 25 | 140 | 170 | 1285 | 1315 | 115 | 508 | 457 | 508 | 216 | 858 | 30 | 315 | 600 | 550 | 660 | 23 | 624 | 1404 | 1434 |
| 315 LK | 65 | 89 | 69 | 95 | 18 | 25 | 140 | 170 | 1446 | 1475 | 115 | 590 | 508 | 560/ | 216 | 858 | 28 | 315 | 600 | 550 | 660 | 23 | 624 | 1552 | 1589 |
| | | | | | | | | | | | | | | 710 | | | | | | | | | | | |
| 355 SM_ | 70 | 100 | 62.5 | 90 | 20 | 28 | 140 | 210 | 1409 | 1479 | 130 | 610 | 500 | 560 | 254 | 984 | 35 | 355 | 740 | 680 | 800 | 23 | 720 | 1526 | 1596 |
| 355 ML_ | 70 | 100 | 62.5 | 90 | 20 | 28 | 140 | 210 | 1514 | 1584 | 130 | 610 | 560 | 630 | 254 | 984 | 35 | 355 | 740 | 680 | 800 | 23 | 720 | 1633 | 1703 |
| 355 LK_ | 70 | 100 | 62.5 | 90 | 20 | 28 | 140 | 210 | 1764 | 1834 | 130 | 610 | 710 | 900 | 254 | 984 | 35 | 355 | 740 | 680 | 800 | 23 | 720 | 1881 | 1951 |
| 400 L_ | 80 | 110 | 85 | 126 | 22 | 28 | 170 | 210 | 1851 | 1891 | 150 | 710 | 900 | 1000 | 224 | 1071 | 35 | 400 | 940 | 880 | 1000 | 28 | 810 | 1860 | 1900 |
| 400 LK_ | 80 | 100 | 85 | 106 | 22 | 28 | 170 | 210 | 1851 | 1891 | 150 | 686 | 710 | 800 | 280 | 1071 | 35 | 400 | 740 | 680 | 800 | 24 | 810 | 1860 | 1900 |
| 450 | 80 | 120 | - | 127 | - | 32 | - | 210 | - | 2071 | 180 | 800 | 1000 | 1120 | 250 | 1255 | 42 | 450 | 1080 | 1000 | 1150 | 28 | On request | | |

[1] Required distance from fan cover air inlet to obstacle behind motor

[2] For IE3 motors

| Tolerances: | |
|---|---|
| A, B | ± 0.8 |
| D, DA | ISO k6 < Ø 48mm |
| | ISO m6 > Ø 48mm |
| F, FA | ISO h9 |
| H | -0.5 |
| N | ISO j6 |
| C, CA | ± 0.8 |

### Available B14 and B5 flange alternatives

| Flange size | Variant code | Flange dimension | | | | Motor size 80-132 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | M | N | S | 80 | 90 | 100 | 112 | 132 |
| FT100 | 258 | 120 | 100 | 80 | M6 | Std B14 | NA | NA | NA | NA |
| FT115 | 260 | 140 | 115 | 95 | M8 | Opt. | Std B14 | NA | NA | NA |
| FT130 | 229 | 160 | 130 | 110 | M8 | Opt. | Opt. | Std B14 | Std B14 | NA |
| FT165 | 236 | 200 | 165 | 130 | M10 | NA | NA | Opt. | Opt. | Std B14 |
| FT215 | 246 | 250 | 215 | 180 | M12 | NA | NA | Opt. | Opt. | Opt. |
| FT265 | 256 | 300 | 265 | 230 | M12 | NA | NA | NA | NA | Opt. |
| FF100 | 257 | 120 | 100 | 80 | 7 | Opt. | M | NA | NA | NA |
| FF115 | 259 | 140 | 115 | 95 | 10 | Opt. | Opt. | NA | NA | NA |
| FF130 | 228 | 160 | 130 | 110 | 10 | Opt. | Opt. | Opt. | Opt. | NA |
| FF165 | 235 | 200 | 165 | 130 | 12 | Std B5 | Std B5 | Opt. | Opt. | Opt. |
| FF215 | 245 | 250 | 215 | 180 | 14.5 | NA | NA | Std B5 | Std B5 | Opt. |
| FF265 | 255 | 300 | 265 | 230 | 14.5 | NA | NA | NA | NA | Std B5 |

Std. B14 = Standard small flange for given frame size

Std. B5 = Standard large flange for given frame size

Opt. = optional flange for given frame size

NA = Not applicable

In all dimension drawings: The tables give the main dimensions in mm.

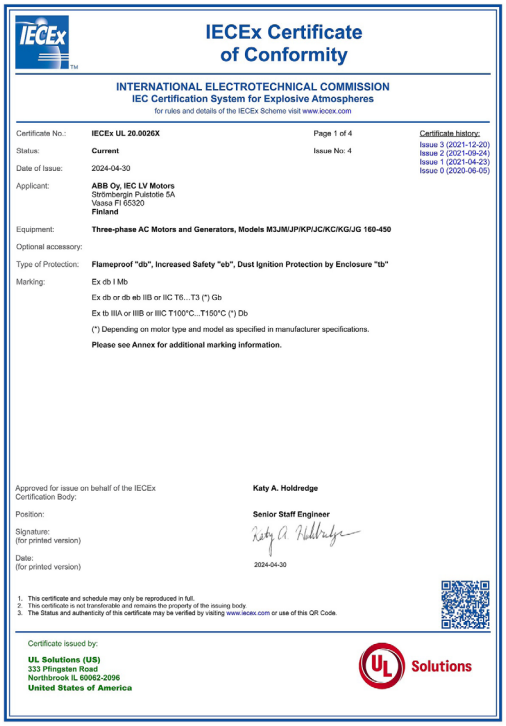
For detailed drawings please see our web-pages or contact ABB.

# Certificate examples

01 IECEx Certificate of Conformity

02 EU Declaration of Conformity

03 EU Type Examination Certificate



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx UL 20.0026X** Page 1 of 4

Status: **Current** Issue No: 4

Date of Issue: 2024-04-30

Certificate history:
Issue 3 (2021-12-20)
Issue 2 (2021-09-24)
Issue 1 (2021-04-23)
Issue 0 (2020-06-05)

Applicant: **ABB Oy, IEC LV Motors**
Strömbergin Puistotie 5A
Vaasa FI 65320
**Finland**

Equipment: **Three-phase AC Motors and Generators, Models M3JM/JP/KP/JC/KC/KG/JG 160-450**

Optional accessory:

Type of Protection: **Flameproof "db", Increased Safety "eb", Dust Ignition Protection by Enclosure "tb"**

Marking: Ex db I Mb

Ex db or db eb IIB or IIC T6…T3 (*) Gb

Ex tb IIIA or IIIB or IIIC T100°C…T150°C (*) Db

(*) Depending on motor type and model as specified in manufacturer specifications.

**Please see Annex for additional marking information.**

Approved for issue on behalf of the IECEx Certification Body: **Katy A. Holdredge**

Position: **Senior Staff Engineer**

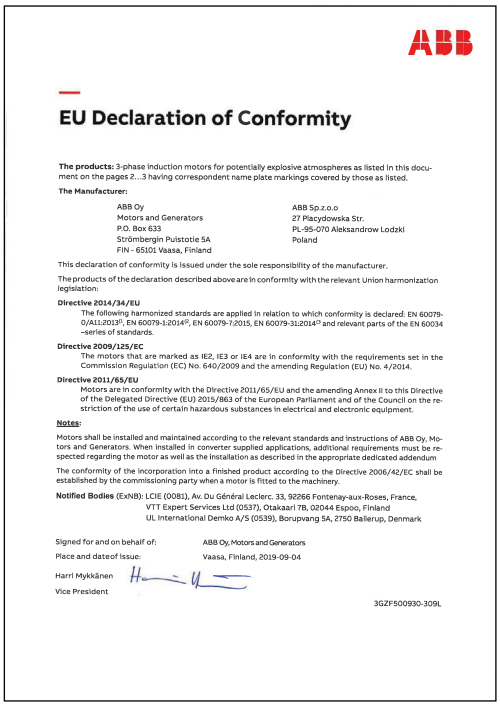
Signature: (for printed version)

Date: (for printed version) 2024-04-30

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:
**UL Solutions (US)**
**333 Pfingsten Road**
**Northbrook IL 60062-2096**
**United States of America**

01



ABB

## EU Declaration of Conformity

**The products:** 3-phase induction motors for potentially explosive atmospheres as listed in this document on the pages 2…3 having correspondent name plate markings covered by those as listed.

**The Manufacturer:**

ABB Oy
Motors and Generators
P.O. Box 633
Strömbergin Puistotie 5A
FIN - 65101 Vaasa, Finland

ABB Sp.z.o.o
27 Pacydowska Str.
PL-95-070 Aleksandrow Lodzki
Poland

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration described above are in conformity with the relevant Union harmonization legislation:

**Directive 2014/34/EU**
The following harmonized standards are applied in relation to which conformity is declared: EN 60079-0/A11:2013[1], EN 60079-1:2014[2], EN 60079-7:2015, EN 60079-31:2014[3] and relevant parts of the EN 60034 –series of standards.

**Directive 2009/125/EC**
The motors that are marked as IE2, IE3 or IE4 are in conformity with the requirements set in the Commission Regulation (EC) No. 640/2009 and the amending Regulation (EU) No. 4/2014.

**Directive 2011/65/EU**
Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

**Notes:**

Motors shall be installed and maintained according to the relevant standards and instructions of ABB Oy, Motors and Generators. When installed in converter supplied applications, additional requirements must be respected regarding the motor as well as the installation as described in the appropriate dedicated addendum

The conformity of the incorporation into a finished product according to the Directive 2006/42/EC shall be established by the commissioning party when a motor is fitted to the machinery.

**Notified Bodies** (ExNB): LCIE (0081), Av. Du Général Leclerc. 33, 92266 Fontenay-aux-Roses, France,
VTT Expert Services Ltd (0537), Otakaari 7B, 02044 Espoo, Finland
UL International Demko A/S (0539), Borupvang 5A, 2750 Ballerup, Denmark

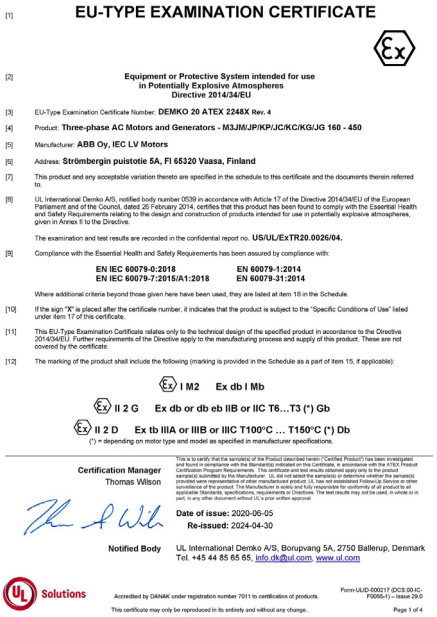
Signed for and on behalf of: ABB Oy, Motors and Generators

Place and date of issue: Vaasa, Finland, 2019-09-04

Harri Mykkänen
Vice President

3GZF500930-309L

02



[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate Number: **DEMKO 20 ATEX 2248X Rev. 4**

[4] Product: **Three-phase AC Motors and Generators - M3JM/JP/KP/JC/KC/KG/JG 160 - 450**

[5] Manufacturer: **ABB Oy, IEC LV Motors**

[6] Address: **Strömbergin puistotie 5A, FI 65320 Vaasa, Finland**

[7] This product and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report no. **US/UL/ExTR20.0026/04.**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN IEC 60079-0:2018** **EN 60079-1:2014**
**EN IEC 60079-7:2015/A1:2018** **EN 60079-31:2014**

Where additional criteria beyond those given here have been used, they are listed at item 18 in the Schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the "Specific Conditions of Use" listed under item 17 of this certificate.

[11] This EU-Type Examination Certificate relates only to the technical design of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by the certificate.

[12] The marking of the product shall include the following (marking is provided in the Schedule as a part of item 15, if applicable):

**I M2 Ex db I Mb**

**II 2 G Ex db or db eb IIB or IIC T6…T3 (*) Gb**

**II 2 D Ex tb IIIA or IIIB or IIIC T100°C … T150°C (*) Db**

(*) = depending on motor type and model as specified in manufacturer specifications.

**Certification Manager**
Thomas Wilson

This is to certify that the sample(s) of the Product described herein ("Certified Product") has been investigated and found in compliance with the Standard(s) indicated on this Certificate, in accordance with the ATEX Product Certification Scheme operated by UL. This certification is based on evaluation of the Product sample(s) submitted by the Manufacturer. UL did not select the sample(s) or determine whether the sample(s) provided were representative of other manufactured product. UL has not established Follow-Up Service or other surveillance of the product. The Manufacturer is solely and fully responsible for conformity of all product to all applicable Standards, specifications, requirements or Directives. The test results may not be used, in whole or in part, in any other document without UL's prior written approval.

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Form-ULID-000217 (DCS:00-IC-F0056-1) – Issue 29.0

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03

# Motors in brief

## Flameproof motors Ex db eb, sizes 80 to 180

| Motor size | | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|
| Stator | Material | Cast iron, EN-GJL-200 or better | | | | | | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | |
| | Corrosion class | C3 | | | | | | |
| Feet | | Cast iron, EN-GJL-200 or better, integrated with stator | | | | | | |
| Bearing end shields | Material | Cast iron, EN-GJL-200 or better | | | | | | |
| | Paint colour shade | Blue, Munsell 8B 4.5/3.25 | | | | | | |
| | Paint colour shade | C3 | | | | | | |
| Bearings | D-end 2-12 poles | 6205-2Z/C3 | 6205-2Z/C3 | 6206-2Z/C3 | 6206-2Z/C | 6208-2Z/C3 | 6309/C3 | 6310/C3 |
| | N-end 2-12 poles | 6204-2Z/C3 | 6205-2Z/C3 | 6206-2Z/C3 | 6206-2Z/C3 | 6208-2Z/C3 | 6309/C3 | 6310/C3 |
| Axially locked bearings | Inner bearing cover | As standard, locked at D-end | | | | | | |
| Bearing seals | | Gamma ring | | | | | | |
| Lubrication | | Permanent grease lubrication | | | | | Regreasable bearings | |
| SPM nippleas | | - | | | | | As standard | |
| Rating plate | Material | Stainless steel | | | | | | |
| Terminal box | Frame material | Cast iron, EN-GJL-200 or better | | | | | | |
| | Cover material | Cast iron, EN-GJL-200 or better | | | | | | |
| | Cover screws material | Acidproof steel A4-80 | | | | | Steel 8.8, zinc electroplat-ed and chromated. | |
| Connections | Cable entries | 1 x M25 + 1 x M20 plugged | | 2 x M32 + 1 x M20 plugged | | | 2 x M40 + 2 x M20 plugged | |
| | Terminals | 6 terminals for connection with cable lugs (not included) | | | | | | |
| Fan | Material | Polyamide. Reinforced with glass fibre. | | | | | Polypropylene. Reinforced with glass fibre. | |
| Fan cover | Material | Steel | | | | Hot dip galvanized steel | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | |
| | Corrosion class | C3 | | | | | | |
| Stator winding | Material | Copper | | | | | | |
| | Insulation | Insulation class F | | | | | | |
| | Winding protec- tion | 3 pcs thermistors as standard | | | | | | |
| Rotor winding | Material | Pressure die-cast aluminum | | | | | | |
| Balancing | | Half-key balancing as standard | | | | | | |
| Keyway | | Closed keyway | | | | | | |
| Drain holes | | - | | | | | Optional | |
| External earthing bolt | | As standard | | | | | | |
| Enclosure | | IP 55 | | | | | | |
| Cooling method | | IC 411 | | | | | | |

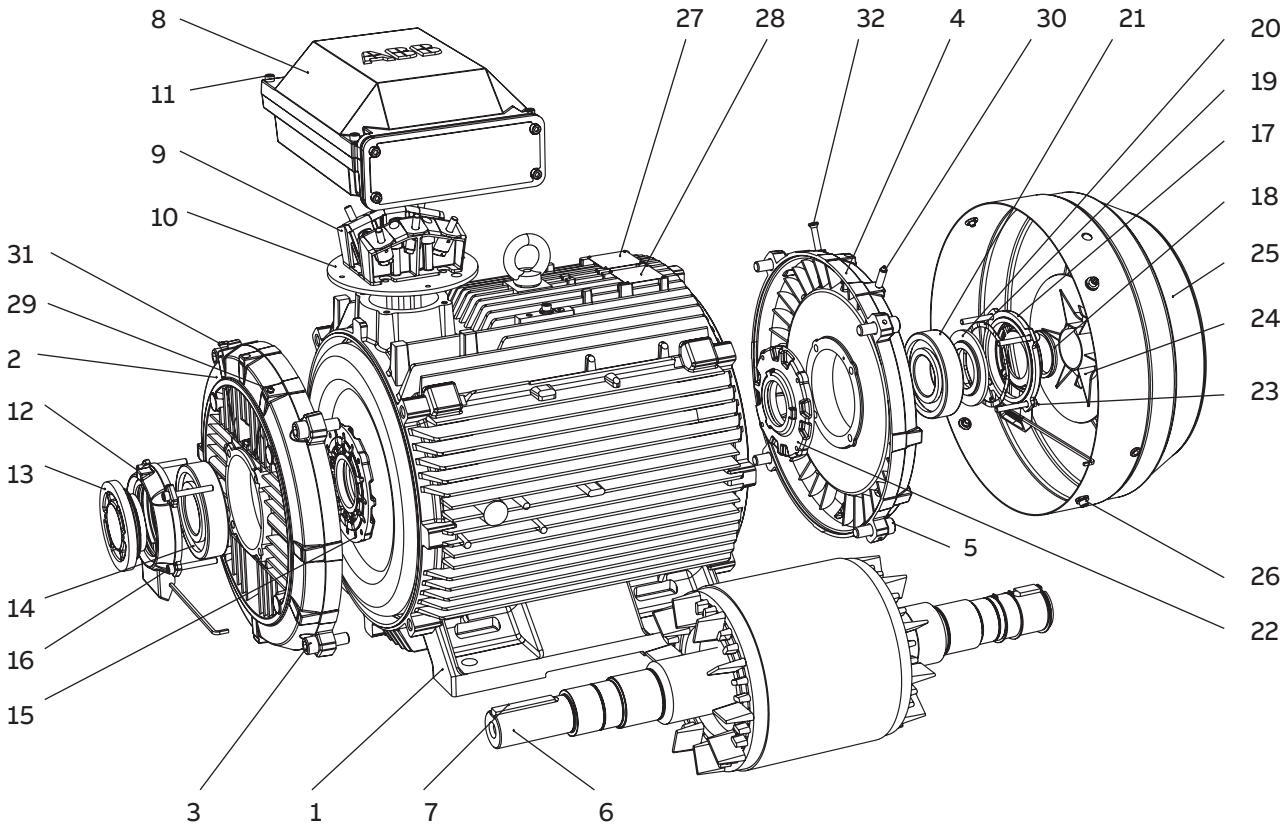
# Motors in brief

## Flameproof motors Ex db eb, sizes 200 to 450

| Motor size | | | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stator | Material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint color shade | | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | | C3 | | | | | | | |
| Feet | Material | | Cast iron, EN-GJL-200 or better, integrated with stator | | | | | | | |
| Bearing end shields | Material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint colour shade | | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Bearings | D-end | 2-pole | 6312M/C3 | 6313M/C3 | 6315M/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317M/C3 | - |
| | | 4-12-pole | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6319/C3 | 6322/C3 | 6324/C3 | 6326M/C3 |
| | N-end | 2-pole | 6310M/C3 | 6312M/C3 | 6313M/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317M/C3 | - |
| | | 4-12-pole | 6310/C3 | 6312/C3 | 6313/C3 | 6316/C3 | 6316/C3 | 6313/C3 | 6319/C3 | 6322/C3 |
| Axially locked bearings | Inner bearing cover | | As standard, locked at D-end | | | | | | | |
| Bearing seals | | | Gamma ring | | | Labyrinth seal | | | | |
| Lubrication | | | Regreasable bearings | | | | | | | |
| SPM nipples | | | As standard | | | | | | | |
| Rating plate | Material | | Stainless steel | | | | | | | |
| Terminal box | Frame material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover material | | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover screws material | | Steel 8.8, zinc electroplated and chromated | | | | | | | |
| Connections | Cable-entries | | 2 x M50 + 2 x M20 plugged | | | 2 x M63 + 2 x M20 plugged | | Refer to table on page 91 | | |
| | Terminals | | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | | Polypropylene. Reinforced with glass fibre. | | | | | Polypropylene reinforced with glass fibre or aluminum. | | |
| Fan cover | Material | | Hot dip galvanized steel | | | | | | | |
| | Paint color shade | | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | | C3 | | | | | | | |
| Stator winding | Material | | Copper | | | | | | | |
| | Insulation | | Insulation class F. | | | | | | | |
| | Winding protection | | 3 pcs thermistors as standard | | | | | | | |
| Rotor winding12.6600 | Material | | Pressure die-cast aluminum | | | | | | | |
| Balancing | | | Half key balancing | | | | | | | |
| Keyway | | | Closed | | | Open | | | | |
| Heating elements | On request | | 25 W | 60 W | | | 120 W | | | 200 W |
| Drain holes | | | Optional | | | | | | | |
| External earthing bolt | | | As standard | | | | | | | |
| Enclosure | | | IP 55 | | | | | | | |
| Cooling method | | | IC 41 | | | | | | | |

# Motor construction

## Flameproof motors, Ex db eb




1 Stator frame
2 Endshield, D-end
3 Screws for endshield, D-end
4 Endshield, N-end
5 Screws for endshield, N-end
6 Rotor with shaft
7 Key, D-end
8 Terminal box
9 Terminal board
10 Intermediate flange
11 Screws for terminal box cover
12 Outer bearing cover, D-end
13 Valve disc with labyrinth seal, D-end;
14 standard in 2-pole motors (V-ring in 4-8 pole)
15 Bearing, D-end
16 Inner bearing cover, D-end
17 Screws for bearing cover, D-end
18 Outer bearing cover, N-end
19 Seal, N-end
20 Wave spring (280-315)
21 Coil spring (355-450)
22 Valve disc, N-end
23 Bearing, N-end
24 Inner bearing cover, N-end
23 Screws for bearing cover, N-end
24 Fan
25 Fan cover
26 Screws for fan cover
27 Rating plate
28 Regreasing plate
29 Grease nipple, D-end
30 Grease nipple, N-end
31 SPM nipple, D-end
32 SPM nipple, N-end

# Increased safety cast iron motors Ex ec IIC T3 Gc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121 IE4 Ex ec cast iron motors, 1000 r/min
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# Ordering information

## Explanation of the product code

| Motor type | Motor size | Product code | Mounting arrangement code, Voltage and frequency code, Generation code | Variant codes |
|---|---|---|---|---|
| M3GP | 160MLA | 3GGP 161 | 410 - ADD | 002, etc. |
| | | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14 | |

| Positions 1 to 4 | |
|---|---|
| 3GGP: | Totally enclosed fan cooled squirrel cage motor with cast iron frame, increased safety Ex ec |

| Positions 5 and 6 | |
|---|---|
| IEC size | |
| 07: | 71 |
| 08: | 80 |
| 09: | 90 |
| 10: | 100 |
| 11: | 112 |
| 13: | 132 |
| 16: | 160 |
| 18: | 180 |
| 20: | 200 |
| 22: | 225 |
| 25: | 250 |
| 28: | 280 |
| 31: | 315 |
| 35: | 355 |
| 40: | 400 |

| Position 7 | |
|---|---|
| Speed (Pole pairs) | |
| 1: | 2 poles |
| 2: | 4 poles |
| 3: | 6 poles |
| 4: | 8 poles |

| Positions 8 to 10 | |
|---|---|
| 8: | Frame lenght |
| 9: | Stator package length |
| 10: | Speed for two-speed induction, Permanent Magnet, SynRM and High Speed motors |

| Position 11 |
|---|
| - (Dash) |

| Position 12 | |
|---|---|
| Mounting arrangement | |
| A: | Foot-mounted, top-mounted terminal box |
| B: | Flange-mounted, large flange |
| C: | Flange-mounted, small flange (size 90 to 132) |

| Position 13 | |
|---|---|
| Voltage and frequency code | |
| Single-speed motors | |
| C: | 400VY 50Hz, 460VY 60Hz |
| D: | 400 VΔ, 415 VΔ, 690 VY 50 Hz |
| E: | 500 VΔ 50 Hz |
| F: | 500 VY 50 Hz |
| P: | 400VD 50Hz, 460VD 60Hz |
| S: | 230 VΔ, 400 VY, 415 VY 50 Hz |

| Position 14 | |
|---|---|
| Generation code | |
| G, H... | The product code must be, if needed, followed by variant codes. |

# Rating plates

—
01 Sample rating plate for IE4 Increased safety Ex ec motors

—
01

1 ABB logo
2 Manufacturing place
3 CE mark on Ecodesign approved motors UKCA mark on UK approved motors
4 Manufacturing standard
5 Product description
6 Manufacturing year
7 Factory order reference number
8 Serial number
9 Insulation class, IP protection class
10 Voltage, Frequency, output, speed, current, power factory, duty
11 Product code
12 Bearing type
13 Weight

# Technical data

## IE4 Ex ec cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 30 | M3GP 200MLA 2 | 3GGP201410-**M | 2967 | 94,5 | 94,6 | 93,9 | 0,88 | 51,7 | 9,2 | 96,6 | 3,27 | 3,74 | 0,217 | 309 | 72 |
| 37 | M3GP 200MLB 2 | 3GGP201420-**M | 2955 | 94,8 | 95,4 | 95,5 | 0,89 | 63,4 | 7,5 | 121 | 2,7 | 3,4 | 0,217 | 309 | 72 |
| 45 | M3GP 225SMA 2 | 3GGP221210-**M | 2971 | 95 | 95,2 | 94,5 | 0,88 | 77,3 | 8 | 144,62 | 3,44 | 3,59 | 0,323 | 395 | 74 |
| 55 | M3GP 250SMA 2 | 3GGP251210-**M | 2976 | 95,3 | 95,5 | 95,2 | 0,88 | 94,4 | 8,4 | 178 | 3,3 | 3,6 | 0,634 | 483 | 75 |
| 75 | M3GP 280SMB 2 | 3GGP281220-**M | 2980 | 95,6 | 95,6 | 95 | 0,87 | 129 | 7,8 | 240 | 2,5 | 3,3 | 0,9 | 665 | 77 |
| 90 | M3GP 280SMC 2 | 3GGP281230-**M | 2981 | 95,8 | 95,6 | 95 | 0,88 | 153 | 8 | 288 | 3 | 3,1 | 1,15 | 725 | 77 |
| 110 | M3GP 315SMB 2 | 3GGP311220-**M | 2982 | 96 | 96 | 95,3 | 0,88 | 189 | 6,7 | 352 | 1,9 | 2,6 | 1,4 | 940 | 77 |
| 132 | M3GP 315SMC 2 | 3GGP311230-**M | 2986 | 96,2 | 96,3 | 95,9 | 0,88 | 226 | 7,9 | 422 | 2,4 | 3 | 1,7 | 1025 | 77 |
| 160 | M3GP 315MLA 2 | 3GGP311410-**M | 2983 | 96,3 | 96,5 | 96,3 | 0,9 | 268 | 7,3 | 512 | 2,2 | 2,7 | 2,1 | 1190 | 77 |
| 200 | M3GP 355SMA 2 | 3GGP351210-**M | 2985 | 96,5 | 96,2 | 95,4 | 0,9 | 336 | 7,6 | 640 | 2 | 3,1 | 3 | 1600 | 83 |
| 250 | M3GP 355SMB 2 | 3GGP351220-**M | 2983 | 96,5 | 96,6 | 96,2 | 0,9 | 415 | 7,6 | 800 | 2,2 | 3 | 3,4 | 1680 | 83 |
| 315 | M3GP 355SMC 2 | 3GGP351230-**M | 2984 | 96,5 | 96,5 | 95,9 | 0,89 | 533 | 7,8 | 1008 | 2,3 | 2,8 | 3,6 | 1750 | 83 |
| 355 | M3GP 355MLA 2 | 3GGP351410-**M | 2981 | 96,5 | 96,7 | 96,3 | 0,9 | 595 | 7,5 | 1137 | 2,3 | 2,6 | 4,1 | 2000 | 83 |
| 400 | M3GP 355MLB 2 | 3GGP351420-**M | 2982 | 96,5 | 96,2 | 95,5 | 0,88 | 677 | 7,1 | 1280 | 2,3 | 2,9 | 4,1 | 2000 | 83 |
| 450 | M3GP 355MLC 2 | 3GGP351430-**M | 2983 | 96,5 | 96,5 | 95,7 | 0,9 | 743 | 7,9 | 1440 | 2,2 | 2,9 | 4,3 | 2080 | 83 |
| 500 | M3GP 355LKA 2 | 3GGP351810-**M | 2982 | 96,5 | 96,5 | 96 | 0,9 | 827 | 7,5 | 1601 | 2 | 3,9 | 4,8 | 2320 | 83 |
| 560 | M3GP 400LA 2 | 3GGP401510-**M | 2988 | 96,5 | 96,5 | 95,7 | 0,89 | 934 | 7,8 | 1789 | 2,46 | 3,67 | 7,9 | 2950 | 82 |
| 560 | M3GP 355LKB 2 | 3GGP351820-**M | 2983 | 96,5 | 96,4 | 95,9 | 0,92 | 903 | 10 | 1793 | 2,2 | 4,1 | 5,2 | 2460 | 83 |
| 630 | M3GP 400LB 2 | 3GGP401520-**M | 2987 | 96,5 | 96,2 | 95,6 | 0,89 | 1049 | 7,6 | 2014 | 2,56 | 3,7 | 8,2 | 2950 | 82 |
| 710 | M3GP 400LC 2 | 3GGP401530-**M | 2987 | 96,5 | 96,3 | 95,7 | 0,89 | 1178 | 7,2 | 2270 | 2,6 | 3,4 | 9,3 | 3050 | 82 |
| 800 | M3GP 450LA 2 | 3GGP451510-**M | 2990 | 96,5 | 96,2 | 95,4 | 0,87 | 1362 | 7,8 | 2555 | 1,26 | 3,4 | 12,2 | 4000 | 85 |
| 900 | M3GP 450LB 2 | 3GGP451520-**M | 2990 | 96,5 | 96,3 | 95,6 | 0,87 | 1534 | 7,6 | 2874 | 1,5 | 3,1 | 13,5 | 4000 | 85 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3GP 280SMD 2 | 3GGP281240-**M | 2979 | 96 | 96 | 95,3 | 0,85 | 192 | 8,4 | 352 | 2,9 | 3,7 | 1,15 | 725 | 77 |
| 132 | M3GP 280MLA 2 | 3GGP281410-**M | 2979 | 96,2 | 96,2 | 95,6 | 0,87 | 225 | 8,2 | 423 | 3 | 3,5 | 1,4 | 840 | 81 |
| 160 | M3GP 280MLB 2 | 3GGP281420-**M | 2968 | 96,3 | 96,6 | 96,6 | 0,9 | 266 | 6,7 | 515 | 2,4 | 2,6 | 1,55 | 890 | 81 |
| 200 | M3GP 315MLB 2 | 3GGP311420-**M | 2983 | 96,5 | 96,8 | 96,7 | 0,9 | 333 | 6,8 | 640 | 1,9 | 2,6 | 2,2 | 1220 | 77 |
| 250 | M3GP 315LKB 2 | 3GGP311820-**M | 2982 | 96,5 | 96,8 | 96,8 | 0,91 | 413 | 7,9 | 800 | 2,5 | 2,7 | 2,9 | 1540 | 77 |
| 315 | M3GP 315LKC 2 | 3GGP311830-**M | 2981 | 96,5 | 96,6 | 96,2 | 0,89 | 528 | 8,8 | 1009 | 3,2 | 3,2 | 3,3 | 1630 | 78 |

# Technical data

## IE4 Ex ec cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 30 | M3GP 200MLA 4 | 3GGP202410-**M | 1486 | 94,9 | 94,9 | 94,3 | 0,76 | 59,8 | 8,7 | 194 | 4,1 | 4,2 | 0,369 | 304 | 63 |
| 37 | M3GP 225SMA 4 | 3GGP222210-**M | 1480 | 95,2 | 95,7 | 95,6 | 0,84 | 66,8 | 7,5 | 239 | 3,1 | 3,2 | 0,536 | 383 | 66 |
| 45 | M3GP 225SMC 4 | 3GGP222230-**M | 1484 | 95,4 | 95,7 | 95,5 | 0,82 | 83,4 | 8,5 | 289,6 | 3,63 | 3,78 | 0,607 | 433 | 66 |
| 55 | M3GP 250SMA 4 | 3GGP252210-**M | 1483 | 95,7 | 95,8 | 95,4 | 0,83 | 100 | 7,8 | 354 | 3,3 | 3,6 | 0,933 | 467 | 67 |
| 75 | M3GP 280SMC 4 | 3GGP282230-**M | 1487 | 96 | 96,4 | 96,1 | 0,86 | 130 | 7,8 | 481 | 2,8 | 2,9 | 1,85 | 725 | 72 |
| 90 | M3GP 280MLA 4 | 3GGP282410-**M | 1489 | 96,1 | 96,5 | 96,4 | 0,85 | 160 | 8,8 | 577 | 3,4 | 3,2 | 2,3 | 840 | 72 |
| 110 | M3GP 315SMC 4 | 3GGP312230-**M | 1491 | 96,3 | 96,5 | 96,1 | 0,85 | 194 | 7,8 | 704 | 2,4 | 3,1 | 2,9 | 1000 | 68 |
| 132 | M3GP 315SMD 4 | 3GGP312240-**M | 1490 | 96,4 | 96,6 | 96,2 | 0,85 | 234 | 7,9 | 846 | 2,6 | 3,2 | 3,2 | 1065 | 68 |
| 160 | M3GP 315MLB 4 | 3GGP312420-**M | 1490 | 96,6 | 96,8 | 96,4 | 0,86 | 278 | 7,9 | 1026 | 2,7 | 3 | 3,9 | 1220 | 68 |
| 200 | M3GP 355SMA 4 | 3GGP352210-**M | 1491 | 96,7 | 96,8 | 96,4 | 0,87 | 345 | 7,3 | 1282 | 2,1 | 2,7 | 5,9 | 1610 | 74 |
| 250 | M3GP 355SMB 4 | 3GGP352220-**M | 1491 | 96,7 | 96,8 | 96,5 | 0,87 | 433 | 7,8 | 1601 | 2,5 | 2,9 | 6,9 | 1780 | 74 |
| 315 | M3GP 355SMC 4 | 3GGP352230-**M | 1490 | 96,7 | 96,8 | 96,5 | 0,86 | 554 | 7,4 | 2017 | 2,4 | 2,9 | 7,2 | 1820 | 74 |
| 355 | M3GP 355MLA 4 | 3GGP352410-**M | 1491 | 96,7 | 96,9 | 96,5 | 0,87 | 616 | 7,9 | 2274 | 2,7 | 2,9 | 8,4 | 2140 | 78 |
| 400 | M3GP 355MLB 4 | 3GGP352420-**M | 1490 | 96,7 | 96,7 | 96,4 | 0,85 | 700 | 6,8 | 2563 | 2,1 | 2,8 | 8,4 | 2140 | 78 |
| 450 | M3GP 355MLC 4 | 3GGP352430-**M | 1489 | 96,7 | 96,8 | 96,5 | 0,86 | 779 | 6,8 | 2886 | 2,4 | 2,8 | 8,4 | 2140 | 78 |
| 500 | M3GP 355LKA 4 | 3GGP352810-**M | 1490 | 96,7 | 96,7 | 96,1 | 0,86 | 865 | 6,8 | 3204 | 2 | 3 | 10 | 2500 | 78 |
| 560 | M3GP 400LA 4 | 3GGP402510-**M | 1491 | 96,7 | 96,7 | 96,3 | 0,85 | 982 | 7,4 | 3586 | 2,4 | 2,8 | 15 | 3200 | 78 |
| 630 | M3GP 400LB 4 | 3GGP402520-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,86 | 1091 | 7,6 | 4034 | 2,2 | 2,9 | 16 | 3300 | 78 |
| 800 | M3GP 450LA 4 | 3GGP452510-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,86 | 1388 | 7 | 5121 | 1,3 | 2,8 | 23 | 4050 | 85 |
| 900 | M3GP 450LB 4 | 3GGP452520-**M | 1491 | 96,7 | 96,5 | 96 | 0,85 | 1575 | 7 | 5761 | 1,3 | 2,8 | 25 | 4050 | 85 |
| 1000 | M3GP 450LC 4 | 3GGP452530-**M | 1491 | 96,7 | 96,7 | 96,1 | 0,86 | 1724 | 6,8 | 6404 | 1,3 | 2,7 | 30 | 4350 | 85 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3GP 280MLB 4 | 3GGP282420-**M | 1489 | 96,3 | 96,3 | 95,7 | 0,8 | 205 | 8,8 | 706 | 4 | 4 | 2,5 | 890 | 75 |
| 132 | M3GP 280MLC 4 | 3GGP282430-**M | 1489 | 96,4 | 96,4 | 95,8 | 0,8 | 247 | 8,3 | 846 | 3,5 | 4,1 | 2,5 | 890 | 75 |
| 200 | M3GP 315LKB 4 | 3GGP312820-**M | 1490 | 96,7 | 96,9 | 96,8 | 0,87 | 346 | 7,6 | 1282 | 2,5 | 2,9 | 5 | 1480 | 74 |
| 250 | M3GP 315LKC 4 | 3GGP312830-**M | 1490 | 96,7 | 96,9 | 96,8 | 0,87 | 432 | 7,8 | 1601 | 2,3 | 3 | 5,5 | 1600 | 74 |
| 315 | M3GP 315LKE 4 | 3GGP312850-**M | 1488 | 96,7 | 97 | 97 | 0,84 | 558 | 7,3 | 2029 | 2,5 | 3,1 | 4,6 | 1540 | 72 |

# Technical data

## IE4 Ex ec cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class**
**BIE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$ A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 18.5 | M3GP 200MLA 6 | 3GGP203410-**M | 991 | 93,4 | 93,7 | 93,2 | 0,8 | 35,7 | 8,1 | 178 | 3 | 3,6 | 0,531 | 306 | 63 |
| 22 | M3GP 200MLC 6 | 3GGP203430-**M | 990 | 93,7 | 93,7 | 93,2 | 0,77 | 44,3 | 8,6 | 212 | 3 | 3,83 | 0,545 | 311 | 63 |
| 30 | M3GP 225SMA 6 | 3GGP223210-**M | 988 | 94,2 | 94,5 | 94,1 | 0,78 | 59,2 | 7,3 | 290 | 3 | 3,4 | 0,813 | 369 | 63 |
| 37 | M3GP 250SMA 6 | 3GGP253210-**M | 992 | 94,5 | 94,9 | 94,8 | 0,76 | 74 | 8,6 | 357 | 3,7 | 3,7 | 1,49 | 457 | 63 |
| 45 | M3GP 280SMB 6 | 3GGP283220-**M | 992 | 94,8 | 95,1 | 94,6 | 0,85 | 80,9 | 7,5 | 434 | 2,4 | 2,6 | 2,2 | 680 | 65 |
| 55 | M3GP 280SMC 6 | 3GGP283230-**M | 990 | 95,1 | 95,4 | 95,1 | 0,85 | 99,4 | 6,8 | 506 | 2,4 | 2,6 | 2,85 | 725 | 65 |
| 75 | M3GP 315SMC 6 | 3GGP313230-**M | 994 | 95,4 | 95,6 | 95,2 | 0,83 | 138 | 7 | 721 | 2,2 | 2,8 | 4,9 | 1000 | 67 |
| 90 | M3GP 315SMD 6 | 3GGP313240-**M | 994 | 95,6 | 95,8 | 95,4 | 0,81 | 170 | 7,2 | 864 | 2,4 | 2,9 | 4,9 | 1040 | 67 |
| 110 | M3GP 315MLB 6 | 3GGP313420-**M | 994 | 95,8 | 96 | 95,8 | 0,83 | 202 | 6,9 | 1057 | 2,3 | 2,7 | 6,3 | 1200 | 68 |
| 132 | M3GP 315LKA 6 | 3GGP313810-**M | 993 | 96 | 96,2 | 96 | 0,82 | 243 | 6,9 | 1269 | 2,4 | 2,7 | 7,3 | 1410 | 68 |
| 160 | M3GP 355SMB 6 | 3GGP353220-**M | 995 | 96,2 | 96,2 | 95,7 | 0,82 | 294 | 7 | 1536 | 2,1 | 2,7 | 9,7 | 1680 | 73 |
| 200 | M3GP 355SMC 6 | 3GGP353230-**M | 995 | 96,3 | 96,5 | 96,1 | 0,82 | 367 | 7,3 | 1920 | 2,3 | 2,8 | 11,3 | 1820 | 73 |
| 250 | M3GP 355MLB 6 | 3GGP353420-**M | 995 | 96,5 | 96,7 | 96,6 | 0,83 | 456 | 7,1 | 2399 | 2,3 | 2,7 | 13,5 | 2180 | 73 |
| 315 | M3GP 355LKA 6 | 3GGP353810-**M | 994 | 96,6 | 96,7 | 96,5 | 0,83 | 576 | 6,9 | 3026 | 2,3 | 2,6 | 15,5 | 2500 | 76 |
| 355 | M3GP 355LKB 6 | 3GGP353820-**M | 995 | 96,6 | 96,6 | 96 | 0,81 | 668 | 7,7 | 3407 | 2,7 | 2,9 | 16,5 | 2600 | 76 |
| 400 | M3GP 400LA 6 | 3GGP403510-**M | 994 | 96,6 | 96,7 | 96,3 | 0,8 | 747 | 7,5 | 3843 | 2,8 | 3,1 | 17 | 2900 | 76 |
| 400 | M3GP 400LKA 6 | 3GGP403810-**M | 994 | 96,6 | 96,7 | 96,3 | 0,8 | 747 | 7,5 | 3843 | 2,8 | 3,1 | 17 | 2900 | 76 |
| 450 | M3GP 400LB 6 | 3GGP403520-**M | 995 | 96,6 | 96,5 | 95,7 | 0,81 | 830 | 8,3 | 4319 | 3,4 | 3,6 | 22 | 3300 | 76 |
| 450 | M3GP 400LKB 6 | 3GGP403820-**M | 995 | 96,6 | 96,5 | 95,7 | 0,81 | 830 | 8,3 | 4319 | 3,4 | 3,6 | 22 | 3300 | 76 |
| 500 | M3GP 400LC 6 | 3GGP403530-**M | 995 | 96,6 | 96,5 | 95,9 | 0,82 | 911 | 7,8 | 4799 | 3,2 | 3,4 | 22 | 3300 | 76 |
| 560 | M3GP 400LD 6 | 3GGP403540-**M | 993 | 96,6 | 96,6 | 96,1 | 0,85 | 984 | 7,4 | 5386 | 2,4 | 2,8 | 24 | 3400 | 77 |
| 630 | M3GP 450LA 6 | 3GGP453510-**M | 995 | 96,6 | 96,6 | 95,9 | 0,82 | 1146 | 7,5 | 6046 | 1,4 | 3,2 | 31 | 4150 | 81 |
| 710 | M3GP 450LB 6 | 3GGP453520-**M | 995 | 96,6 | 96,7 | 96,2 | 0,85 | 1244 | 7 | 6814 | 1,3 | 2,5 | 37 | 4500 | 81 |
| 800 | M3GP 450LC 6 | 3GGP453530-**M | 995 | 96,6 | 96,6 | 96,1 | 0,84 | 1415 | 7,2 | 7677 | 1,3 | 2,7 | 41 | 4800 | 81 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$ A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 75 | M3GP 280SMD 6 | 3GGP283240-**M | 990 | 95,4 | 95,7 | 95,5 | 0,81 | 141 | 7 | 726 | 2,8 | 2,8 | 2,5 | 730 | 65 |
| 160 | M3GP 315LKC 6 | 3GGP313830-**M | 994 | 96,2 | 96,4 | 96,3 | 0,82 | 297 | 7,4 | 1537 | 2,7 | 2,9 | 9,2 | 1600 | 68 |
| 200 | M3GP 315LKE 6 | 3GGP313850-**M | 993 | 96,3 | 96,5 | 96,2 | 0,81 | 372 | 7 | 1923 | 2,2 | 2,8 | 9,2 | 1600 | 76 |

# Technical data

## IE3 Ex ec cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.37 | M3GP 71MC 2 | 3GGP071330-**K | 2743 | 73,8 | 74,4 | 71,7 | 0,76 | 0,94 | 4,9 | 1,26 | 2,33 | 2,81 | 0,00088 | 10 | 58 |
| 0.55 | M3GP 71ME 2 | 3GGP071350-**K | 2755 | 77,8 | 79,6 | 78,8 | 0,83 | 1,25 | 6,8 | 1,9 | 2,8 | 3,1 | 0,00045 | 11 | 56 |
| 0.75 | M3GP 80MD 2 | 3GGP081340-**K | 2872 | 80,7 | 81,1 | 79,4 | 0,87 | 1,51 | 6,2 | 2,43 | 2,88 | 3,43 | 0,0012 | 18 | 57 |
| 1.1 | M3GP 80MG 2 | 3GGP081370-**K | 2862 | 82,7 | 83,7 | 82,8 | 0,87 | 2,1 | 6,3 | 3,65 | 3,03 | 3,5 | 0,0014 | 19 | 60 |
| 1.5 | M3GP 90LB 2 | 3GGP091520-**K | 2892 | 84,2 | 85,3 | 84,5 | 0,89 | 2,7 | 7,3 | 4,8 | 1,97 | 3,24 | 0,0031 | 31 | 69 |
| 2.2 | M3GP 90LC 2 | 3GGP091530-**K | 2900 | 85,9 | 86,7 | 85,7 | 0,89 | 4 | 9,1 | 7,27 | 3,35 | 4,09 | 0,0044 | 35 | 64 |
| 3 | M3GP 100LKA 2 | 3GGP101810-**K | 2907 | 87,1 | 87,6 | 86,5 | 0,89 | 5,4 | 8,8 | 9,9 | 3,25 | 4,32 | 0,0086 | 50 | 68 |
| 4 | M3GP 112MG 2 | 3GGP111370-**K | 2882 | 88,1 | 89,7 | 90,3 | 0,93 | 7 | 8,1 | 13,3 | 2,8 | 3,6 | 0,0132 | 56 | 70 |
| 5.5 | M3GP 132SMF 2 | 3GGP131260-**K | 2902 | 89,2 | 89,9 | 89,4 | 0,9 | 9,7 | 7,3 | 18,2 | 2,72 | 3,6 | 0,0218 | 77 | 67 |
| 7.5 | M3GP 132SMG 2 | 3GGP131270-**K | 2907 | 90,1 | 91 | 91 | 0,9 | 13,2 | 8,1 | 24,7 | 2,66 | 3,74 | 0,0218 | 77 | 70 |
| 11 | M3GP 160MLA 2 | 3GGP161410-**K | 2943 | 91,2 | 91,7 | 91,3 | 0,92 | 18,7 | 8,1 | 35,6 | 2,7 | 3,4 | 0,052 | 141 | 69 |
| 15 | M3GP 160MLB 2 | 3GGP161420-**K | 2943 | 91,9 | 92,8 | 92,6 | 0,92 | 25,4 | 8,4 | 48,6 | 3,1 | 3,4 | 0,062 | 170 | 69 |
| 18.5 | M3GP 160MLC 2 | 3GGP161430-**K | 2942 | 92,4 | 93 | 92,8 | 0,93 | 30,8 | 8,3 | 60 | 3,1 | 3,6 | 0,072 | 183 | 69 |
| 22 | M3GP 180MLA 2 | 3GGP181410-**K | 2957 | 92,7 | 93,2 | 93 | 0,91 | 37,4 | 8,1 | 71 | 2,6 | 3,2 | 0,116 | 234 | 69 |
| 30 | M3GP 200MLA 2 | 3GGP201410-**K | 2958 | 93,3 | 93,7 | 93,6 | 0,9 | 51 | 7,8 | 96,8 | 2,8 | 3,1 | 0,196 | 289 | 77 |
| 37 | M3GP 200MLB 2 | 3GGP201420-**K | 2960 | 93,7 | 94,1 | 93,9 | 0,86 | 65,5 | 8,8 | 119 | 3,1 | 3,4 | 0,217 | 314 | 72 |
| 45 | M3GP 225SMA 2 | 3GGP221210-**K | 2972 | 94 | 94,2 | 93,8 | 0,89 | 76,8 | 7,8 | 144 | 3,1 | 3 | 0,323 | 409 | 74 |
| 55 | M3GP 250SMA 2 | 3GGP251210-**K | 2975 | 94,3 | 94,5 | 94,1 | 0,89 | 93,6 | 8 | 176 | 2,8 | 3,3 | 0,579 | 452 | 75 |
| 75 | M3GP 280SMB 2 | 3GGP281220-**K | 2980 | 94,7 | 94,7 | 94 | 0,87 | 129 | 7,8 | 240 | 2,5 | 3,3 | 0,9 | 665 | 77 |
| 90 | M3GP 280SMC 2 | 3GGP281230-**K | 2981 | 95 | 94,8 | 94,1 | 0,88 | 153 | 8 | 288 | 2,95 | 3,1 | 1,15 | 725 | 77 |
| 110 | M3GP 315SMB 2 | 3GGP311220-**K | 2982 | 95,2 | 95,2 | 94,3 | 0,88 | 189 | 6,7 | 352 | 1,9 | 2,6 | 1,4 | 940 | 77 |
| 132 | M3GP 315SMC 2 | 3GGP311230-**K | 2986 | 95,4 | 95,5 | 95,1 | 0,88 | 226 | 7,9 | 422 | 2,4 | 3 | 1,7 | 1025 | 77 |
| 160 | M3GP 315MLA 2 | 3GGP311410-**K | 2983 | 95,6 | 95,9 | 95,6 | 0,9 | 268 | 7,3 | 512 | 2,2 | 2,7 | 2,1 | 1190 | 77 |
| 200 | M3GP 355SMA 2 | 3GGP351210-**K | 2985 | 95,8 | 95,5 | 94,5 | 0,89 | 336 | 7,6 | 640 | 2 | 3,1 | 3 | 1600 | 83 |
| 250 | M3GP 355SMB 2 | 3GGP351220-**K | 2983 | 95,8 | 96 | 95,5 | 0,9 | 415 | 7,6 | 800 | 2,2 | 3 | 3,4 | 1680 | 83 |
| 315 | M3GP 355SMC 2 | 3GGP351230-**K | 2984 | 95,8 | 95,8 | 95,1 | 0,89 | 533 | 7,8 | 1008 | 2,3 | 2,8 | 3,6 | 1750 | 83 |
| 355 | M3GP 355MLA 2 | 3GGP351410-**K | 2981 | 95,8 | 96,1 | 95,7 | 0,9 | 595 | 7,5 | 1137 | 2,3 | 2,6 | 4,1 | 2000 | 83 |
| 400 | M3GP 355MLB 2 | 3GGP351420-**K | 2982 | 95,8 | 95,6 | 94,7 | 0,88 | 677 | 7,1 | 1280 | 2,3 | 2,9 | 4,1 | 2000 | 83 |
| 450 | M3GP 355MLC 2 | 3GGP351430-**K | 2983 | 95,8 | 95,8 | 95 | 0,9 | 743 | 7,9 | 1440 | 2,2 | 2,9 | 4,3 | 2080 | 83 |
| 500 | M3GP 355LKA 2 | 3GGP351810-**K | 2982 | 95,8 | 95,8 | 95,3 | 0,9 | 827 | 7,5 | 1601 | 2 | 3,9 | 4,8 | 2320 | 83 |
| 560 | M3GP 400LA 2 | 3GGP401510-**K | 2988 | 95,8 | 95,8 | 94,9 | 0,89 | 934 | 7,8 | 1789 | 2,46 | 3,67 | 7,9 | 2950 | 82 |
| 560 | M3GP 355LKB 2 | 3GGP351820-**K | 2983 | 95,8 | 95,8 | 95,1 | 0,9 | 925 | 8 | 1792 | 2,2 | 4,1 | 5,2 | 2460 | 83 |
| 630 | M3GP 400LB 2 | 3GGP401520-**K | 2987 | 95,8 | 95,5 | 94,8 | 0,89 | 1049 | 7,6 | 2014 | 2,56 | 3,7 | 8,2 | 3050 | 82 |
| 710 | M3GP 400LC 2 | 3GGP401530-**K | 2987 | 95,8 | 95,7 | 94,9 | 0,89 | 1178 | 7,2 | 2270 | 2,56 | 3,4 | 9,3 | 3300 | 82 |
| 800 | M3GP 450LA 2 | 3GGP451510-**K | 2990 | 95,8 | 95,5 | 94,5 | 0,87 | 1362 | 7,8 | 2555 | 1,26 | 3,39 | 12,2 | 4000 | 85 |
| 900 | M3GP 450LB 2 | 3GGP451520-**K | 2990 | 95,8 | 95,5 | 94,7 | 0,87 | 1534 | 7,6 | 2874 | 1,49 | 3,09 | 13,5 | 4200 | 85 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3GP 315MLB 2 | 3GGP311420-**K | 2983 | 96,4 | 96,7 | 96,6 | 0,9 | 333 | 6,8 | 640 | 1,9 | 2,6 | 2,2 | 1220 | 77 |
| 250 | M3GP 315LKB 2 | 3GGP311820-**K | 2982 | 95,8 | 96,2 | 96,2 | 0,91 | 413 | 7,9 | 800 | 2,5 | 2,7 | 2,9 | 1540 | 77 |

# Technical data

## IE3 Ex ec cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.25 | M3GP 71MD 4 | 3GGP072340-**K | 1416 | 73,5 | 75,1 | 73,8 | 0,8 | 0,6 | 4,8 | 1,68 | 2 | 2,6 | 0,0009 | 11 | 45 |
| 0.37 | M3GP 71MLE 4 | 3GGP072450-**K | 1432 | 77,3 | 77,4 | 74,5 | 0,76 | 0,9 | 5,8 | 2,46 | 2,7 | 3,3 | 0,00122 | 15 | 45 |
| 0.55 | M3GP 80MLD 4 | 3GGP082440-**K | 1439 | 80,8 | 82,2 | 81,4 | 0,81 | 1,18 | 6,3 | 3,6 | 2,3 | 3,29 | 0,0028 | 20 | 45 |
| 0.75 | M3GP 80MLG 4 | 3GGP082470-**K | 1445 | 82,5 | 83,5 | 82,2 | 0,79 | 1,62 | 6,9 | 4,97 | 2,6 | 3,76 | 0,0033 | 22 | 57 |
| 1.1 | M3GP 90LC 4 | 3GGP092530-**K | 1444 | 84,1 | 84,6 | 83,2 | 0,79 | 2,3 | 7,2 | 7,28 | 3,64 | 4,2 | 0,0067 | 33 | 56 |
| 1.5 | M3GP 90LD 4 | 3GGP092540-**K | 1439 | 85,3 | 86,4 | 85,9 | 0,78 | 3,1 | 7,8 | 9,95 | 3,35 | 4,47 | 0,0072 | 34 | 56 |
| 2.2 | M3GP 100LKA 4 | 3GGP102810-**K | 1452 | 86,7 | 87,8 | 87,7 | 0,83 | 4,2 | 8,9 | 14,46 | 3,4 | 4,1 | 0,0146 | 49 | 56 |
| 3 | M3GP 100LKB 4 | 3GGP102820-**K | 1452 | 87,7 | 89 | 89 | 0,83 | 5,8 | 9 | 19,7 | 3,2 | 4 | 0,0146 | 49 | 58 |
| 4 | M3GP 112MG 4 | 3GGP112370-**K | 1454 | 88,6 | 89,2 | 88,3 | 0,75 | 8,7 | 6,9 | 26,3 | 3,1 | 3,3 | 0,0176 | 52 | 59 |
| 5.5 | M3GP 132SMF 4 | 3GGP132260-**K | 1462 | 89,6 | 90,6 | 90,6 | 0,81 | 10,8 | 7,3 | 35,87 | 2,41 | 3,39 | 0,0401 | 81 | 67 |
| 7.5 | M3GP 132SMG 4 | 3GGP132270-**K | 1457 | 90,4 | 91,4 | 91,5 | 0,81 | 14,8 | 7,3 | 49,1 | 2,39 | 3,38 | 0,0401 | 81 | 64 |
| 11 | M3GP 160MLA 4 | 3GGP162410-**K | 1473 | 91,4 | 91,8 | 91,3 | 0,84 | 20,4 | 7,7 | 71,3 | 2,6 | 2,9 | 0,108 | 188 | 62 |
| 15 | M3GP 160MLB 4 | 3GGP162420-**K | 1474 | 92,1 | 92,7 | 92,4 | 0,84 | 27,8 | 7,9 | 97,1 | 2,8 | 3,3 | 0,125 | 187 | 62 |
| 18.5 | M3GP 180MLA 4 | 3GGP182410-**K | 1481 | 92,6 | 92,9 | 92,3 | 0,82 | 34,9 | 7,6 | 119 | 3 | 3,1 | 0,217 | 235 | 62 |
| 22 | M3GP 180MLB 4 | 3GGP182420-**K | 1480 | 93 | 93,5 | 93,2 | 0,82 | 41,5 | 8,2 | 141 | 2,8 | 3,1 | 0,217 | 235 | 62 |
| 30 | M3GP 200MLA 4 | 3GGP202410-**K | 1484 | 93,6 | 93,8 | 93,2 | 0,84 | 54,6 | 8,3 | 193 | 3 | 3,3 | 0,366 | 319 | 63 |
| 37 | M3GP 225SMA 4 | 3GGP222210-**K | 1482 | 93,9 | 94,6 | 94,5 | 0,86 | 65,4 | 7,7 | 238 | 2,8 | 3,1 | 0,536 | 398 | 66 |
| 45 | M3GP 225SMB 4 | 3GGP222220-**K | 1482 | 94,2 | 94,7 | 94,6 | 0,85 | 80,2 | 7,9 | 289 | 2,8 | 3,2 | 0,536 | 398 | 66 |
| 55 | M3GP 250SMA 4 | 3GGP252210-**K | 1485 | 94,6 | 95,2 | 94,9 | 0,85 | 97,8 | 7,9 | 353 | 3 | 3,3 | 0,933 | 476 | 67 |
| 75 | M3GP 280SMB 4 | 3GGP282220-**K | 1486 | 95 | 95,4 | 95,3 | 0,85 | 134 | 7,4 | 482 | 2,5 | 2,8 | 1,5 | 665 | 72 |
| 90 | M3GP 280SMC 4 | 3GGP282230-**K | 1487 | 95,2 | 95,5 | 95,1 | 0,85 | 161 | 7,9 | 578 | 2,9 | 3 | 1,85 | 725 | 72 |
| 110 | M3GP 315SMC 4 | 3GGP312230-**K | 1491 | 95,4 | 95,7 | 95,2 | 0,85 | 194 | 7,8 | 704 | 2,4 | 3,1 | 2,9 | 1000 | 68 |
| 132 | M3GP 315SMD 4 | 3GGP312240-**K | 1490 | 95,6 | 95,8 | 95,4 | 0,85 | 234 | 7,9 | 846 | 2,6 | 3,2 | 3,2 | 1065 | 68 |
| 160 | M3GP 315MLB 4 | 3GGP312420-**K | 1490 | 95,8 | 96 | 95,6 | 0,86 | 278 | 7,9 | 1026 | 2,7 | 3 | 3,9 | 1220 | 68 |
| 200 | M3GP 355SMA 4 | 3GGP352210-**K | 1491 | 96 | 96,1 | 95,7 | 0,87 | 345 | 7,3 | 1282 | 2,1 | 2,7 | 5,9 | 1610 | 74 |
| 250 | M3GP 355SMB 4 | 3GGP352220-**K | 1491 | 96 | 96,1 | 95,9 | 0,87 | 433 | 7,8 | 1601 | 2,5 | 2,9 | 6,9 | 1780 | 74 |
| 315 | M3GP 355SMC 4 | 3GGP352230-**K | 1490 | 96 | 96,1 | 95,9 | 0,85 | 554 | 7,4 | 2017 | 2,4 | 2,9 | 7,2 | 1820 | 74 |
| 355 | M3GP 355MLA 4 | 3GGP352410-**K | 1491 | 96 | 96,3 | 95,9 | 0,87 | 616 | 7,9 | 2274 | 2,7 | 2,9 | 8,4 | 2140 | 78 |
| 400 | M3GP 355MLB 4 | 3GGP352420-**K | 1489 | 96 | 96 | 95,5 | 0,85 | 705 | 6,8 | 2565 | 2,3 | 2,6 | 8,4 | 2140 | 78 |
| 450 | M3GP 355MLC 4 | 3GGP352430-**K | 1490 | 96 | 96,1 | 95,6 | 0,86 | 780 | 6,9 | 2884 | 2,3 | 2,9 | 8,4 | 2140 | 78 |
| 500 | M3GP 355LKA 4 | 3GGP352810-**K | 1490 | 96 | 96 | 95,3 | 0,86 | 865 | 6,8 | 3204 | 2 | 3 | 10 | 2500 | 78 |
| 560 | M3GP 400LA 4 | 3GGP402510-**K | 1491 | 96 | 96 | 95,4 | 0,85 | 982 | 7,4 | 3586 | 2,4 | 2,8 | 15 | 3200 | 78 |
| 630 | M3GP 400LB 4 | 3GGP402520-**K | 1491 | 96 | 96 | 95,4 | 0,86 | 1077 | 7,6 | 4034 | 2,2 | 2,9 | 16 | 3300 | 78 |
| 680 | M3GP 400LC 4 | 3GGP402530-**K | 1491 | 96 | 96 | 95,4 | 0,85 | 1206 | 7,7 | 4354 | 2,5 | 3,1 | 17 | 3400 | 78 |
| 800 | M3GP 450LA 4 | 3GGP452510-**K | 1491 | 96 | 96 | 95,4 | 0,86 | 1396 | 7 | 5121 | 1,3 | 2,8 | 23 | 4050 | 85 |
| 900 | M3GP 450LB 4 | 3GGP452520-**K | 1492 | 96 | 95,9 | 95,2 | 0,86 | 1573 | 7 | 5761 | 1,3 | 2,8 | 25 | 4350 | 85 |
| 1000 | M3GP 450LC 4 | 3GGP452530-**K | 1491 | 96 | 96 | 95,3 | 0,86 | 1724 | 6,8 | 6404 | 1,3 | 2,7 | 30 | 4700 | 85 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3GP 315LKB 4 | 3GGP312820-**K | 1490 | 96,6 | 96,8 | 96,7 | 0,87 | 346 | 7,6 | 1282 | 2,5 | 2,9 | 5 | 1480 | 74 |
| 250 | M3GP 315LKC 4 | 3GGP312830-**K | 1490 | 96 | 96,2 | 96,1 | 0,87 | 432 | 7,8 | 1601 | 2,3 | 3 | 5,5 | 1600 | 74 |

# Technical data

## IE3 Ex ec cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.18 | M3GP 71ME 6 | 3GGP073350-**K | 887 | 63,9 | 63,3 | 57,6 | 0,74 | 0,57 | 3,2 | 1,9 | 1,9 | 2,2 | 0,0009 | 10 | 45 |
| 0.25 | M3GP 80MA 6 | 3GGP083310-**K | 937 | 68,6 | 67,3 | 61,9 | 0,64 | 0,76 | 2,6 | 2,52 | 2,8 | 3,4 | 0,0019 | 14 | 47 |
| 0.37 | M3GP 80MD 6 | 3GGP083340-**K | 930 | 73,5 | 74,3 | 72 | 0,68 | 1 | 4,6 | 3,75 | 2,8 | 3,2 | 0,0028 | 16 | 47 |
| 0.55 | M3GP 80MLG 6 | 3GGP083470-**K | 937 | 77,2 | 77,9 | 76,1 | 0,63 | 1,56 | 4,4 | 5,6 | 2,8 | 3,2 | 0,0044 | 21 | 60 |
| 0.75 | M3GP 90LG 6 | 3GGP093570-**K | 938 | 78,9 | 80,4 | 79,7 | 0,74 | 1,8 | 4,8 | 7,7 | 2,42 | 2,73 | 0,0072 | 34 | 44 |
| 1.1 | M3GP 100LKG 6 | 3GGP103870-**K | 969 | 81 | 81,1 | 79 | 0,68 | 2,6 | 5,9 | 10,9 | 1,99 | 2,18 | 0,0025 | 47 | 49 |
| 1.5 | M3GP 112MH 6 | 3GGP113380-**K | 972 | 82,5 | 82,2 | 79,6 | 0,64 | 3,8 | 7 | 14,7 | 2,66 | 4,45 | 0,0196 | 53 | 66 |
| 2.2 | M3GP 132SMC 6 | 3GGP133230-**K | 978 | 84,3 | 84,4 | 82,7 | 0,69 | 5,1 | 5,4 | 21,5 | 1,96 | 2,6 | 0,0416 | 81 | 57 |
| 3 | M3GP 132SMD 6 | 3GGP133240-**K | 977 | 85,6 | 85,9 | 84,3 | 0,69 | 6,9 | 5,9 | 29 | 1,9 | 3,3 | 0,0416 | 82 | 57 |
| 4 | M3GP 132SMG 6 | 3GGP133270-**K | 974 | 86,8 | 87,4 | 86,6 | 0,69 | 9,3 | 5,6 | 38,7 | 1,8 | 2,84 | 0,0416 | 82 | 57 |
| 5.5 | M3GP 132SMH 6 | 3GGP133280-**K | 966 | 88 | 88,9 | 88,7 | 0,73 | 12,1 | 5 | 54,1 | 1,83 | 2,7 | 0,0654 | 79 | 57 |
| 7.5 | M3GP 160MLA 6 | 3GGP163410-**K | 980 | 89,1 | 89,9 | 89,3 | 0,78 | 15,2 | 7,9 | 73 | 1,7 | 2,8 | 0,114 | 172 | 59 |
| 11 | M3GP 160MLB 6 | 3GGP163420-**K | 979 | 90,3 | 90,9 | 90,2 | 0,74 | 23,5 | 8,5 | 107 | 2,2 | 3,9 | 0,131 | 198,7 | 59 |
| 15 | M3GP 180MLA 6 | 3GGP183410-**K | 981 | 91,2 | 91,5 | 90,4 | 0,77 | 30,4 | 5,5 | 146 | 1,7 | 2,7 | 0,225 | 234 | 59 |
| 18.5 | M3GP 200MLA 6 | 3GGP203410-**K | 990 | 91,7 | 92,1 | 91,4 | 0,77 | 37,3 | 7,5 | 178 | 2,6 | 3,2 | 0,448 | 291 | 63 |
| 22 | M3GP 200MLB 6 | 3GGP203420-**K | 990 | 92,2 | 92,6 | 91,9 | 0,79 | 43 | 7,8 | 212 | 2,6 | 3,2 | 0,531 | 318 | 63 |
| 30 | M3GP 225SMA 6 | 3GGP223210-**K | 989 | 92,9 | 93,5 | 93,3 | 0,81 | 56,8 | 7,9 | 289 | 2,8 | 3,1 | 0,813 | 392 | 63 |
| 37 | M3GP 250SMA 6 | 3GGP253210-**K | 991 | 93,3 | 93,8 | 93,6 | 0,83 | 68 | 7,7 | 356 | 2,7 | 2,9 | 1,49 | 467 | 63 |
| 45 | M3GP 280SMB 6 | 3GGP283220-**K | 992 | 93,7 | 94,1 | 93,5 | 0,85 | 80,9 | 7,5 | 434 | 2,4 | 2,6 | 2,2 | 680 | 65 |
| 55 | M3GP 280SMC 6 | 3GGP283230-**K | 990 | 94,1 | 94,4 | 94,1 | 0,85 | 99,4 | 6,8 | 506 | 2,4 | 2,6 | 2,85 | 725 | 65 |
| 75 | M3GP 315SMC 6 | 3GGP313230-**K | 994 | 94,6 | 94,8 | 94,4 | 0,83 | 138 | 7 | 721 | 2,2 | 2,8 | 4,9 | 1000 | 67 |
| 90 | M3GP 315SMD 6 | 3GGP313240-**K | 994 | 94,9 | 95,1 | 94,7 | 0,81 | 170 | 7,2 | 864 | 2,4 | 2,9 | 4,9 | 1040 | 67 |
| 110 | M3GP 315MLB 6 | 3GGP313420-**K | 994 | 95,1 | 95,3 | 95,1 | 0,83 | 202 | 6,9 | 1058 | 2,3 | 2,7 | 6,3 | 1200 | 68 |
| 132 | M3GP 315LKA 6 | 3GGP313810-**K | 993 | 95,4 | 95,6 | 95,4 | 0,82 | 243 | 6,9 | 1269 | 2,4 | 2,7 | 7,3 | 1410 | 68 |
| 160 | M3GP 355SMB 6 | 3GGP353220-**K | 995 | 95,6 | 95,6 | 95 | 0,82 | 294 | 7 | 1536 | 2,1 | 2,7 | 9,7 | 1680 | 73 |
| 200 | M3GP 355SMC 6 | 3GGP353230-**K | 995 | 95,8 | 96 | 95,6 | 0,82 | 367 | 7,3 | 1920 | 2,3 | 2,8 | 11,3 | 1820 | 73 |
| 250 | M3GP 355MLB 6 | 3GGP353420-**K | 995 | 95,8 | 96 | 95,9 | 0,83 | 456 | 7,1 | 2399 | 2,3 | 2,7 | 13,5 | 2180 | 73 |
| 315 | M3GP 355LKA 6 | 3GGP353810-**K | 994 | 95,8 | 96 | 95,6 | 0,83 | 576 | 6,9 | 3026 | 2,3 | 2,6 | 15,5 | 2500 | 76 |
| 355 | M3GP 355LKB 6 | 3GGP353820-**K | 995 | 95,8 | 95,9 | 95,3 | 0,81 | 668 | 7,7 | 3407 | 2,7 | 2,9 | 16,5 | 2600 | 76 |
| 400 | M3GP 400LA 6 | 3GGP403510-**K | 993 | 95,8 | 95,8 | 95,1 | 0,82 | 731 | 7,1 | 3846 | 2,3 | 2,7 | 17 | 2900 | 76 |
| 450 | M3GP 400LB 6 | 3GGP403520-**K | 994 | 95,8 | 95,8 | 95,2 | 0,82 | 819 | 7,4 | 4323 | 2,4 | 2,5 | 20,5 | 3150 | 76 |
| 500 | M3GP 400LC 6 | 3GGP403530-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3300 | 76 |
| 500 | M3GP 400LKC 6 | 3GGP403830-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3300 | 76 |
| 560 | M3GP 400LD 6 | 3GGP403540-**K | 993 | 95,8 | 95,8 | 95,2 | 0,85 | 984 | 7,4 | 5386 | 2,4 | 2,8 | 24 | 3400 | 77 |
| 630 | M3GP 450LA 6 | 3GGP453510-**K | 994 | 95,8 | 95,9 | 95,3 | 0,84 | 1127 | 6,5 | 6053 | 1,1 | 2,5 | 31 | 4150 | 81 |
| 710 | M3GP 450LB 6 | 3GGP453520-**K | 995 | 95,8 | 95,9 | 95,3 | 0,85 | 1244 | 7 | 6814 | 1,3 | 2,5 | 37 | 4500 | 81 |
| 800 | M3GP 450LC 6 | 3GGP453530-**K | 995 | 95,8 | 95,8 | 95,1 | 0,84 | 1415 | 7,2 | 7677 | 1,3 | 2,7 | 41 | 4800 | 81 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 160 | M3GP 315LKC 6 | 3GGP313830-**K | 994 | 95,6 | 95,8 | 95,7 | 0,82 | 297 | 7,4 | 1537 | 2,7 | 2,9 | 9,2 | 1600 | 68 |

# Technical data

## IE3 Ex ec cast iron motors, 800 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_nA$ | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **800 r/min = 8 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.12 | M3GP 71ME 8 | 3GGP074350-**K | 659 | 50,7 | 48,9 | 41,9 | 0,68 | 0,49 | 2,5 | 1,7 | 1,9 | 2,1 | 0,00107 | 11 | 43 |
| 0.75 | M3GP 100LKA 8 | 3GGP104810-**K | 710 | 75 | 74,5 | 70,5 | 0,65 | 2,13 | 4,4 | 10 | 2,35 | 2,8 | 0,00855 | 37 | 53 |
| 1.1 | M3GP 100LKB 8 | 3GGP104820-**K | 703 | 77,7 | 77,7 | 74,7 | 0,65 | 3,08 | 4,4 | 14,9 | 2,7 | 2,9 | 0,0128 | 45 | 53 |
| 1.5 | M3GP 112MC 8 | 3GGP114330-**K | 717 | 79,7 | 80,1 | 78,8 | 0,62 | 4,12 | 4,3 | 19,9 | 1,8 | 2,6 | 0,0194 | 53 | 55 |
| 2.2 | M3GP 132SMA 8 | 3GGP134210-**K | 725 | 81,9 | 82,3 | 80,2 | 0,64 | 5,8 | 5,2 | 28,9 | 2 | 3 | 0,0291 | 66 | 57 |
| 3 | M3GP 132SMG 8 | 3GGP134270-**K | 723 | 83,5 | 84,1 | 82,8 | 0,66 | 7,5 | 4,8 | 39,6 | 1,8 | 2,8 | 0,0375 | 76 | 57 |
| 4 | M3GP 160MLA 8 | 3GGP164410-**K | 734 | 84,8 | 85,1 | 83,2 | 0,65 | 10,3 | 4,5 | 52 | 1,8 | 2,3 | 0,091 | 148 | 59 |
| 5.5 | M3GP 160MLB 8 | 3GGP164420-**K | 732 | 86,2 | 87,1 | 86,1 | 0,69 | 13 | 5 | 71,7 | 2 | 2,35 | 0,091 | 150 | 59 |
| 7.5 | M3GP 160MLC 8 | 3GGP164430-**K | 733 | 87,3 | 88,2 | 87,2 | 0,69 | 17,6 | 5,1 | 97,7 | 2 | 2,4 | 0,12 | 167 | 59 |
| 11 | M3GP 180MLA 8 | 3GGP184410-**K | 731 | 88,6 | 89,2 | 88,4 | 0,7 | 25,3 | 5 | 143,6 | 2,1 | 2,1 | 0,2 | 219 | 59 |
| 15 | M3GP 200MLA 8 | 3GGP204410-**K | 737 | 89,6 | 90,5 | 90,1 | 0,74 | 32,5 | 5,2 | 194 | 2,1 | 2,4 | 0,45 | 290 | 60 |
| 18.5 | M3GP 225SMA 8 | 3GGP224210-**K | 736 | 90,1 | 90,8 | 90,1 | 0,74 | 39,8 | 5,2 | 240 | 2 | 2,25 | 0,669 | 350 | 63 |
| 22 | M3GP 225SMB 8 | 3GGP224220-**K | 736 | 90,6 | 91,6 | 91,5 | 0,73 | 47,5 | 5,3 | 285 | 2,26 | 2,47 | 0,722 | 363 | 63 |
| 30 | M3GP 250SMA 8 | 3GGP254210-**K | 741 | 91,3 | 91,7 | 91 | 0,71 | 67 | 5,6 | 386 | 2,7 | 2,7 | 1,4 | 440 | 63 |
| 37 | M3GP 280SMA 8 | 3GGP284210-**K | 741 | 91,8 | 92 | 91,3 | 0,79 | 72,6 | 7,3 | 476 | 1,7 | 3 | 1,85 | 605 | 65 |
| 45 | M3GP 280SMB 8 | 3GGP284220-**K | 741 | 92,2 | 92,3 | 91,7 | 0,78 | 89,2 | 7,6 | 579 | 1,8 | 3,1 | 2,2 | 645 | 65 |
| 55 | M3GP 315SMA 8 | 3GGP314210-**K | 742 | 92,5 | 93,1 | 92,5 | 0,8 | 106 | 7,1 | 707 | 1,6 | 2,7 | 3,2 | 830 | 62 |
| 75 | M3GP 315SMB 8 | 3GGP314220-**K | 741 | 93,1 | 93,2 | 93,1 | 0,82 | 146 | 7,1 | 966 | 1,7 | 2,7 | 4,1 | 930 | 62 |
| 90 | M3GP 315SMC 8 | 3GGP314230-**K | 741 | 93,4 | 93,7 | 93,4 | 0,82 | 170 | 7,4 | 1159 | 1,8 | 2,7 | 4,9 | 1000 | 64 |
| 110 | M3GP 315MLA 8 | 3GGP314410-**K | 740 | 93,7 | 94 | 94,1 | 0,83 | 211 | 7,3 | 1419 | 1,8 | 2,7 | 5,8 | 1150 | 72 |
| 132 | M3GP 355SMA 8 | 3GGP354210-**K | 744 | 94 | 93,9 | 93,4 | 0,79 | 256 | 7,5 | 1694 | 1,5 | 2,6 | 7,9 | 1520 | 69 |
| 160 | M3GP 355SMB 8 | 3GGP354220-**K | 744 | 94,3 | 94,3 | 93,8 | 0,79 | 293 | 7,6 | 2053 | 1,6 | 2,6 | 9,7 | 1680 | 69 |
| 200 | M3GP 355SMC 8 | 3GGP354230-**K | 742 | 94,6 | 95 | 94,8 | 0,79 | 385 | 7,4 | 2576 | 1,6 | 2,6 | 11,3 | 1820 | 69 |
| 250 | M3GP 355MLB 8 | 3GGP354420-**K | 743 | 94,6 | 94,7 | 94,1 | 0,8 | 472 | 7,5 | 3213 | 1,6 | 2,7 | 13,5 | 2180 | 72 |
| 315 | M3GP 400LA 8 | 3GGP404510-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 2900 | 71 |
| 315 | M3GP 400LKA 8 | 3GGP404810-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 2900 | 71 |
| 355 | M3GP 400LB 8 | 3GGP404520-**K | 743 | 94,6 | 94,9 | 94,6 | 0,83 | 641 | 6,8 | 4562 | 1,2 | 2,5 | 21 | 3200 | 71 |
| 400 | M3GP 400LC 8 | 3GGP404530-**K | 744 | 94,6 | 94,9 | 94,3 | 0,81 | 735 | 6 | 5134 | 1,3 | 2,7 | 24 | 3400 | 71 |
| 450 | M3GP 450LA 8 | 3GGP454510-**K | 744 | 94,6 | 95 | 94,6 | 0,83 | 813 | 6 | 5775 | 1 | 2,5 | 26 | 3750 | 80 |
| 500 | M3GP 450LB 8 | 3GGP454520-**K | 744 | 94,6 | 94,7 | 94,5 | 0,83 | 902 | 6,4 | 6417 | 1 | 2,6 | 29 | 4000 | 80 |
| 560 | M3GP 450LC 8 | 3GGP454530-**K | 744 | 94,6 | 94,9 | 94,2 | 0,81 | 1038 | 7 | 7188 | 1,2 | 2,9 | 35 | 4350 | 80 |
| 630 | M3GP 450LD 8 | 3GGP454540-**K | 745 | 94,6 | 94,8 | 94 | 0,82 | 1162 | 7,6 | 8075 | 1,3 | 3,2 | 41 | 4800 | 80 |

# Variant codes

## Increased safety cast iron motors, Ex ec IIC T3 Gc

Variant codes specify additional options and features to the standard motor. The desired features are listed as three-digit variant codes in the motor order. Note also that there are variants that cannot be used together.

Most of the variant codes apply to IE2 and IE3 motors. However, confirm the availability of variants for IE motors with your ABB sales office before making an order.

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| **Administration** | | | | | | | | | | | | | | | | | |
| 529 | Customer witnessed visual inspection of complete order line. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 530 | Two-year extension on standard warranty | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 531 | Sea freight packing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 533 | Wooden sea freight packing | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 590 | Mounting of customer supplied part other than coupling. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 648 | Rating plate in special language | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 999 | Case specific design requiring a quotation | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Balancing | | | | | | | | | | | | | | | | | |
| 417 | Vibration acc. to Grade B (IEC 60034-14). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 423 | Balanced without key. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 424 | Full-key balancing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Bearings and Lubrication** | | | | | | | | | | | | | | | | | |
| 194 | 2Z bearings greased for life at both ends. | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | - | - | - | - | - |
| 433 | Outlet grease collector | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 506 | Nipples for vibration measurement : SKF Marlin Quick Connect stud CMSS-2600-3 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 593 | Bearings grease suitable for food and beverage industry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 654 | Provision for vibration sensors (M8x1) | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 795 | Lubrication information plate | - | - | - | - | - | - | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| 796 | Grease nipples JIS B 1575 PT 1/8 Type A | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 797 | Stainless steel SPM nipples | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 798 | Stainless steel grease nipples | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 799 | Grease nipples flat type DIN 3404, thread M10x1 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 800 | Grease nipples JIS B 1575 PT 1/8" pin type | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 036 | Transport lock for bearings. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 037 | Roller bearing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 040 | Heat-resistant grease | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 043 | SPM compatible nipples for vibration measurement | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| 058 | Angular contact bearing at D-end, shaft force away from bearing. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 059 | Angular contact bearing at N-end, shaft force towards bearing. | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● |
| 060 | Angular contact bearing at D-end, shaft force towards bearing. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 061 | Angular contact bearing at N-end, shaft force away from bearing. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 107 | Pt100 2-wire in bearings. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 128 | Double PT100, 2-wire in bearings | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 129 | Double PT100, 3-wire in bearings | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 130 | Pt100 3-wire in bearings. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 188 | 63-series bearing in D-end | ● | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| **Branch standard designs** | | | | | | | | | | | | | | | | | |
| 178 | Stainless steel / acid proof bolts. | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 204 | Jacking bolts for foot mounted motors. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ |
| 209 | Non-standard voltage or frequency, (special winding). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 396 | Motor designed for minimum ambient temperature -20 °C to -40 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 397 | Motor designed for minimum ambient temperature -40 °C to -55 °C, with space heaters (code 450/451 must be added) | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 398 | Motor designed for minimum ambient temperature -20 °C to -40 °C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 399 | Motor designed for minimum ambient temperature -40 °C to -55 °C | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 425 | Corrosion protected stator and rotor core. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 524 | Special run-out tolerances on flange and shaft for close coupled pump applications. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 786 | Special design shaft upwards (V3, V35, V6) for outdoor mounting. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| **Cooling system** | | | | | | | | | | | | | | | | | |
| 044 | Unidirectional fan for reduced noise level. Rotation clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 045 | Unidirectional fan for reduced noise level. Rotation counter clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 068 | Light alloy metal fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 183 | Separate motor cooling (fan axial, N-end). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 206 | Steel fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 514 | Separate motor cooling (fan on top) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● |
| 791 | Stainless steel fan cover | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Coupling** | | | | | | | | | | | | | | | | | |
| 035 | Assembly of customer supplied coupling-half. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Documentation** | | | | | | | | | | | | | | | | | |
| 141 | Binding 2D main dimension drawing. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 370 | Motor model drawing in 3D | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 374 | Binding 2D motor detailed drawing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 536 | Photos of manufactured motors | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 537 | Advanced data sheet | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 722 | Rotor dimension drawing (incl. torsional stiffness). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 777 | Premium documentation package | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Drain holes** | | | | | | | | | | | | | | | | | |
| 065 | Plugged existing drain holes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 448 | Draining holes with metal plugs. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Earthing Bolt** | | | | | | | | | | | | | | | | | |
| 525 | External earthing bolts on motor feet | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Hazardous Environments** | | | | | | | | | | | | | | | | | |
| 334 | Ex t, Dust group III B T125C Db, IP6X (non-conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 335 | Ex t, Dust group III B T125C Dc, IP5X (non-conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 336 | Ex t, Dust group III C T125 Db, IP6X (conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 337 | Ex t, Dust group III C T125 Dc, IP6X (conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 338 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIB T125C Dc (non-conductive dust), IP5X. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 339 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIC T125C Dc (conductive dust), IP6X. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 516 | Temperature detectors approved to be connected to an Ex i circuit | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 807 | UL certified Class 1, Div.2 Group A, B, C and D, T3. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 810 | UL certified Class II, Div. 2 Group F and G, T4. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 813 | Thermistor-based surface temperature protection T4 for frequency converter duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 814 | Ex t (DIP) motors, temperature class T 150C. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Heating elements** | | | | | | | | | | | | | | | | | |
| 450 | Heating element, 100-120 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 451 | Heating element, 200 - 240 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Insulation system** | | | | | | | | | | | | | | | | | |
| 014 | Winding insulation class H. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 405 | Special winding insulation for frequency converter supply. | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 406 | Winding insulation for supply > 690 <= 1000 volts | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Marine** | | | | | | | | | | | | | | | | | |
| 024 | Fulfilling Bureau Veritas (BV) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 025 | Fulfilling DNV requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 026 | Fulfilling Lloyds Register of Shipping (LR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 027 | Fulfilling American Bureau of Shipping (ABS) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 050 | Fulfilling Registro Italiano Navale (RINA) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 096 | Fulfilling Lloyds Register of Shipping (LR) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 186 | Fulfilling DNV requirements, without certificate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 481 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 483 | Fulfilling China Classification Societies (CCS) requirements (Beijing), with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 484 | Fulfilling Korea Register of Shipping (KR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 491 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 492 | Fulfilling Registro Italiano Navale (RINA) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 493 | Fulfilling China Classification Societies (CCS) requirements (Beijing), without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 494 | Fulfilling Korea Register of Shipping (KR) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 496 | Fulfilling Bureau Veritas (BV) requirements, without certificate(non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 675 | Fulfilling American Bureau of Shipping (ABS) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mounting arrangements** | | | | | | | | | | | | | | | | | |
| 008 | IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3). | ● | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 009 | IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 047 | IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5). | ● | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 066 | Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 235 | Flange FF 165. | - | ○ | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 236 | Flange FT 165. | - | - | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 305 | Additional lifting lugs. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Painting** | | | | | | | | | | | | | | | | | |
| 105 | Paint thickness report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 114 | Special paint color, standard grade | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 115 | Painting system C4,durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 168 | Primer paint only. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 303 | Painted insulation layer on inside of the terminal boxes. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 710 | Norsok M-501 rev. 7 Coating system no. 2B | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 711 | Painting system C5, durability High | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 712 | Painting system C5-M according to Petrobras specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 713 | Painting system according Total Egina specification. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 717 | Painting system C4, durability High | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 719 | Painting system CX | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 754 | Painting system C5, durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 755 | Norsok M-501 revision 6, Coating system no. 1 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Protection** | | | | | | | | | | | | | | | | | |
| 005 | Protective roof | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 072 | Radial seal at D-end. Not possible for 2-pole , 280 and 315 frames | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| 073 | Sealed against oil at D-end. | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | - | - | - |
| 158 | Degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 250 | Degree of protection IP66 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 401 | Protective roof, horizontal motor. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 403 | Degree of protection IP56. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 434 | Degree of protection IP56, open deck. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 783 | Labyrinth sealing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| **Rating & instruction plates** | | | | | | | | | | | | | | | | | |
| 002 | Restamping voltage, frequency and output, continuous duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 004 | Additional text on std rating plate (max 12 digits on free text line). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 095 | Restamping output (maintained voltage, frequency), intermittent duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 126 | Tag plate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 135 | Mounting of additional identification plate, stainless. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 139 | Additional identification plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 159 | Additional plate with text "Made in ...." | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 160 | Additional rating plate affixed. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 161 | Additional rating plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 163 | Frequency converter rating plate. Rating data according to quotation. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 181 | Rating plate with ABB standard loadability values for VSD operation. Other auxiliaries for VSD operation to be selected as necessary. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 332 | Baldor Catalogue # | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 333 | Not for use in the USA | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 528 | Rating plate sticker | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Shaft & rotor** | | | | | | | | | | | | | | | | | |
| 069 | Two shaft extensions according to catalog drawings. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 070 | Special shaft extension at D-End, standard shaft material | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 155 | Cylindrical shaft extension, D-end, without key-way. | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● |
| 164 | Shaft extension with closed keyway | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 165 | Shaft extension with open keyway | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | - | - |
| 410 | Shaft material stainless steel | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 591 | Special shaft extension according to customer specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 600 | Special shaft extension at N-end, standard shaft material. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 630 | Shaft material certificate 3.1/3.2 according to EN10204:2004 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Standards and Regulations** | | | | | | | | | | | | | | | | | |
| 331 | Motor not for sale for use in EU or UK. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 381 | Frame agreement betw. ABB and Shell according to Shell DEP 33.66.05.31-GEN February 2018 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 421 | VIK design (Verband der Industriellen Energie- und Kraftwirtschaft e.V.). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 509 | Fulfilling US Integral Horsepower Motor Rule (IHP). | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 523 | Neste Rotterdam design. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 535 | NBR IR3 design | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 540 | Fulfilling energy efficiency requirements for China | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 541 | Inmetro certification | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 543 | Australian MEPS | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 544 | Australian HE MEPS | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 551 | IA certificate of conformity for South Africa | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 558 | Saudi Arabian MEPS (SASO) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 586 | Fulfilling UK Conformity Assessment (UKCA) requirements. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 599 | EQM – Emirates Quality Mark | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 682 | CCC Ex certificate for China | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 758 | Saudi Aramco design. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 803 | PESO/CCoE certificate for India | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 811 | JIP-33 standard design | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 827 | Petrobras N-2919 Specification design | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 841 | Shell DEP 33.66.05.31-GEN February 2022 | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| **Stator winding temperature sensors** | | | | | | | | | | | | | | | | | |
| 328 | PTC - thermistors (3 in series), 120ºC, in stator winding | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 435 | PTC - thermistors (3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 439 | PTC - thermistors (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 441 | PTC - thermistors (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 445 | Pt100 2-wire in stator winding, 1 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 446 | Pt100 2-wire in stator winding, 2 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 502 | Pt100 3-wire in stator winding, 1 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 503 | Pt100 3-wire in stator winding, 2 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 511 | PTC thermistors (2 x 3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| **Terminal box** | | | | | | | | | | | | | | | | | |
| 019 | Larger than standard terminal box. | ● | ● | ● | ● | ● | ● | - | - | - | - | - | ● | ● | ● | ● | - |
| 021 | Terminal box LHS (seen from D-end). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 022 | Cable entry LHS (seen from D-end). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 157 | Terminal box degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 180 | Terminal box RHS (seen from D-end). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 230 | Standard metal cable gland. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 292 | Adapter C-C | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - |
| 293 | Adapter D-D | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - |
| 294 | Adapter E-D | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● |
| 295 | Adapter E-2D | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ○ | - |
| 296 | Adapter E-3D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● |
| 351 | Terminal block turned according to cable entry | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 380 | Separate terminal box for temperature detectors, std. material | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 400 | 4 x 90 degr turnable terminal box. | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - |
| 413 | Extended cable connection, no terminal box. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 418 | Separate terminal box for auxiliaries, standard material. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 466 | Terminal box at N-end. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 468 | Cable entry from D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 469 | Cable entry from N-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 553 | Terminal box degree of protection IP66. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 554 | Cast iron flange for cable glands drilled and tapped according to order. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 557 | Nickel plated cable glands mounted according to order. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 565 | Adapter for terminal box on the side (RHS) | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | - | - |
| 566 | Adapter for terminal box on the side (LHS) | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | - | - |
| 567 | Separate terminal box material: cast Iron | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 568 | Separate terminal box for heating elements, std. material | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 624 | Prepared for inch cable glands according to BSPP standard. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 727 | Stainless steel flange for cable glands drilled and tapped according to order. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 730 | Prepared for NPT cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 731 | Two standard metal cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 734 | Standard cable gland, Ex d IIC, armoured cable. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 735 | Standard cable gland, Ex d IIC, non-armoured cable. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 741 | Motor equipped with Ex eb terminal box (IEC/EN 60079-7). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 743 | Non-drilled cast iron flange for cable glands | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 744 | Stainless steel non-drilled flange for cable glands. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 745 | Painted cast iron flange equipped with nickel plated brass cable glands | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 746 | Stainless steel cable flange equipped with standard nickel plated brass cable glands | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Testing** | | | | | | | | | | | | | | | | | |
| 145 | Type test report from a catalogue motor, 400V 50Hz. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 146 | Type test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 148 | Routine test report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 150 | Customer witnessed testing. Specify test procedure with other codes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 222 | Torque/speed test, type test and multi-point load test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 560 | Shaft voltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 561 | Overspeed test,for one motor from specific delivery batch | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 562 | Overvoltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 760 | Vibration level test | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 761 | Vibration spectrum test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 762 | Noise level test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 763 | Noise spectrum test for one motor from specific delivery batch. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 764 | Test for one motor from specific delivery batch with ABB frequency converter available at ABB test field. ABB standard test procedure. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Variable speed drives** | | | | | | | | | | | | | | | | | |
| 182 | Mounting of non-listed pulse tacho. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 470 | Prepared for hollow shaft pulse tacho (L&L equivalent). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 479 | Mounting of other type of pulse tacho with shaft extension, tacho not included. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 701 | Insulated bearing at N-end. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 704 | EMC cable entry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 747 | 1024 pulse tacho, Ex d, tD, L&L 841910002 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

# Mechanical design

## Motor frame and drain holes

### Motor frame

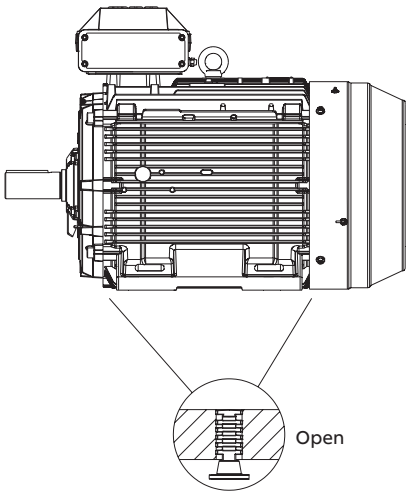
The motor frame, end shields and main terminal box are made of cast iron. Feet are integrated with the frame.

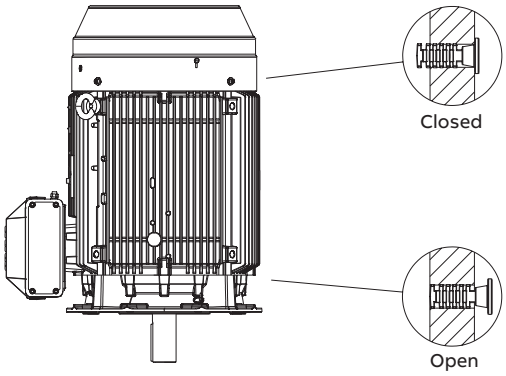
Motors can be supplied for foot mounting, flange mounting, and combinations of these.

### Drain holes

Increased safety motors are provided with drain holes fitted with closable plugs as standard. The plugs are made of plastic material and are delivered in open position.

When mounting arrangement differs from foot mounted IM B3, mention variant code 066 when ordering to ensure the drain plug is mounted in the lowest position.



# Mechanical design

## Lifting lugs

The motors are provided as standard with lifting lugs according to the table below. For improved lifting possibilities can variant code 305 be added, please refer to the variant code section for information about availability.

| Frame size | Type of lugs | Foot mounted motors | Flange mounted motors |
|---|---|---|---|
| 71, 80 | No lugs, weight of motors is less than 25kg | – | – |
| 90–132 | Detachable eye bolt | 2 pcs on top of motor diagonally placed, size M8 | 2 pcs on top of motor diagonally placed, size M8 |
| 160–200 | Integrated in casting / detachable eye bolt | 2 pcs on top of motor diagonally placed, integrated in frame casting | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end. 2 pcs eye bolts size M12 delivered with each motor |
| 225–250 | Integrated in casting / detachable eye bolt | 2 pcs on top of motor diagonally placed, integrated in frame casting | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end. 2 pcs eye bolts size M16 delivered with each motor |
| 280, 315 | Detachable eye bolt | 1 pcs close to terminal box on top, size M24 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M24 delivered with each motor |
| 355 | Detachable eye bolt | 1 pcs close to terminal box on top, size M30 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M30 delivered with each motor |
| 400 | Detachable eye bolt | 1 pcs close to terminal box on top, size M36 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M36 delivered with each motor |
| 450 | Detachable eye bolt | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 3 pcs eye bolts size M42 delivered with each motor | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M42 delivered with each motor |

# Mechanical design

## Heating elements

Heating elements are installed into windings to keep them free of corrosion in humid conditions. The required power of heating elements is shown in the table. You can order heating elements with variant code 450 or 451.

| Motor size | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| Motor size | 200 | 225 | 250 | 280 | 315 | 355 | 400 |
|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 60 | 60 | 60 | 2x60 | 2x60 | 2x60 |

# Mechanical design

## Bearings

ABB's increased safety Ex ec motors are normally fitted with single-row deep-groove grease lubricated ball bearings, as shown in the table below.

If the bearing at the D-end is replaced with a roller bearing (NU- or NJ-), higher radial forces can be handled. Roller bearings are suitable for belt-drive applications and can be ordered with variant code 037.

### Axially-locked bearings

All motors with deep groove ball bearings are equipped with an axially locked bearing at the D-end, as a standard feature.

### Transport locking

Motors with roller bearings or an angular-contact ball bearing are fitted with a transport lock before dispatch to prevent damage to bearings during transport. A warning label is attached to motors when transport locking is used.

When high axial forces are involved, angular-contact ball bearings should be used. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force to ensure that optimal bearing system design is chosen. The variant codes for ordering angular-contact ball bearings are 058 and 059.

Locking may also be fitted in other cases if severe transport conditions are expected.

## Standard and alternative bearing designs

### Standard and alternative designs

| Motor size | Number of poles | Standard design | Alternative designs | | |
|---|---|---|---|---|---|
| | | Deep groove ball bearings | Roller bearings (037) | | Ang. contact ball bearings (058, 059) |
| | | D-end | N-end | D-end | D-end |
| 71 | 2-8 | 6203-2Z/C3 | 6202-2Z/C3 | NA | NA |
| 80 | 2-8 | 6204-2Z/C3 | 6203-2Z/C3 | NA | NA |
| 90 | 2-8 | 6205-2Z/C3 | 6204-2Z/C3 | NA | NA |
| 100 | 2-8 | 6206-2Z/C3 | 6205-2Z/C3 | NA | NA |
| 112 | 2-8 | 6206-2Z/C3 | 6205-2Z/C3 [1] | NA | NA |
| 132 | 2-8 | 6208-2Z/C3 | 6208-2Z/C3 | NA | NA |
| 160 | 2-12 | 6309/C3 | 6209/C3 | NU 309 ECP/C3 | 7309 B |
| 180 | 2-12 | 6310/C3 | 6209/C3 | NU 310 ECP/C3 | 7310 B |
| 200 | 4-12 | 6312/C3 | 6210/C3 | NU 312 ECP/C3 | 7312 B |
| 225 | 4-12 | 6313/C3 | 6212/C3 | NU 313 ECP/C3 | 7313 B |
| 250 | 4-12 | 6315/C3 | 6213/C3 | NU 315 ECP/C3 | 7315 B |
| 280 | 2 | 6316/C3 | 6316/C3 | [2] | 7316 B |
| | 4-12 | 6316/C3 | 6316/C3 | NU 316 ECP/C3 | 7316 B |
| 315 | 2 | 6316/C3 | 6316/C3 | [2] | 7316 B |
| | 4-12 | 6319/C3 | 6316/C3 | NU 319 ECP/C3 | 7319 B |
| 355 | 2 | 6316M/C3 | 6316M/C3 | [2] | 7316 B |
| | 4-12 | 6322/C3 | 6316/C3 | NU 322 ECP/C3 | 7322 B |
| 400 | 2 | 6317M/C3 | 6317M/C3 | [2] | 7317 B |
| | 4-12 | 6324/C3 | 6319/C3 | NU 324 ECP/C3 | 7324 B |
| 450 | 2 | 6317M/C3 | 6317M/C3 | [2] | 7317 B |
| | 4-12 | 6326M/C3 | 6322/C3 | NU 326 ECP/C3 | 7326 B |

[1] N-end bearing 6206-2Z/C3 on IE3 and IE4 motors

[2] On request

## Bearing seals

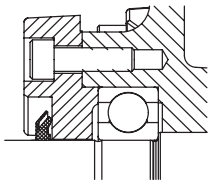
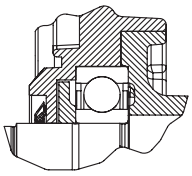
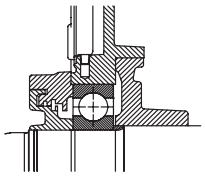
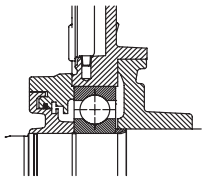
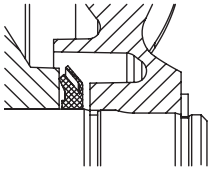
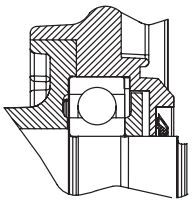
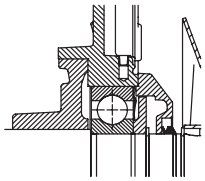
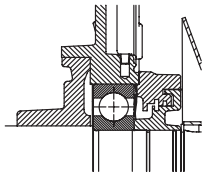
Table below present the standard and alternative and types of bearing seals per motor size.

### Bearing seals

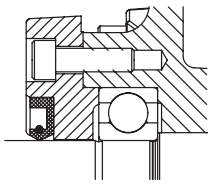
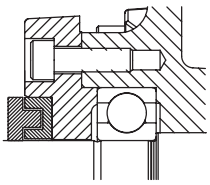
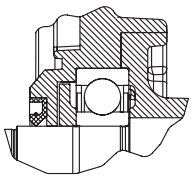
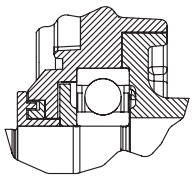
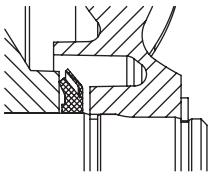
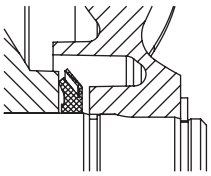
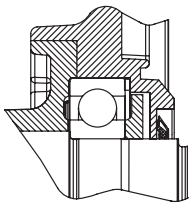
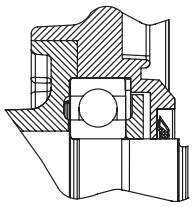
| Motor size | Number of poles | Standard design | | Alternative design | |
|---|---|---|---|---|---|
| | | D-end | N-end | Radial seal at D-end (variant code 072 [1]) | Labyrinth seal at D-end (variant code 783) [1] |
| 71 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 80 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 90 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 100 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 112 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 132 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 160 | 2.elo | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 180 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 200 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 225 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 250 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 280 | 2 | Labyrinth seal | V-ring | NA | Standard |
| | 4 - 8 | V-ring | V-ring | NA | Labyrinth seal |
| 315SM, ML | 2 | Labyrinth seal | V-ring | NA | Standard |
| | 4 - 8 | V-ring | V-ring | NA | Labyrinth seal |
| 315LK | 2- 8 | Labyrinth seal | V-ring | NA | Standard |
| 355 | 2 - 12 | Labyrinth seal | V-ring | NA | Standard |
| 400 | 2 | Labyrinth seal | Labyrinth seal | NA | Standard |
| 400 | 4 - 12 | Labyrinth seal | V-ring | NA | Standard |
| 450 | 2 - 12 | Labyrinth seal | Labyrinth seal | NA | Standard |

[1] N-end bearing seal of standard design, special N-end bearing seal arrangements on request

### Standard design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 71-132, gamma/ gamma seal | 160-250, gamma/ gamma seal | 280, 315 2pole, 335 all pole numbers and 400 4-12 pole, labyrinth/ V-ring seal | 400 2-pole, labyrinth/ labyrinth seal |

### Alternative design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 80-132, VC072 radial/ gamma seals | 80-132, VC783 labyrinth/ gamma seals | 160-250, VC072 radial/ gamma seals | 160-250, VC783 labyrinth/gamma seals |

### Bearing life

The nominal life $L_{10h}$ of a bearing is defined according to ISO 281 as the number of operating hours achieved or exceeded by 90 % of identical bearings in a large test series under specified conditions. 50 % of bearings achieve at least five times this lifetime.

The calculated bearing life $L_{10h}$ for power transmission by means of coupling is for horizontally mounted motors in sizes up to 315 ≥ 100,000 hours.

### Lubrication

On delivery, motors in frame size 160 and above are pre-lubricated with high-quality grease. Before first start-up, see instructions for re-lubrication and recommended grease in the installation, operation, maintenance and safety manual for low voltage motors for explosive atmospheres delivered together with the motor, or see the lubrication plate on the motor.

### Motors with bearings greased for life

Motors in frame sizes 71-132 are equipped with bearings greased for life, while this is available as an option for frame sizes 160-250. Bearings are lubricated with high-quality, high-temperature grease. Bearing types are stated on the rating plate.

The approximate lifetime of bearings in four-pole motors is about 40 0000 duty hours. Lifetime is subject to the load conditions of the application run by the motor.

### Motors with re-lubrication nipples

In frame sizes 160-400, the bearing system is provided with valve discs to ease lubrication. Motors are lubricated while running. The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1-2 hours after re-greasing. This ensures that the construction is tight and bearings remain dust- and dirt-free.

A grease-collection method can be used optionally.

The following tables show lubrication intervals according to the L1 principle for various nominal speeds in 25 °C ambient temperature. These values apply to horizontally mounted motors (B3) with 80 °C bearing temperature and high-quality grease containing lithium-complex soap and mineral or PAO-oil.

## Lubrication intervals

### Lubrication intervals in duty hours for ball bearings

| Frame size | Amount of grease g/ bearing | Amount of grease g/N- end | Speed 3600 r/min | Speed 3000 r/min | Speed 1800 r/min | Speed 1500 r/min | Speed 1000 r/min | Speed 500-900 r/min |
|---|---|---|---|---|---|---|---|---|
| **Ball bearings** | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | |
| 160 | 13 | 13 | 7100 | 8900 | 14300 | 16300 | 20500 | 21600 |
| 180 | 15 | 15 | 6100 | 7800 | 13100 | 15100 | 19400 | 20500 |
| 200 | 20 | 15 | 4300 | 5900 | 11000 | 13000 | 17300 | 18400 |
| 225 | 23 | 20 | 3600 | 5100 | 10100 | 12000 | 16400 | 17500 |
| 250 | 30 | 23 | 2400 | 3700 | 8500 | 10400 | 14700 | 15800 |
| 280 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 280 | 40 | 40 | - | - | 7800 | 9600 | 13 900 | 15 000 |
| 315 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 315 | 55 | 40 | - | - | 5900 | 7600 | 11 800 | 12 900 |
| 355 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 355 | 70 | 40 | - | - | 4000 | 5600 | 9600 | 10 700 |
| 400 | 40 | 40 | 1500 | 2700 | - | - | - | - |
| 400 | 85 | 55 | - | - | 3200 | 4700 | 8600 | 9700 |
| 450 | 95 | 70 | - | - | 2500 | 3900 | 7700 | 8700 |

### Lubrication intervals in duty hours for roller bearings

| Frame size | Amount of grease g/ bearing | Amount of grease g/N- end | Output kW | Speed 3600 r/min | Speed 3000 r/min | Output kW | Speed 1800 r/ min | Speed 1500 r/ min | Output kW | Speed 1000 r/ min | Output kW | Speed 500-900 r/ min |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ball bearings** | | | | | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | | | | | |
| 160 | 13 | 13 | all | 3600 | 4500 | all | all 7200 | 8100 | all | 10300 | all | 10800 |
| 180 | 15 | 15 | | 3000 | 3900 | all | all 6600 | 7500 | all | 9700 | all | 10200 |
| 200 | 20 | 15 | | 2100 | 3000 | all | all 5500 | 6500 | all | 8600 | all | 9200 |
| 225 | 23 | 20 | | 1800 | 1600 | all | all 5100 | 6000 | all | 8200 | all | 8700 |
| 250 | 30 | 23 | | 1200 | 1900 | all | all 4200 | 5200 | all | 7300 | all | 7900 |
| 280 | 40 | 40 | | - | - | all | all 4000 | 5300 | all | 7000 | all | 8500 |
| 315 | 55 | 40 | | - | - | all | all 2900 | 3800 | all | 5900 | all | 6500 |

# Mechanical design

## Radial forces

### Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated with FR as follows:

$$D = \frac{1.9 \cdot 10^7 \cdot K \cdot P}{n \cdot F_R}$$

| Where: | |
|---|---|
| D: | pulley diameter, mm |
| P: | power requirement, kW |
| n: | motor speed, r/min. |
| K: | belt tension factor, dependent on belt type and type of duty. A common value for V-belts is 2.5 |
| $F_R$: | permissible radial force, refer to tables below. |

### Permissible loading on the shaft

The following table shows permissible radial forces on the shaft in Newtons, assuming zero axial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life $L_{10h}$ of 40 000 hours per motor size.

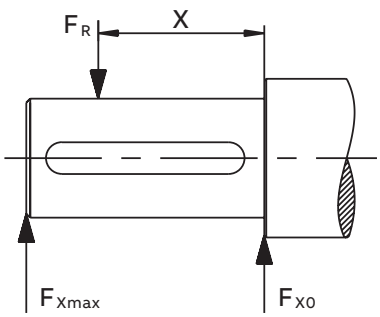
Permissible loads of simultaneous radial and axial forces can be supplied on request.

These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft together with flame path dimensions affects permissible forces.

If the radial force is applied between points X0 and Xmax, the permissible force $F_R$ can be calculated with the following formula:

$$F_R = F_{X0} - \frac{X}{E}(F_{X0} - F_{Xmax})$$

| Where: | |
|---|---|
| E: | length of the shaft extension in the standard version |



## Permissible radial forces

| Motor size | Poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings | | | | Roller bearings | | Roller bearings | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | | | | |
| | | | Ball bearings | | | | | | | |
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 71 | 2 | 30 | 540 | 460 | 420 | 360 | 1285 | 650 | 1040 | 650 |
| | 4 | 30 | 700 | 605 | 555 | 480 | 1615 | 650 | 1310 | 650 |
| | 6 | 30 | 780 | 665 | 620 | 530 | 1640 | 650 | 1450 | 650 |
| | 8 | 30 | 860 | 730 | 685 | 580 | 1640 | 600 | 1580 | 650 |
| 80 | 2 | 40 | 710 | 600 | 385 | 350 | 1910 | 865 | 1555 | 865 |
| | 4 | 40 | 940 | 810 | 725 | 625 | 2335 | 865 | 1945 | 865 |
| | 6 | 40 | 1060 | 895 | 840 | 710 | 2335 | 865 | 2160 | 865 |
| | 8 | 40 | 1185 | 1020 | 940 | 810 | 2335 | 865 | 2335 | 865 |
| 90 | 2 | 50 | 820 | 690 | 650 | 545 | 2205 | 1330 | 1790 | 1330 |
| | 4 | 50 | 1035 | 870 | 820 | 690 | 2715 | 1330 | 2205 | 1330 |
| | 6 | 50 | 1185 | 995 | 940 | 790 | 3054 | 1330 | 2490 | 1330 |
| | 8 | 50 | 1300 | 1095 | 1035 | 870 | 3340 | 1330 | 2715 | 1330 |
| 100 | 2 | 60 | 1130 | 925 | 900 | 735 | 2905 | 1900 | 2360 | 1900 |
| | 4 | 60 | 1425 | 1165 | 1135 | 925 | 3575 | 1900 | 2905 | 1900 |
| | 6 | 60 | 1635 | 1335 | 1295 | 1060 | 4040 | 1900 | 3280 | 1900 |
| | 8 | 60 | 1820 | 1520 | 1445 | 1205 | 4460 | 1900 | 3620 | 1900 |
| 112 | 2 | 60 | 1170 | 980 | 925 | 775 | 3000 | 1970 | 2435 | 1970 |
| | 4 | 60 | 1475 | 1235 | 1170 | 980 | 3695 | 1970 | 3000 | 1970 |
| | 6 | 60 | 1690 | 1310 | 1340 | 1120 | 4170 | 1970 | 3390 | 1970 |
| | 8 | 60 | 1860 | 1310 | 1475 | 1235 | 4450 | 1970 | 3695 | 1970 |
| 132 | 2 | 80 | 1840 | 1500 | 1460 | 1190 | 4255 | 3465 | 3455 | 2815 |
| | 4 | 80 | 2320 | 1890 | 1840 | 1500 | 5240 | 4265 | 4255 | 3465 |
| | 6 | 80 | 2660 | 2165 | 2110 | 1715 | 5915 | 3680 | 4805 | 3680 |
| | 8 | 80 | 2925 | 2380 | 2320 | 1890 | 6450 | 3680 | 5240 | 3680 |
| 160 MLA | 2 | 110 | 3540 | 2740 | 2955 | 2285 | 7100 | 4300 | 6140 | 4300 |
| | 4 | 110 | 4000 | 3100 | 3325 | 2570 | 8000 | 4300 | 6870 | 4300 |
| | 6 | 110 | 4170 | 3200 | 3440 | 2655 | 8600 | 4300 | 7270 | 4300 |
| | 8 | 110 | 4600 | 3585 | 3855 | 2985 | 9300 | 4300 | 7955 | 4300 |
| 160 MLB | 2 | 110 | 3540 | 2740 | 2955 | 2270 | 7085 | 4300 | 6070 | 4300 |
| | 4 | 110 | 4085 | 3300 | 3370 | 2725 | 8300 | 4300 | 7055 | 4300 |
| | 6 | 110 | 4100 | 3355 | 3400 | 2755 | 8600 | 4300 | 7300 | 4300 |
| | 8 | 110 | 4200 | 3270 | 3455 | 2670 | 9000 | 4300 | 7570 | 4300 |
| 160 MLC | 2 | 110 | 3400 | 2600 | 2855 | 2200 | 6800 | 4300 | 5885 | 4300 |
| | 4 | 110 | 3700 | 3000 | 3070 | 2485 | 7800 | 4300 | 6640 | 4300 |
| | 6 | 110 | 3600 | 2900 | 2870 | 2325 | 8000 | 4300 | 6700 | 4300 |
| | 8 | 110 | 4170 | 3370 | 3370 | 2725 | 9000 | 4300 | 7585 | 4300 |
| 160 MLD | 2 | 110 | 3585 | 2900 | 3000 | 2440 | 7100 | 4300 | 6140 | 4300 |
| | 4 | 110 | 3400 | 2755 | 2755 | 2240 | 7600 | 4300 | 6370 | 4300 |
| 160 MLE | 2 | 110 | 3185 | 2570 | 2640 | 2140 | 6785 | 4300 | 5770 | 4300 |
| 180 MLA | 2 | 110 | 4100 | 3385 | 3455 | 2825 | 8125 | 5500 | 7025 | 5500 |
| | 4 | 110 | 4270 | 3485 | 3525 | 2885 | 8600 | 5500 | 7300 | 5500 |
| | 6 | 110 | 4700 | 3800 | 3855 | 3155 | 9400 | 5500 | 7900 | 5500 |
| | 8 | 110 | 4785 | 3900 | 3870 | 3170 | 9800 | 5500 | 8255 | 5500 |
| 180 MLB | 2 | 110 | 4170 | 3400 | 3470 | 2825 | 7900 | 5500 | 6770 | 5500 |
| | 4 | 110 | 4185 | 3400 | 3440 | 2810 | 8500 | 5500 | 7200 | 5500 |
| | 6 | 110 | 4370 | 3570 | 3525 | 2885 | 9000 | 5500 | 7600 | 5500 |
| 180 MLC | 4 | 110 | 3700 | 3055 | 3010 | 2470 | 7900 | 5500 | 6655 | 5440 |
| 200 MLA | 2 | 110 | 5600 | 4685 | 4700 | 3925 | 10900 | 9100 | 9470 | 7900 |
| | 4 | 110 | 6285 | 5200 | 5240 | 4370 | 12500 | 9550 | 10700 | 8900 |
| | 6 | 110 | 6800 | 5700 | 5700 | 4770 | 13600 | 9550 | 11670 | 9550 |
| | 8 | 110 | 6800 | 5700 | 5600 | 4685 | 14100 | 9550 | 12000 | 9550 |
| 200 MLB | 2 | 110 | 5670 | 4700 | 4700 | 3925 | 11000 | 9200 | 9500 | 7900 |
| | 4 | 110 | 5700 | 4700 | 4700 | 3925 | 12000 | 9550 | 10185 | 8500 |
| | 6 | 110 | 6400 | 5370 | 5300 | 4425 | 13200 | 9550 | 11200 | 9385 |
| 200 MLC | 2 | 110 | 5000 | 4185 | 4185 | 3500 | 10400 | 8700 | 8900 | 7455 |
| | 4 | 110 | 5400 | 4500 | 4425 | 3685 | 11600 | 9550 | 9800 | 8200 |
| | 6 | 110 | 5800 | 4885 | 4740 | 3955 | 12500 | 9550 | 10600 | 8800 |
| 200 MLD | 2 | 110 | 4985 | 4170 | 4170 | 3485 | 10400 | 8700 | 8900 | 7400 |
| 225 SMA | 2 | 110 | 6400 | 5400 | 5355 | 4500 | 13300 | 10700 | 11500 | 9700 |
| | 4 | 140 | 7300 | 5900 | 6155 | 4970 | 15400 | 10250 | 13200 | 10250 |
| | 6 | 140 | 7600 | 6200 | 6370 | 5140 | 16400 | 10250 | 14000 | 10250 |
| | 8 | 140 | 8500 | 6900 | 7100 | 5725 | 17900 | 10250 | 15300 | 10250 |

| Motor size | Poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings | | | | Roller bearings | | Roller bearings | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | | | | |
| | | | Ball bearings | | | | | | | |
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 225 SMB | 2 | 110 | 6100 | 5185 | 5155 | 4340 | 13000 | 10700 | 11200 | 9455 |
| | 4 | 140 | 7085 | 5700 | 5885 | 4755 | 15100 | 10250 | 12900 | 10250 |
| | 6 | 140 | 7100 | 5700 | 5840 | 4700 | 16000 | 10250 | 13500 | 10250 |
| | 8 | 140 | 8000 | 6485 | 6600 | 5340 | 17300 | 10250 | 14700 | 10250 |
| 225 SMC | 2 | 110 | 5600 | 4700 | 4685 | 3940 | 12600 | 10600 | 10770 | 9070 |
| | 4 | 140 | 6400 | 5200 | 5300 | 4285 | 14500 | 10250 | 12385 | 10000 |
| 225 SMD | 2 | 110 | 5500 | 4640 | 4600 | 3880 | 12420 | 10460 | 10640 | 8960 |
| | 4 | 140 | 5800 | 4700 | 4725 | 3800 | 13500 | 10250 | 11400 | 9270 |
| 250 SMA | 2 | 140 | 7700 | 6285 | 6500 | 5285 | 17100 | 10900 | 14900 | 10900 |
| | 4 | 140 | 8700 | 7000 | 7300 | 5900 | 19800 | 13800 | 17000 | 13785 |
| | 6 | 140 | 9400 | 7600 | 7800 | 6355 | 21600 | 13800 | 18400 | 13800 |
| | 8 | 140 | 9600 | 7800 | 7900 | 6400 | 22700 | 13800 | 19300 | 13800 |
| 250 SMB | 2 | 140 | 7100 | 5800 | 6000 | 4885 | 16700 | 10900 | 14400 | 10900 |
| | 4 | 140 | 7800 | 6300 | 6470 | 5240 | 18900 | 13800 | 16200 | 13100 |
| | 6 | 140 | 8900 | 7200 | 7355 | 5955 | 21200 | 13800 | 18000 | 13800 |
| 250 SMC | 2 | 140 | 6800 | 5500 | 5670 | 4600 | 16300 | 10900 | 14000 | 10900 |
| | 4 | 140 | 7400 | 6000 | 6055 | 4900 | 18100 | 13800 | 15400 | 12485 |
| | 6 | 140 | 8200 | 6600 | 6670 | 5400 | 20300 | 13800 | 17200 | 13800 |
| 280 SM_ | 2 | 140 | 7300 | 6000 | 5800 | 4900 | 20400 | 6000 | 16500 | 6000 |
| | 4 | 140 | 9200 | 7800 | 7300 | 6200 | 25100 | 9200 | 20300 | 9200 |
| | 6 | 140 | 10600 | 8900 | 8400 | 7000 | 28300 | 9200 | 23000 | 9200 |
| | 8 | 140 | 11700 | 9200 | 9200 | 7800 | 30900 | 9200 | 25100 | 9200 |
| 280 ML_ | 2 | 140 | 7400 | 6200 | 5800 | 5000 | 20600 | 6200 | 16700 | 6200 |
| | 4 | 140 | 9200 | 7900 | 7300 | 6200 | 25000 | 9500 | 20300 | 9500 |
| | 6 | 140 | 10500 | 9000 | 8300 | 7100 | 28300 | 9400 | 22900 | 9400 |
| | 8 | 140 | 11600 | 9500 | 9200 | 7900 | 30800 | 9500 | 25000 | 9500 |
| 315 SM_ | 2 | 140 | 7300 | 6000 | 5800 | 4950 | 20300 | 6000 | 16500 | 6000 |
| | 4 | 170 | 11400 | 9400 | 9000 | 7450 | 32500 | 9600 | 26600 | 9600 |
| | 6 | 170 | 13000 | 9600 | 10300 | 8500 | 37000 | 9600 | 30000 | 9600 |
| | 8 | 170 | 14400 | 9600 | 11400 | 9400 | 40300 | 9600 | 32700 | 9600 |
| 315 ML_ | 2 | 140 | 7400 | 6400 | 5850 | 5050 | 20600 | 5850 | 16700 | 5850 |
| | 4 | 170 | 11500 | 9700 | 9100 | 7650 | 32700 | 13600 | 26500 | 13600 |
| | 6 | 170 | 13200 | 11100 | 10400 | 8800 | 36900 | 13600 | 29900 | 13600 |
| | 8 | 170 | 14500 | 12200 | 11500 | 9700 | 40200 | 13600 | 32600 | 13600 |
| 315 LK_ | 2 | 140 | 7400 | 6550 | 5800 | 5150 | 20800 | 5550 | 16800 | 5550 |
| | 4 | 170 | 11500 | 10000 | 9100 | 7850 | 33100 | 13350 | 26800 | 13350 |
| | 6 | 170 | 13200 | 11400 | 10450 | 9050 | 37300 | 13350 | 30300 | 13350 |
| | 8 | 170 | 14600 | 12600 | 11550 | 10000 | 40800 | 13350 | 33100 | 13350 |
| 355 SM_ | 2 | 140 | 7350 | 6450 | 5750 | 5050 | 20600 | 7200 | 16700 | 7200 |
| | 4 | 210 | 15200 | 12600 | 12000 | 9950 | 45500 | 14000 | 36900 | 14000 |
| | 6 | 210 | 17500 | 14000 | 13800 | 11400 | 51400 | 14000 | 41700 | 14000 |
| | 8 | 210 | 19300 | 14000 | 15250 | 12600 | 56000 | 14000 | 45500 | 14000 |
| 355 ML_ | 2 | 140 | 7350 | 6550 | 5750 | 5100 | 20800 | 6750 | 16800 | 6750 |
| | 4 | 210 | 15300 | 12900 | 12000 | 10100 | 45900 | 13600 | 37200 | 13600 |
| | 6 | 210 | 17600 | 13600 | 13900 | 11600 | 51500 | 13600 | 42100 | 13600 |
| | 8 | 210 | 19400 | 13600 | 15300 | 12900 | 56000 | 13600 | 45900 | 13600 |
| 355 LK_ | 2 | 140 | 7350 | 6650 | 5650 | 5100 | 21000 | 6550 | 17000 | 6550 |
| | 4 | 210 | 15200 | 13000 | 11850 | 10200 | 46000 | 13000 | 37300 | 13000 |
| | 6 | 210 | 17500 | 13000 | 13700 | 11900 | 52000 | 13000 | 42000 | 13000 |
| | 8 | 210 | 19400 | 13000 | 15200 | 13000 | 56500 | 13000 | 46000 | 13000 |
| 400 L_ | 2 | 170 | 7650 | 6850 | 4400 | 3900 | 23900 | 9050 | 19350 | 9050 |
| | 4 | 210 | 15600 | 13550 | 12150 | 10550 | 52500 | 16000 | 43300 | 16000 |
| | 6 | 210 | 17800 | 15450 | 13850 | 12000 | 60000 | 16000 | 48800 | 16000 |
| | 8 | 210 | 19700 | 16000 | 15350 | 13350 | 65700 | 16000 | 53200 | 16000 |
| 400 LK_ | 2 | 170 | 7650 | 6850 | 4400 | 3900 | 23900 | 9050 | 19350 | 9050 |
| | 4 | 210 | 15600 | 11500 | 12150 | 10550 | 52500 | 11500 | 43300 | 11500 |
| | 6 | 210 | 17800 | 11500 | 13850 | 11500 | 60000 | 11500 | 48800 | 11500 |
| | 8 | 210 | 19700 | 11500 | 15350 | 11500 | 65700 | 11500 | 53200 | 11500 |
| 450 L_ | 2 | 170 | 7400 | 6700 | 3500 | 3300 | 24000 | 7500 | 19000 | 7500 |
| | 4 | 210 | 17000 | 15200 | 13000 | 11600 | 62000 | 25000 | 50000 | 25000 |
| | 6 | 210 | 19000 | 17000 | 14000 | 13000 | 70000 | 24000 | 56000 | 24000 |
| | 8 | 210 | 21300 | 19000 | 16500 | 14600 | 76000 | 23000 | 62000 | 23000 |

# Mechanical design

## Axial forces

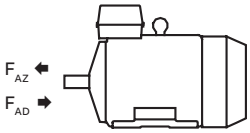
—
01 Mounting arrangement IM B3

01 Mounting arrangement IM V1

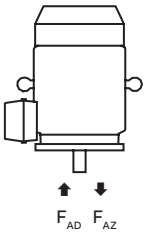
The following tables present permissible axial forces on the shaft in Newtons, assuming zero radial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20,000 and 40,000 hours per motor size.

At 60 Hz, the values must be reduced by 10 percent, and for two-speed motors, the higher speed determines permissible axial force. Permissible loads of simultaneous radial and axial forces can be supplied on request.

For axial force $F_{AD}$, it is assumed that the D-bearing is locked with a locking ring.




01




02

## Permissible axial forces

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | | | Mounting arrangement IM V1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 71 | 2 | 30 | 615 | 285 | 505 | 175 | 630 | 275 | 520 | 165 |
| | 4 | 30 | 760 | 430 | 615 | 285 | 790 | 410 | 645 | 265 |
| | 6 | 30 | 870 | 540 | 695 | 365 | 890 | 525 | 720 | 355 |
| | 8 | 30 | 960 | 630 | 765 | 435 | 985 | 615 | 785 | 415 |
| 80 | 2 | 40 | 880 | 300 | 735 | 155 | 915 | 280 | 770 | 135 |
| | 4 | 40 | 1075 | 495 | 880 | 300 | 1130 | 455 | 935 | 260 |
| | 6 | 40 | 1215 | 635 | 985 | 405 | 1270 | 600 | 1040 | 370 |
| | 8 | 40 | 1330 | 750 | 1070 | 490 | 1400 | 705 | 1140 | 450 |
| 90 | 2 | 50 | 780 | 500 | 620 | 340 | 840 | 455 | 680 | 300 |
| | 4 | 50 | 985 | 705 | 775 | 495 | 1070 | 650 | 860 | 440 |
| | 6 | 50 | 1140 | 860 | 890 | 610 | 1225 | 800 | 975 | 555 |
| | 8 | 50 | 1265 | 985 | 985 | 705 | 1355 | 925 | 1075 | 645 |
| 100 | 2 | 60 | 925 | 570 | 735 | 350 | 1285 | 510 | 1060 | 290 |
| | 4 | 60 | 1480 | 860 | 1190 | 570 | 1600 | 780 | 1305 | 490 |
| | 6 | 60 | 1690 | 1070 | 1350 | 730 | 1815 | 995 | 1470 | 650 |
| | 8 | 60 | 1865 | 1245 | 1480 | 860 | 1995 | 1160 | 1610 | 775 |
| 112 | 2 | 60 | 1155 | 595 | 935 | 375 | 1290 | 505 | 1070 | 280 |
| | 4 | 60 | 1445 | 885 | 1155 | 595 | 1595 | 785 | 1300 | 495 |
| | 6 | 60 | 1655 | 1095 | 1315 | 755 | 1810 | 995 | 1465 | 650 |
| | 8 | 60 | 1830 | 1270 | 1445 | 885 | 1985 | 1170 | 1600 | 780 |
| 132 | 2 | 80 | 1765 | 965 | 1420 | 620 | 1925 | 855 | 1580 | 510 |
| | 4 | 80 | 2210 | 1410 | 1755 | 955 | 2420 | 1270 | 1965 | 815 |
| | 6 | 80 | 2535 | 1735 | 2000 | 1200 | 2770 | 1580 | 2235 | 1045 |
| | 8 | 80 | 2800 | 2000 | 2205 | 1405 | 3055 | 1835 | 2455 | 1235 |
| 160 MLA | 2 | 110 | 2850 | 2850 | 2325 | 2325 | 3100 | 2578 | 2570 | 2048 |
| | 4 | 110 | 3450 | 3450 | 2775 | 2775 | 3820 | 3150 | 3120 | 2450 |
| | 6 | 110 | 3690 | 3690 | 2970 | 2970 | 4100 | 3410 | 3325 | 2635 |
| | 8 | 110 | 4155 | 4155 | 3315 | 3315 | 4440 | 3845 | 3640 | 3045 |
| 160 MLB | 2 | 110 | 2850 | 2850 | 2325 | 2325 | 3120 | 2570 | 2580 | 2030 |
| | 4 | 110 | 3435 | 3435 | 2760 | 2760 | 3880 | 3085 | 3180 | 2385 |
| | 6 | 110 | 3600 | 3600 | 2880 | 2880 | 4120 | 3240 | 3360 | 2480 |
| | 8 | 110 | 3750 | 3750 | 2970 | 2970 | 4140 | 3450 | 3340 | 2650 |
| 160 MLC | 2 | 110 | 2775 | 2775 | 2280 | 2280 | 3080 | 2500 | 2560 | 1980 |
| | 4 | 110 | 3150 | 3150 | 2535 | 2535 | 3620 | 2770 | 2985 | 2135 |
| | 6 | 110 | 3135 | 3135 | 2490 | 2490 | 3680 | 2700 | 3005 | 2025 |
| | 8 | 110 | 3675 | 3675 | 2910 | 2910 | 4240 | 3260 | 3445 | 2465 |
| 160 MLD | 2 | 110 | 2865 | 2865 | 2330 | 2330 | 3220 | 2540 | 2665 | 1985 |
| | 4 | 110 | 2900 | 2900 | 2320 | 2320 | 3420 | 2470 | 2820 | 1870 |
| 160 MLE | 2 | 110 | 2500 | 2500 | 2025 | 2025 | 2900 | 2150 | 2420 | 1670 |
| 180 MLA | 2 | 110 | 3300 | 3300 | 2700 | 2700 | 3660 | 2940 | 3060 | 2340 |
| | 4 | 110 | 3600 | 3600 | 2920 | 2920 | 4160 | 3150 | 3460 | 2450 |
| | 6 | 110 | 4140 | 4140 | 3320 | 3320 | 4800 | 3675 | 3940 | 2815 |
| | 8 | 110 | 4220 | 4220 | 3360 | 3360 | 4960 | 3740 | 4040 | 2820 |
| 180 MLB | 2 | 110 | 3340 | 3340 | 2725 | 2725 | 3760 | 2960 | 3125 | 2320 |
| | 4 | 110 | 3580 | 3580 | 2900 | 2900 | 4220 | 3095 | 3500 | 2375 |
| | 6 | 110 | 3800 | 3800 | 3040 | 3040 | 4500 | 3285 | 3700 | 2485 |
| 180 MLC | 4 | 110 | 3220 | 3220 | 2560 | 2560 | 3880 | 2660 | 3220 | 2000 |
| 200 MLA | 2 | 110 | 4460 | 4460 | 3640 | 3640 | 5000 | 3965 | 4200 | 3125 |
| | 4 | 110 | 5000 | 5260 | 4260 | 4260 | 5000 | 4680 | 5000 | 3640 |
| | 6 | 110 | 5000 | 5480 | 4720 | 4720 | 5000 | 5265 | 5000 | 4065 |
| | 8 | 110 | 5000 | 5880 | 4700 | 4700 | 5000 | 5195 | 5000 | 3955 |
| 200 MLB | 2 | 110 | 4440 | 4440 | 3620 | 3620 | 5000 | 3905 | 4220 | 3085 |
| | 4 | 110 | 4720 | 4720 | 3840 | 3840 | 5000 | 4060 | 4700 | 3120 |
| | 6 | 110 | 5000 | 5480 | 4420 | 4420 | 5000 | 4800 | 5000 | 3660 |
| 200 MLC | 2 | 110 | 3940 | 3940 | 3180 | 3180 | 4600 | 3385 | 3880 | 2665 |
| | 4 | 110 | 4480 | 4480 | 3620 | 3620 | 5000 | 3775 | 4520 | 2875 |
| | 6 | 110 | 4980 | 4980 | 3980 | 3980 | 5000 | 4165 | 5000 | 3105 |
| 200 MLD | 2 | 110 | 3940 | 3940 | 3200 | 3200 | 4660 | 3370 | 3925 | 2635 |
| 225 SMA | 2 | 110 | 4980 | 4980 | 4060 | 4060 | 5000 | 4375 | 4780 | 3455 |
| | 4 | 140 | 5000 | 6080 | 4920 | 4920 | 5000 | 5445 | 5000 | 4225 |
| | 6 | 140 | 5000 | 6520 | 5000 | 5260 | 5000 | 5735 | 5000 | 4395 |
| | 8 | 140 | 5000 | 7420 | 5000 | 5960 | 5000 | 6535 | 5000 | 5095 |

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | | | Mounting arrangement IM V1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 225 SMB | 2 | 110 | 4860 | 4860 | 3960 | 3960 | 5000 | 4245 | 4780 | 3345 |
| | 4 | 140 | 5000 | 5880 | 4780 | 4780 | 5000 | 5175 | 5000 | 3995 |
| | 6 | 140 | 5000 | 6020 | 4840 | 4840 | 5000 | 5155 | 5000 | 3915 |
| | 8 | 140 | 5000 | 6940 | 5000 | 5560 | 5000 | 6055 | 5000 | 4635 |
| 225 SMC | 2 | 110 | 4380 | 4380 | 3540 | 3540 | 5000 | 3670 | 4440 | 2900 |
| | 4 | 140 | 5000 | 5240 | 4260 | 4260 | 5000 | 4445 | 5000 | 3425 |
| 225 SMD | 2 | 110 | 4320 | 4320 | 3480 | 3480 | 5000 | 3590 | 4400 | 2790 |
| | 4 | 140 | 4800 | 4800 | 3820 | 3820 | 5000 | 3895 | 5000 | 2935 |
| 250 SMA | 2 | 140 | 6000 | 6080 | 4920 | 4920 | 6000 | 5345 | 5840 | 4225 |
| | 4 | 140 | 6000 | 7140 | 5820 | 5820 | 6000 | 6300 | 6000 | 4920 |
| | 6 | 140 | 6000 | 7880 | 6000 | 6380 | 6000 | 6950 | 6000 | 5350 |
| | 8 | 140 | 6000 | 8200 | 6000 | 6600 | 6000 | 7125 | 6000 | 5385 |
| 250 SMB | 2 | 140 | 5620 | 5620 | 4540 | 4540 | 6000 | 4830 | 5640 | 3810 |
| | 4 | 140 | 6000 | 6320 | 5100 | 5100 | 6000 | 5325 | 6000 | 4085 |
| | 6 | 140 | 6000 | 7480 | 6000 | 6040 | 6000 | 6370 | 6000 | 4830 |
| 250 SMC | 2 | 140 | 5260 | 5260 | 4220 | 4220 | 6000 | 4395 | 5400 | 3415 |
| | 4 | 140 | 5960 | 5960 | 4760 | 4760 | 6000 | 4900 | 6000 | 3700 |
| | 6 | 140 | 6000 | 6860 | 5520 | 5520 | 6000 | 5575 | 6000 | 4135 |
| 280 SM_ | 2 | 140 | 6200 | 4250 | 4900 | 2900 | 7550 | 3150 | 6200 | 1800 |
| | 4 | 140 | 8000 | 6000 | 6250 | 4250 | 9600 | 4550 | 7800 | 2750 |
| | 6 | 140 | 7250 | 9250 | 7150 | 5150 | 11150 | 5500 | 9000 | 3350 |
| | 8 | 140 | 10300 | 8300 | 7950 | 5950 | 12200 | 7000 | 9850 | 4700 |
| 280 ML_ | 2 | 140 | 6100 | 4100 | 4800 | 2800 | 8150 | 2750 | 6800 | 1400 |
| | 4 | 140 | 7800 | 5800 | 6000 | 4000 | 10450 | 4050 | 8650 | 2250 |
| | 6 | 140 | 8950 | 6950 | 6900 | 4900 | 12350 | 4750 | 10250 | 2600 |
| | 8 | 140 | 10000 | 8000 | 7700 | 5700 | 13450 | 5800 | 11050 | 3450 |
| 315 SM_ | 2 | 140 | 6180 | 4200 | 4850 | 2850 | 7950 | 2600 | 6600 | 1300 |
| | 4 | 170 | 9400 | 7400 | 7250 | 5250 | 11750 | 5500 | 9550 | 3300 |
| | 6 | 170 | 10900 | 8900 | 8350 | 6350 | 13600 | 6300 | 11050 | 3750 |
| | 8 | 170 | 12000 | 10000 | 9200 | 7000 | 15350 | 7900 | 12450 | 5000 |
| 315 ML_ | 2 | 140 | 6050 | 4050 | 4750 | 2750 | 8650 | 2300 | 7300 | [1] |
| | 4 | 170 | 9250 | 7250 | 7100 | 5100 | 12500 | 5050 | 10300 | 2900 |
| | 6 | 170 | 10650 | 8650 | 8100 | 6100 | 14900 | 5800 | 12350 | 3250 |
| | 8 | 170 | 11500 | 9900 | 8900 | 6800 | 15400 | 6300 | 13600 | 3400 |
| 315 LK_ | 2 | 140 | 6000 | 3950 | 4650 | 2650 | 9100 | 1350 | 7750 | [1] |
| | 4 | 170 | 9100 | 7150 | 7000 | 5000 | 13100 | 3850 | 10900 | 1700 |
| | 6 | 170 | 10500 | 8500 | 7950 | 5950 | 15700 | 4100 | 13100 | 1550 |
| | 8 | 170 | 11750 | 9750 | 8900 | 6900 | 16900 | 6300 | 14100 | 3450 |
| 355 SM_ | 2 | 140 | 3050 | 6850 | 1750 | 5550 | 6350 | 4250 | 4950 | 2900 |
| | 4 | 210 | 8600 | 12400 | 5900 | 9700 | 13250 | 8600 | 10450 | 5850 |
| | 6 | 210 | 10550 | 14350 | 7300 | 11100 | 15650 | 9580 | 12350 | 6270 |
| | 8 | 210 | 12200 | 16000 | 8550 | 12350 | 17350 | 12500 | 13600 | 8900 |
| 355 ML_ | 2 | 140 | 2900 | 6700 | 1600 | 5400 | 7100 | 3700 | 5750 | 2350 |
| | 4 | 210 | 8360 | 12150 | 5650 | 9450 | 14600 | 7950 | 11850 | 5150 |
| | 6 | 210 | 10100 | 13900 | 6900 | 10700 | 18050 | 8600 | 14700 | 5300 |
| | 8 | 210 | 12000 | 15800 | 7300 | 11000 | 21100 | 11650 | 17000 | 7600 |
| 355 LK_ | 2 | 140 | 2650 | 6450 | 1350 | 5150 | 8250 | 2650 | 6900 | 1300 |
| | 4 | 210 | 8200 | 12000 | 5450 | 9250 | 15650 | 6600 | 12850 | 3800 |
| | 6 | 210 | 9900 | 13700 | 6700 | 10500 | 19100 | 7050 | 15800 | 3750 |
| | 8 | 210 | 11450 | 15250 | 7800 | 11600 | 21200 | 8700 | 17500 | 5000 |
| 400 L, LK_ | 2 | 170 | 2150 | 7150 | [1] | 5800 | 8650 | 2150 | 7220 | [1] |
| | 4 | 210 | 7100 | 13100 | 4300 | 10300 | 16050 | 6400 | 13150 | 3400 |
| | 6 | 210 | 8850 | 14850 | 5500 | 11500 | 18450 | 6750 | 15100 | 3400 |
| | 8 | 210 | 10450 | 16450 | 6750 | 12750 | 20100 | 8350 | 16450 | 4700 |
| 450 L_ | 2 | 170 | 1800 | 6800 | [1] | 5500 | 11500 | [1] | 10000 | [1] |
| | 4 | 210 | 7600 | 13500 | 4500 | 10500 | 20000 | 4400 | 17700 | 1200 |
| | 6 | 210 | 9000 | 15000 | 5600 | 11500 | 26000 | 3700 | 22200 | [1] |
| | 8 | 210 | 10800 | 16800 | 7000 | 12900 | 27800 | 5500 | 23700 | 1350 |

[1] On request.

# Terminal box

## Standard terminal box

### Protection and mounting options

The degree of protection for the standard terminal box is IP 55.It complies with the requirements of the protection method ‘e’ protection level ‘c’ increased safety and prevents all ignition sources such as sparks, excessive over heating etc. The features of the terminal box are: No self loosening terminals, compliance with creepage and clearance distances as defined in standard for increased safety ‘ec’ protection.

By default, terminal boxes are mounted on top of the motor at D-end. Side mounted terminal box is possible in frame sizes 160 and 400. Mounting at N-end is also possible for the larger frame sizes. Please refer to the variant code section for more details.

### Turnability

The standard terminal boxes for motor sizes 160–315 can be turned 4*90°, and in sizes 355–500, 2*180° after delivery. For sizes 355–500, it is also possible to mount a terminal box with an opening towards the D or N-end, using the relevant variant codes when ordering, this is needed to get the terminal block turned in the right position. For motors in size 71–132, a 4*90° turnable terminal box is optional- this can be ordered with variant code 400.

### Cable entries

Terminal box is provided as standard with tapped holes for cable glands, no cable glands are included as standard. The entry holes are closed with Ex eb approved blanking plugs made of nickel-plated brass, one of the main entries is closed with a plastic plug as transport and storage protection

Very large motors have an angle adapter between the terminal box and gland plate. Please refer to the table on next page for further information about amount and size of threaded holes, plugs provided as standard.

Different types of cable glands are available as option, suitable for either armoured and nonarmoured cables, please refer to the Terminal box alternatives section for more details.

### Cable type and terminations

Terminations are suitable for copper and aluminum cables (Al- cables on request for motor sizes 160 to 250). Cables are connected to terminals by cable lugs, which are not included in the delivery.

### Earthing bolts

The motors are as standard provided with at least one earthing bolt inside the terminal box and another on the frame. The earthing bolt on the frame is located on top close to the terminal box, motors in size 160-250 is the earthing bolt located on RHS foot (seen from D-end).

### Ordering

To ensure the delivery of desired terminations and cable entries for the motor, state the cable type, quantity, size, outer diameter and possibly type of cable glands needed when ordering.

See section Variant codes for all options available.

## Standard delivery

Standard delivery if no other information is provided.

| Motor size | Design letter | Voltage code | Pole number | Terminal box type | Size of gland plate opening on terminal box | 45° angle adapter | Amount and size of threaded plugged holes, or cable sealing end unit | Max. connectable core cross section mm² / phase | Number and size of terminal bolts |
|---|---|---|---|---|---|---|---|---|---|
| **IE2 and IE3 motors** | | | | | | | | | |
| 71 | | | 2-8 | integr. | - | - | 2xM16x1.5 | 1x2.5 | 6 x M4 |
| 80 | | | 2-8 | integr. | - | - | 2xM25x1.5 | 1x4 | 6 x M4 |
| 90 | | | 2-8 | integr. | - | - | 2xM25x1.5 | 1x6 | 6 x M5 |
| 100-132 | | | 2-8 | integr. | - | - | 2x M32x1.5 | 1x10 | 6 x M5 |
| 160-180 | | | 2-8 | 63 | B | - | 2xM40x1.5 | 1x35 | 6 x M6 |
| 200-250 | | | 2-8 | 160 | C | - | 2xM63x1.5 | 1x70 | 6 x M10 |
| 280 SM | | | | 210 | C | - | 2xM63x1.5 | 2x150 | 6 x M12 |
| 280 ML | | | 2-4 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 280 ML | | | 6-8 | 210 | C | - | 2xM63x1.5 | 2x150 | 6 x M12 |
| 315SM_, ML_ | | | 2-8 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 315LKB | | | 2 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 315LKC | | | 2 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 315LK_ | | | 4-8 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMA - SMB | | D,S | 2-4 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMA | | E,F | 2-4 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMB | K | E,F | 2-4 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMB | G,L,M | E,F | 2-4 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMA-SMB | | | 6-12 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMC | | | 2-4 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMC | K,M | D,S | 6 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMC | G,L | D,S | 6 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMC | | E,F | 6 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMC | | | 8-12 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355ML_, LK_ | | | 2-4 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_, LK_ | G,L | E,F | 6 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_, LK_ | K,M | E,F | 6 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355ML_, LK_ | | D,S | 6-8 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_ | | E,F | 8 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355LK_ | | E,F | 8 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_, LK_ | | | 10-12 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 400 | | | 2-8 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 450 LA, LKA | | | 2 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 LA, LKA | M | | 4 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 LA, LKA | G,K | D,S | 4 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 LA, LKA | G,K | E,F | 4 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 450 LA, LKA | | | 6 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 450 LB, LC, LKB, LKC | | | 2-6 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 | | | 8 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |

| Auxiliary cable entries | Pole numbers | Amount and size of threaded plugged holes | Max. connectable corecross section mm2 /phase |
|---|---|---|---|
| 160 - 450 | 2-8 | 2x M20x1.5 | 1x 2.5 |

# Terminal box

## Terminal box dimensions

—
01 Terminal box type 63 and 160

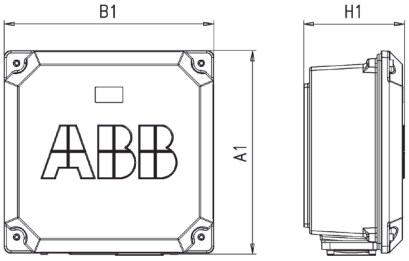
02 Terminal box types 210 and 370

03 Terminal box type 750 + adapter

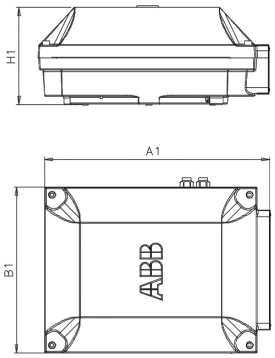
04 Terminal box type 1200 + adapter

For motor sizes 71 to 132 the terminal box is integrated in motor frame and the dimensions for terminal boxes can be found in the motor dimension drawings in ABB Library.

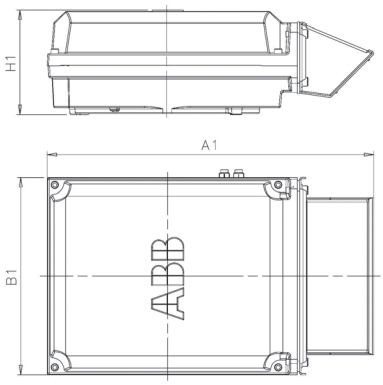
To match the correct terminal box with motor sizes 160-450, find the motor type and correspondent terminal box type on the previous page. The box types and heir dimensions are presented on this page.



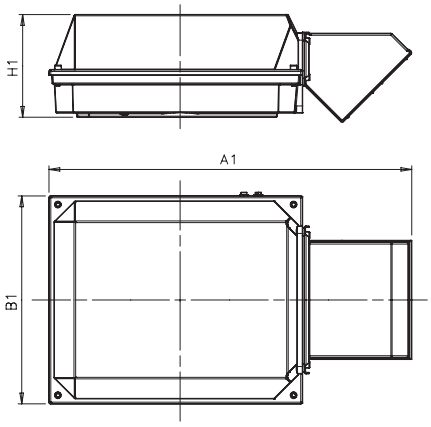

01




02




03

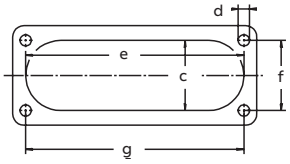



04

| Terminal box types acc acc. to current capacity | A1 mm | B1 mm | H1 mm | Gland plate opening |
|---|---|---|---|---|
| 63 | 247 | 247 | 109 | B |
| 160 | 300 | 310 | 154 | C |
| 210 | 416 | 306 | 177 | C |
| 370 | 451 | 347 | 200 | D |
| 750 with E-D adapter | 686 | 413 | 219 | D |
| 750 without E-D adapter | 523 | 413 | 219 | E |
| 1200 with E-2D adapter | 1000 | 578 | 285 | 2xD |
| 1200 without E-2D adapter | 697 | 578 | 285 | E |
| 1200 with E-2E adapter | 1195 | 578 | 285 | 2xE |
| 1200 with E-3D adapter | 1250 | 578 | 285 | 3xD |

### Dimensions for terminal box inlets

Corresponds to motor sizes 160 and above




| Flange opening | c mm | e mm | f mm | g mm | d thread type |
|---|---|---|---|---|---|
| B | 31 | 120 | 30 | 120 | M6 |
| C *) | 71 | 194 | 62 | 193 | M6 |
| C **) | 67 | 193 | 62 | 193 | M8 |
| D | 100 | 300 | 80 | 292 | M10 |
| E | 115 | 370 | 100 | 360 | M12 |

**Note:** The C flange is different depending on frame size.

*) for frame sizes 200-225

**) for frame size 280

# Terminal box

## Terminal boxes and boards

—
01 Integrated terminal box for motor sizes 71-112. Tapped holes for cable entries

02 Terminal board for motor sizes 90-112, IE2, and 90-100, IE3

03 Terminal board for motor sizes 71-80

04 Terminal board for motor sizes 112, IE3

05 Integrated terminal box for motor sizes 132. Tapped holes for cable entries

06 Terminal board for motor size 132

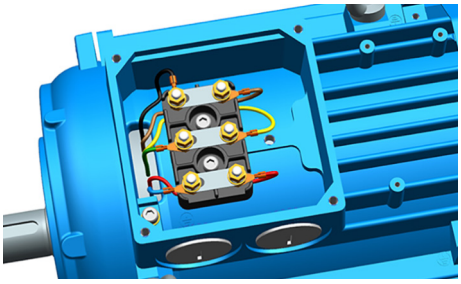
07 Terminal box for motor sizes 160-250. Connection flanges with tapped cable entries

08 Terminal board for motor sizes 160-250

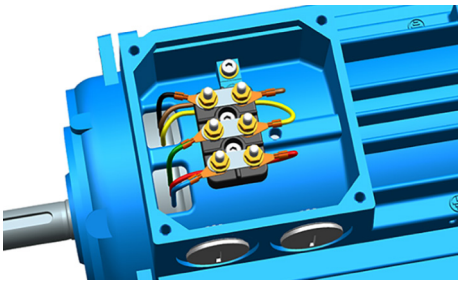
The pictures below show standard terminal boxes and the corresponding terminal boards for various motor sizes.

### Motor sizes 71-112

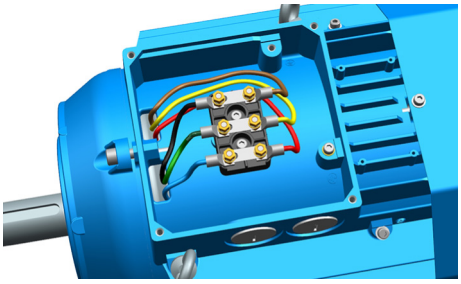
01



02

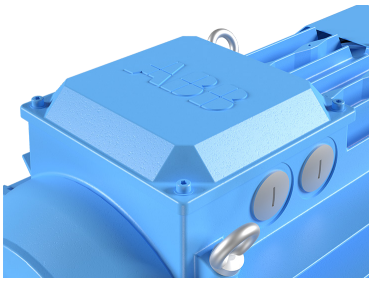


03

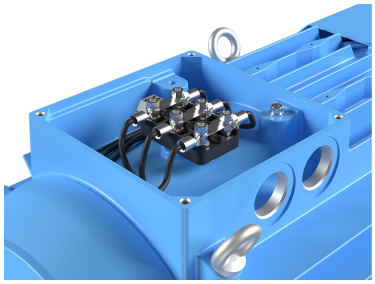


04

### Motor size 132

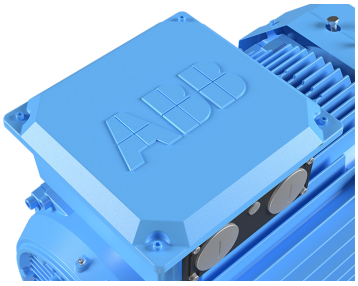


05

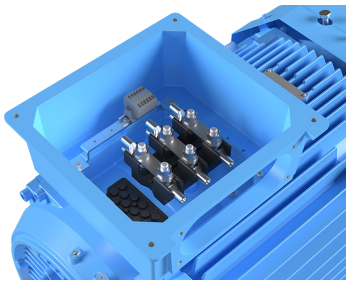


06

### Motor sizes 160-250



07



08

—
09 Terminal box for motor sizes 280 - 315, except LKC. Connection flange with tapped cable entries

10 Terminal board for motor sizes 280 - 315, except LKC

11 Terminal box for motor sizes 315LKC

12 Terminal board for motor sizes 315 LKC

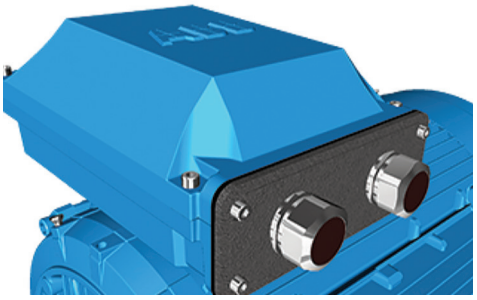
13 Terminal box for motor sizes 355SM

14 Terminal box with angle adapter for motor sizes 355ML - 450

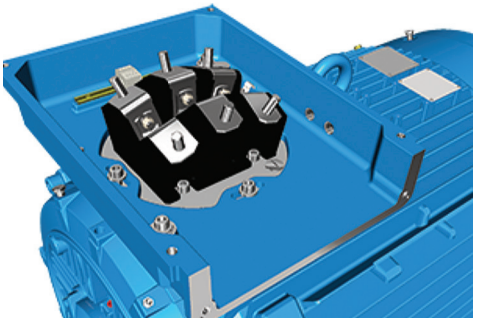
15 Terminal board for motor sizes 355 to 400

16 Terminal board for motor size 450

## Motor sizes 280 - 315

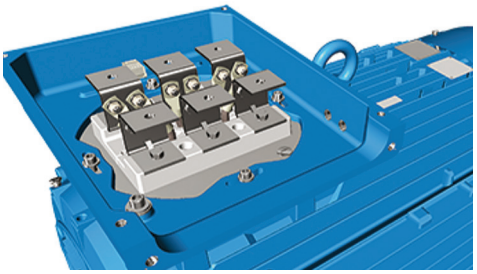


09



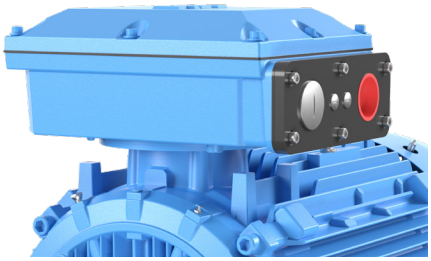
10

11

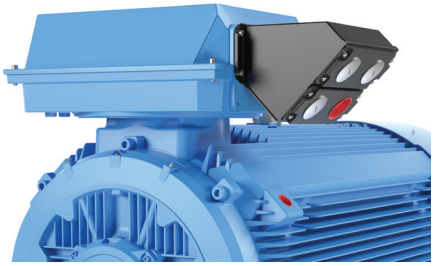


12

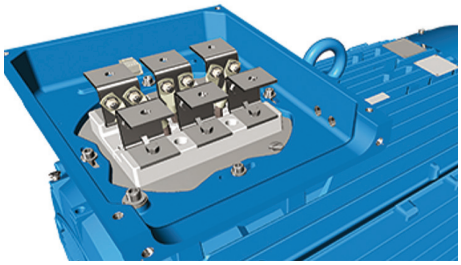
## Motor sizes 355-450



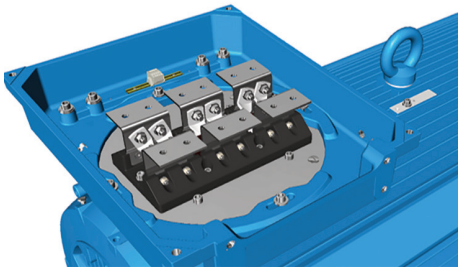
13



14



15



16

# Terminal box

## Terminal box alternatives

### Optional cable termination parts

There is a broad selection of cable termination accessories available to allow a safe and reliable termination of one or several supply cables. The most common options are explained in this chapter.

### How to order

- Check first that the terminal box itself allows mounting of the desired cable and cores (refer to table showing standard delivery for each motor size). If very large cable are used might it be necessary to use a larger terminal box and larger terminal board than standard.
- Select the right cable gland(s) or cable sealing end unit based on the diameter of the cables(s) and suitability for cable type.
- Select appropriate adapter or flange to allow mounting on opening in terminal box.
- Note that turning the terminal box might be prevented by use of some adapters

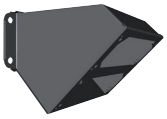
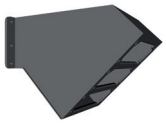
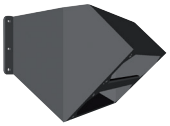
### Ordering example

**Ordering example for M3GP motors**

| | |
|---|---|
| Motor and supply cables | 110kW, 4-pole, 400V 50Hz, IE3. Cables needed: 1 pcs outer diameter 42mm steel wire armoured cable, single cross section 120 mm2. Cables coming from below. |
| Motor | M3GP 315SMC 4, B3 |
| Adapter (to allow entry of cables coming from below) | Not possible |
| Cable glands Ex t suitable for armoured cables (an M50 gland will suit this cable) | Variant code 734 (specify cable dimensions) |
| Gland plate made of steel drilled and tapped with 1 pcs M50 hole (non-std size) | Variant code 554 (1 pcs M50 x 1.5 threaded hole to be specified) |

## Optional adapters

To allow easy termination of cables entering the terminal box from above or below, an angle adapter is recommended. These can be used to allow the mounting of several cable sealing end units or gland plates. For exact suitability on a certain motor size, refer to the 'terminal box opening' column in section Standard terminal box.

| Adapater | | | |  |  |  |
|---|---|---|---|---|---|---|
| Variant code | 292 | 293 | 294 | 295 | 296 | 444 |
| Opening to terminal box | C | D | E | E | E | E |
| Flange or opening for end unit | C | D | D | 2 x D | 3 x D | 2 x E |
| Material | Cast iron | Cast iron | Cast iron | Steel | Steel | Steel |
| Notes | | | | Included as standard delivery for some types. | Only possible on type 1200 terminal box. | Only possible on type 1200 terminal box. |

## Cable glands

The motors are delivered as standard with plugged cable entries as described in the previous section. There is a broad selection of different type of cable and outer diameter ranges.

| **Size of threaded opening for cable gland** | **Cable gland(s) nickel plated brass, Ex t, for non armoured cable, variant code 230 or 731** | **EMC Cable gland(s) nickel plated brass, Ex t, for non armoured cable, variant code 704** | **Cable gland Ex d / Ex t for armoured cable with double sealing, variant code 734** | |
|---|---|---|---|---|
| **Metric (std)** | **Cable outer diameter, mm** | **Cable outer diameter, mm** | **Cable outer diameter, mm** | **Inner sheath diameter, mm** |
| M16 x 1.5 | 4-8 | 4-8 | 7-12 | 4.5-8 |
| M20 x 1.5 | 4-12 | 4-12 | 10-16 | 6-10 |
| M25 x 1.5 | - | - | 13.5-19 | 10-14 |
| M25 x 1.5 *) | 10-18 | 10-18 | 19-25 | 14-18 |
| M32 x 1.5 | 14-24 | 14-24 | 25-30 | 18-23 |
| M40 x 1.5 | 22-32 | 22-32 | 30-36 | 23-28 |
| M50 x 1.5 | - | - | 36-40 | 28-32 |
| M50 x 1.5 *) | 26-35 | 26-35 | 40-46 | 32-37 |
| M63 x 1.5 | - | - | 46-53 | 37-43 |
| M63 x 1.5 *) | 35-45 | 35-45 | 53-60 | 43-50 |
| M75 x 1.5 | 46-62 | 46-62 | 58-70 | 48-60 |
| M90 x 1.5 | - | - | 78-90 | 68-80 |
| M100 x 1.5 | - | - | 88-100 | 78-90 |

*) = High capacity version, delivered as standard with the variant code

### Threaded openings for cable glands with NPT thread (variant code 730)

The motors are delivered as standard with openings for cable glands with metric threads as listed in the section describing the standard terminal box. If glands with NPT threads will be used must variant code 730 be ordered. If nothing else is stated on the orderer will the sizes in tables below be delivered.

| Motor frame size | Main cable entries | NPT plug |
|---|---|---|
| 160-180 | 2 x 1 ¼” | 1 x 1 ¼” |
| 200-250 | 2 x 1 ½” | 1 x 1 ½” |
| 280 | 2 x 2” | 1 x 2” |
| 315 | 2 x 21/2” | 1 x 21/2” |
| 355-450 | 2 x 3” | 1 x 3” |

| Motor frame size | Cable entries for auxiliaries | NPT plug |
|---|---|---|
| 160-450 | 2 x ¾” | 2 x ¾” |

### Threaded openings for cable glands of nonstandard size

If the standard size of threaded openings for cable glands does not suit the gland size and cable that will be used can openings of nonstandard size also be delivered, either by fitting a reducers to make the openings smaller or by increasing the amount or size of holes. The maximum possible size and amount for each gland plate size is listed below. Threaded openings of non-standard size can be ordered using variant codes 554 and 555.

| Gland plate size | Maximum amount and size of threaded holes |
|---|---|
| B | 2 x M40 |
| C | 2 x M63 |
| D | 2 x M90 or 3 x M75 |
| E | 2 x M90 or 4 x M75 |

### Gland plates of non-standard material

The standard material used in gland plates is steel. Gland plates made of stainless steel are optional, either with cable glands or blind without threaded holes. Please refer to the variant code section for more information.

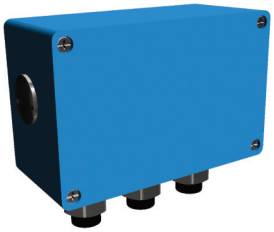
### Auxiliary terminal box

It is possible to equip motors from frame size 132 upwards with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box is made of aluminum, except frame sizes 160-250 where cast iron boxes are used.

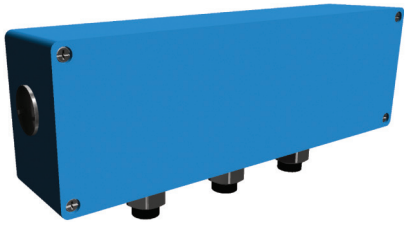
Connection terminals are of spring-loaded type for quick and easy connection. These are suitable for up to 2.5 $mm^2$ wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard.

The standard cable entry is 2 x M20 with plugged entries. If cable glands are needed must these be ordered using the variant codes described earlier in this section.

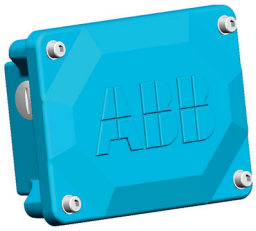
| Related variant codes | |
|---|---|
| 380 | Separate terminal box for temperature detectors |
| 418 | Separate terminal box for auxiliaries |
| 567 | Separate terminal box material: cast Iron |
| 568 | Separate terminal box for heating elements |



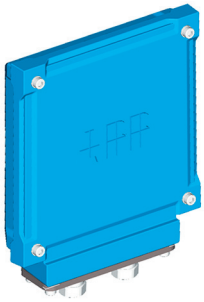
Small auxiliary aluminum terminal box for motor sizes 280- 450 (variant codes 418, 568, 380, 569). The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 125 mm, max 12 strips. Earthing size M4.



Large auxiliary aluminum terminal box for motor sizes 280-450. The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 250 mm, max 30 strips. Earthing size M4.



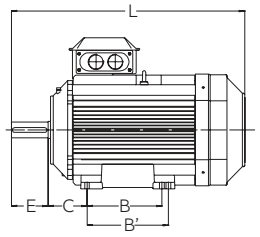
Auxiliary cast iron terminal box for motor size 160-250 (variant code 418). 111 x 162 mm.

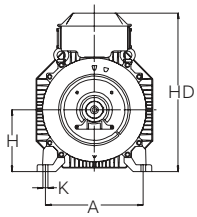


Auxiliary cast iron terminal box for motor sizes 280-450 (variant code 567). 208 x 180 mm.

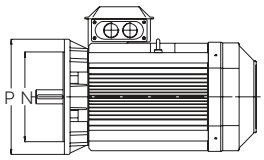
# Dimension drawings

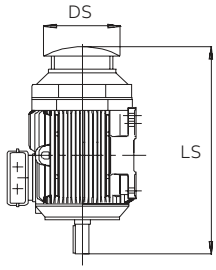
## Increased safety cast iron motors, Ex ec



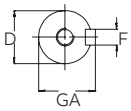



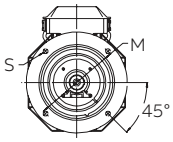

Foot-mounted motor IM 1001, IM B3



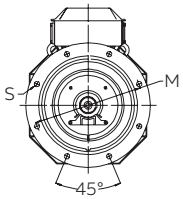




Flange-mounted motor IM 3001, IM B5

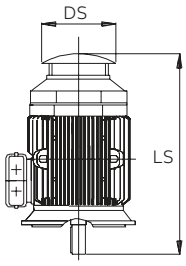



Sizes 80 to 200




Sizes 225 to 450




Protective roof, variant code 005

| Motor size | IM 1001, IM B3 AND IM 3001, IM B5 | | | | | | | | | | IM 1001, IM B3 | | | | | | | | IM 3001, IM B5 | | | | Protective roof | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | | GA | | F | | E | | L max | | A | B | B' | C | HD | K | H | O | M | N | P | S | DS | LS | |
| | poles | | poles | | poles | | poles | | poles | | | | | | | | | | | | | | | poles | |
| | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-6 | | | | | | | | | | | | | | 2 | 4-8 |
| 71 M_ | 14 | 14 | 16 | 16 | 5 | 5 | 30 | 30 | 264 | 264 | 112 | 90 | - | 45 | 178 | 7 | 71 | 20 | 130 | 110 | 160 | 10 | - | 272.5 | - |
| 71 ML_ | 14 | 14 | 16 | 16 | 5 | 5 | 30 | 30 | 264 | 264 | 112 | 90 | - | 45 | 178 | 7 | 71 | 20 | 130 | 110 | 160 | 10 | - | 272.5 | - |
| 80 M_ | 19 | 19 | 21.5 | 21.5 | 6 | 6 | 40 | 40 | 331 | 331 | 125 | 100 | - | 50 | 194 | 10 | 80 | 20 | 165 | 130 | 200 | 12 | 331 | 331 | 360 |
| 80 ML_ | 19 | 19 | 21.5 | 21.5 | 6 | 6 | 40 | 40 | 363 | 363 | 125 | 100 | 112 | 50 | 194 | 10 | 80 | 20 | 165 | 130 | 200 | 12 | 331 | 331 | 360 |
| 90 SL_ | 24 | 24 | 27 | 27 | 8 | 8 | 50 | 50 | 356 | 356 | 140 | 100 | 125 | 56 | 218 | 10 | 90 | 20 | 165 | 130 | 200 | 12 | - | 368.5 | 430 |
| 90 L_ | 24 | 24 | 27 | 27 | 8 | 8 | 50 | 50 | 390 | 390 | 140 | 100 | 125 | 56 | 218 | 10 | 90 | 20 | 165 | 130 | 200 | 12 | - | 368.5 | 430 |
| 100 L_ | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 381 | 381 | 160 | 140 | - | 63 | 247 | 12 | 100 | 25 | 215 | 180 | 250 | 15 | 395 | 395 | 505 |
| 100 ML_ | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 403 | 403 | 160 | 140 | - | 63 | 247 | 12 | 100 | 25 | 215 | 180 | 250 | 15 | 395 | 395 | 505 |
| 100 LK_ | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 435 | 435 | 160 | 140 | 160 | 63 | 247 | 12 | 100 | 25 | 215 | 180 | 250 | 15 | 395 | 395 | 505 |
| IE2 112 | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 403 | 403 | 190 | 140 | - | 70 | 259 | 12 | 112 | 25 | 215 | 180 | 250 | 15 | 417 | 417 | 505 |
| IE3 112 | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 442 | 442 | 190 | 140 | - | 70 | 258 | 12 | 112 | 25 | 215 | 180 | 250 | 15 | 417 | 417 | 505 |
| 132 | 38 | 38 | 41 | 41 | 10 | 10 | 80 | 80 | 532 | 532 | 216 | 140 | 178 | 89 | 300 | 12 | 132 | 30 | 265 | 230 | 300 | 15 | - | 551.5 | 590 |
| 160 | 42 | 42 | 45 | 45 | 12 | 12 | 110 | 110 | 681 | 681 | 254 | 210 | 254 | 108 | 421 | 14.5 | 160 | - | 300 | 250 | 350 | 18.5 | 328 | 756 | 756 |
| 180 | 48 | 48 | 51.5 | 51.5 | 14 | 14 | 110 | 110 | 726 | 726 | 279 | 241 | 279 | 121 | 461 | 14.6 | 180 | - | 300 | 250 | 350 | 18.5 | 359 | 756 | 756 |
| 200 | 55 | 55 | 59 | 59 | 16 | 16 | 110 | 110 | 821 | 821 | 318 | 267 | 305 | 133 | 528 | 18.5 | 200 | - | 350 | 300 | 400 | 18.5 | 414 | 844 | 844 |
| 225 | 55 | 60 | 59 | 64 | 16 | 18 | 110 | 140 | 849 | 849 | 356 | 286 | 311 | 149 | 573 | 18.6 | 225 | - | 400 | 350 | 450 | 18.5 | 462 | 921 | 951 |
| 250 | 60 | 65 | 64 | 69 | 18 | 18 | 140 | 140 | 884 | 884 | 406 | 311 | 349 | 168 | 626 | 24 | 250 | - | 500 | 450 | 550 | 18.5 | 506 | 965 | 965 |
| 280 | 65 | 75 | 69 | 79.5 | 18 | 20 | 140 | 140 | 1088 | 1088 | 457 | 368 | 419 | 190 | 759 | 24 | 280 | - | 500 | 450 | 550 | 18 | 555 | 1190 | 1190 |
| 315 SM_ | 65 | 80 | 69 | 85 | 18 | 22 | 140 | 170 | 1174 | 1204 | 508 | 406 | 457 | 216 | 852 | 30 | 315 | - | 600 | 550 | 660 | 23 | 624 | 1290 | 1320 |
| 315 ML_ | 65 | 90 | 69 | 95 | 18 | 25 | 140 | 170 | 1285 | 1315 | 508 | 457 | 508 | 216 | 852 | 30 | 315 | - | 600 | 550 | 660 | 23 | 624 | 1401 | 1431 |
| 355 SM_ | 70 | 100 | 62.5 | 90 | 20 | 28 | 140 | 210 | 1409 | 1479 | 610 | 500 | 560 | 254 | 958 | 35 | 355 | - | 740 | 680 | 800 | 23 | 720 | 1476 | 1546 |
| 355 ML_ | 70 | 100 | 62.5 | 90 | 20 | 28 | 140 | 210 | 1514 | 1584 | 610 | 560 | 630 | 254 | 958 | 35 | 355 | - | 740 | 680 | 800 | 23 | 720 | 1528 | 1703 |
| 355 LK_ | 70 | 100 | 62.5 | 90 | 20 | 28 | 140 | 210 | 1764 | 1834 | 610 | 710 | 900 | 254 | 958 | 35 | 355 | - | 740 | 680 | 800 | 23 | 720 | 1633 | 1703 |
| 400 L_ | 80 | 110 | 85 | 126 | 22 | 28 | 170 | 210 | 1851 | 1891 | 710 | 900 | 1000 | 224 | 1045 | 35 | 400 | - | 940 | 880 | 1000 | 28 | 810 | 1860 | 1900 |
| 400 LK_ | 80 | 100 | 85 | 106 | 22 | 28 | 170 | 210 | 1851 | 1891 | 686 | 710 | 800 | 280 | 1045 | 35 | 400 | - | 740 | 680 | 800 | 24 | 810 | 1860 | 1900 |
| 450 | - | 120 | - | 127 | - | 32 | - | 210 | - | 2 187 | 800 | 1000 | 1120 | 250 | 1169 | 42 | 450 | - | 1080 | 1000 | 1150 | 28 | On request | | |

| Tolerances: | | Tolerances: | |
|---|---|---|---|
| A, B | ± 0,8 | H | -0.5 |
| D, DA | ISO k6 < Ø 48mm | N | ISO j6 |
| | ISO m6 > Ø 48mm | C, CA | ± 0.8 |
| F, FA | ISO h9 | | |

**IM B14 (IM3601), IM 3602**

| Motor size | LA | M | N | P | S | T | S | T |
|---|---|---|---|---|---|---|---|---|
| 71 | 8 | 85 | 70 | 105 | M6 | 2.5 | M6 | 2.5 |
| 80 | 8 | 100 | 80 | 120 | M6 | 3 | M6 | 3 |
| 90 | 10 | 115 | 95 | 140 | M8 | 3 | M8 | 3 |
| 100 | 10 | 130 | 110 | 160 | M8 | 3.5 | M8 | 3.5 |
| 112 | 10 | 130 | 110 | 160 | M8 | 3.5 | M8 | 3.5 |
| 132 | 12 | 165 | 130 | 200 | M10 | 3.5 | M10 | 3.5 |

In all dimension drawings: The tables give the main dimensions in mm.

For detailed drawings please see our web-pages or contact ABB.

# Certificate examples

01 EU Declaration of Conformity

02 EU Type Examination certificate

03 IECEx Certificate of Conformity

ABB

## EU Declaration of Conformity

**The products:** 3-phase induction motors for potentially explosive atmospheres as listed in this document on the pages 2…3 having correspondent name plate markings covered by those as listed.

**The Manufacturer:**

ABB Oy
Motors and Generators
P.O. Box 633
Strömbergin Puistotie 5A
FIN - 65101 Vaasa, Finland

ABB Sp.z.o.o
27 Placydowska Str.
PL-95-070 Aleksandrow Lodzki
Poland

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration described above are in conformity with the relevant Union harmonization legislation:

**Directive 2014/34/EU**
The following harmonized standards are applied in relation to which conformity is declared: EN 60079-0/A11:2013[D], EN 60079-1:2014[D], EN 60079-7:2015, EN 60079-31:2014[D] and relevant parts of the EN 60034 –series of standards.

**Directive 2009/125/EC**
The motors that are marked as IE2, IE3 or IE4 are in conformity with the requirements set in the Commission Regulation (EC) No. 640/2009 and the amending Regulation (EU) No. 4/2014.

**Directive 2011/65/EU**
Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

**Notes:**

Motors shall be installed and maintained according to the relevant standards and instructions of ABB Oy, Motors and Generators. When installed in converter supplied applications, additional requirements must be respected regarding the motor as well as the installation as described in the appropriate dedicated addendum

The conformity of the incorporation into a finished product according to the Directive 2006/42/EC shall be established by the commissioning party when a motor is fitted to the machinery.

**Notified Bodies** (ExNB): LCIE (0081), Av. Du Général Leclerc. 33, 92266 Fontenay-aux-Roses, France,
VTT Expert Services Ltd (0537), Otakaari 7B, 02044 Espoo, Finland
UL International Demko A/S (0539), Borupvang 5A, 2750 Ballerup, Denmark

Signed for and on behalf of: ABB Oy, Motors and Generators
Place and dateof issue: Vaasa, Finland, 2019-09-04
Harri Mykkänen
Vice President

3GZF500930-309L

01

## TYPE EXAMINATION CERTIFICATE

[1]

[2] **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**

[3] Type Examination Certificate Number: **DEMKO 18 ATEX 2076X** Rev. 3

[4] Product: **M3GP, M3BP, M3LP, M3BN Motors Frame Sizes 71 to 450**

[5] Manufacturer: **ABB Oy, IEC LV Motors**

[6] Address: **Strömbergin Puistotie 5A Vaasa, Finland FI 65320**

[7] This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014.

The examination and test results are recorded in confidential report no. **US/UL/ExTR18.0093/03.**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN IEC 60079-0:2018** **EN IEC 60079-7:2015/A1:2018** **EN 60079-31:2014**

Where additional criteria beyond those given here have been used, they are listed at item 18 in the Schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the "Specific Conditions of Use" listed under item 17 of this certificate.

[11] This Type examination certificate relates only to the design of the specified product, and not to specific items of product subsequently manufactured.

[12] The marking of the product shall include the following (marking is provided in the Schedule as a part of item 15, if applicable):

**Ex II 3 G Ex ec IIC T3…T1 Gc**

**Ex II 3 D Ex tc IIIC T100°C… T150°C Dc**

**Certification Manager**
Thomas Wilson

This is to certify that the sample(s) of the Product described herein ("Certified Product") has been investigated and found in compliance with the Standard(s) indicated on this Certificate, in accordance with the ATEX Product Certification Program Requirements. This certificate and test results obtained apply only to the product sample(s) submitted by the Manufacturer. UL did not select the sample(s) or determine whether the sample(s) provided were representative of other manufactured product. UL has not established Follow-Up Service or other surveillance of this product. The Manufacturer is solely and fully responsible for conformity of all product to all applicable Standards, specifications, requirements or Directives. The test results may not be used, in whole or in part, in any other document without UL's prior written approval.

**Date of issue:** 2018-08-02
**Re-issued:** 2024-06-25

**Certification Body** UL International Demko A/S, Borupvang 5A, 2750 Ballerup, Denmark
Tel. +45 44 85 65 65, info.dk@ul.com, www.ul.com

Solutions

This certificate may only be reproduced in its entirety and without any change.

Form-ULID-000218 (DCS:00-IC-F0060-1) – Issue 21.0

Page 1 of 3

02

## IECEx Certificate of Conformity

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**
**IEC Certification System for Explosive Atmospheres**
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx UL 18.0081X** Page 1 of 4
Status: **Current** Issue No: 3
Date of Issue: 2024-06-25
Applicant: **ABB Oy, IEC LV Motors**
Strömbergin Puistotie 5A
Vaasa FI 65320
**Finland**

Certificate history:
Issue 2 (2021-09-24)
Issue 1 (2019-08-07)
Issue 0 (2018-08-02)

Equipment: **Asynchronous Motors - M3GP*****, M3BP*****, M3BN*****, M3LP***** Frame Sizes 71 to 450**
Optional accessory:
Type of Protection: **Increased Safety "ec", Dust Ignition Protection by Enclosure "tc, tb"**
Marking: Ex ec IIC T3...T1 Gc
Ex tc IIIC T100°C...T150°C Dc
Ex tb IIIC T100°C...T150°C Db
-40°C to +60°C (71-132 Frame Sizes)
-55°C to +80°C (160-450 Frame Sizes)

Approved for issue on behalf of the IECEx Certification Body: **Katy A. Holdredge**
Position: **Senior Staff Engineer**
Signature: (for printed version)
Date: (for printed version) 2024-06-25

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:
**UL Solutions (US)**
**333 Pfingsten Road**
**Northbrook IL 60062-2096**
**United States of America**

Solutions

03

# Motors in brief

## Cast iron Ex ec and Ex t motors, sizes 71 to 180

| Motor size | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|---|
| Stator and end shields | Material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better, integrated with stator | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Feet | | Cast iron, EN-GLJ-150 or better, integrated with stator | | | | | | Forged steel, detachable feet | |
| Bearing end shields | Material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Bearings | D-end 2-8 poles | 6203-2Z/C3 | 6204-2Z/C3 | 6205-2Z/C3 | 6206-2Z/C3 | 6206-2Z/C3 | 6208-2Z/C3 | 6309/C3 | 6310/C3 |
| | N-end 2-8 poles | 6202-2Z/C3 | 6203-2Z/C3 | 6204-2Z/C3 | 6205-2Z/C3 | 6205-2Z/C3 | 6208-2Z/C3 | 6209/C3 | 6209/C3 |
| Axially locked bearings | Inner bearing cover | As standard, locked at D-end | | | | | | | |
| Bearing seal | | Gamma ring | | | | | | | |
| Lubrication | | Permanent grease lubrication. | | | | | | Regreasable bearings | |
| SPM nipples | | Optional | | | | | | As standard | |
| Rating plate | Material | Stainless steel | | | | | | | |
| Terminal box | Frame material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better | |
| | Cover material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better | |
| | Cover screws material | Stainless A4-80 | | | | | | Steel 8.8, zinc electroplat-ed and chromated | |
| Connections | Cable entries | 2xM16 plugged | 2 x M25 plugged | | 2 x M32 plugged | | | 2 x M40 + 2 x M20 plugged | |
| | Terminals | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | Polypropylene. Reinforced with glass fibre. | | | | | | | |
| Fan cover | Material | Steel | | | | | | | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Stator winding | Material | Copper | | | | | | | |
| | Insulation | Insulation class F | | | | | | | |
| | Winding protection | 3 pcs thermistors | | | | | | | |
| Rotor winding | Material | Pressure die-cast aluminum | | | | | | | |
| Balancing | | Half key balancing | | | | | | | |
| Key ways | | Closed | | | | | | | |
| Heating ele-ments | On request | 25 W | | | | | | | |
| Drain holes | | Closed | | | | | | | |
| External earthing bolt | | As standard | | | | | | | |
| Enclosure | | IP 55 | | | | | | | |
| Cooling method | | IC 411 | | | | | | | |

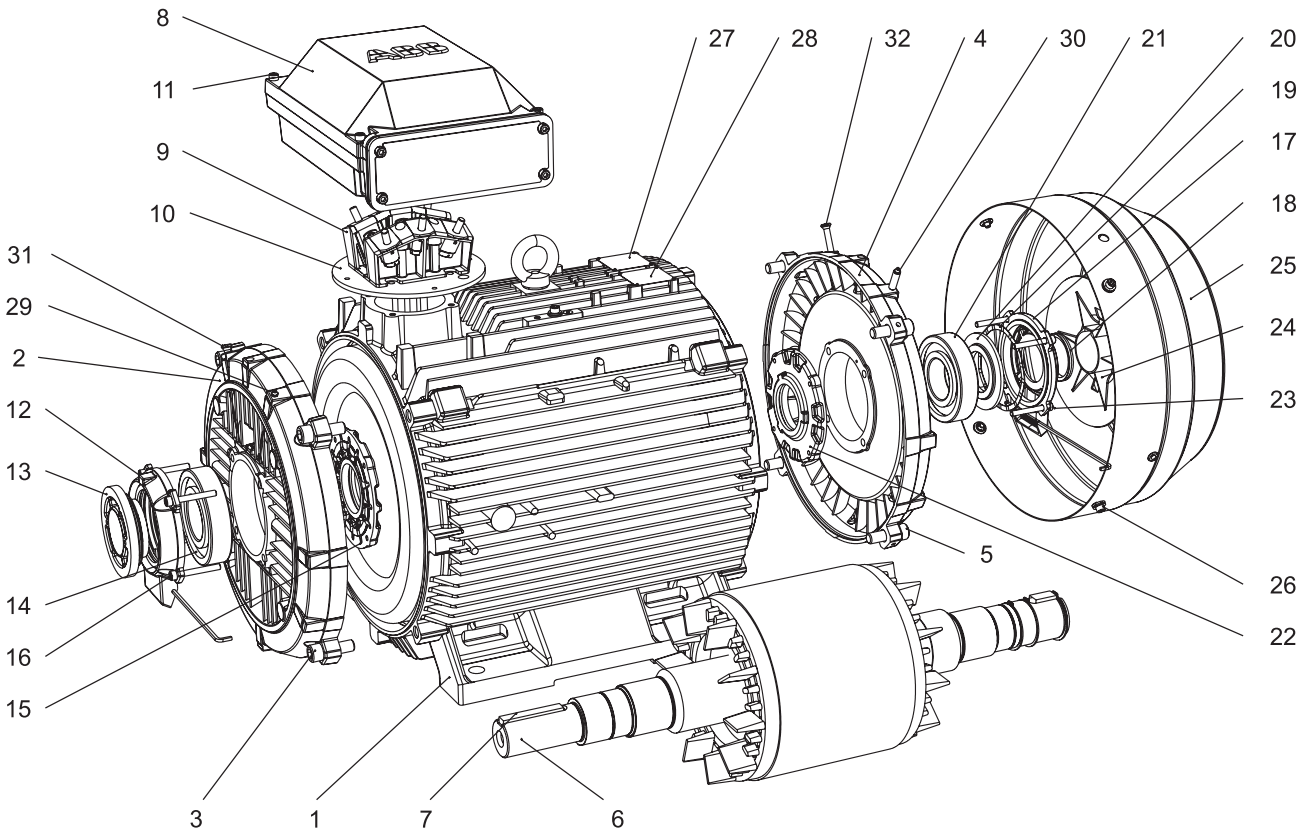
# Motors in brief

## Cast iron Ex ec and Ex t motors, sizes 200 to 450

| Motor size | | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|---|
| Stator | Material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Feet | Material | Cast iron, EN-GJL-200 or better, integrated with stator | | | | | | | |
| Bearing end shields | Material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint colour shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Bearings | D-end 2-pole | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317/C3 | 6316M/C3 |
| | D-end 4-12-pole | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6319/C3 | 6322/C3 | 6324/C3 | 6326M/C3 |
| | N-end 2-pole | 6210/C3 | 6212/C3 | 6213/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317/C3 | 6317M/C3 |
| | N-end 4-12-pole | 6210/C3 | 6212/C3 | 6213/C3 | 6316/C3 | 6316/C3 | 6313/C3 | 6319/C3 | 6322/C3 |
| Axially locked bearings | Inner bearing cover | As standard, locked at D-end | | | | | | | |
| Bearing seals | | Gamma ring | | | V-ring or labyrinth seal | | | | |
| Lubrication | | Regreasable bearings | | | | | | | |
| SPM nipples | | As standard | | | | | | | |
| Rating plate | Material | Stainless steel | | | | | | | |
| Terminal box | Frame material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover screws material | Steel 8.8, zinc electroplated and chromated | | | | | | | |
| Connections | Cable-entries | 2 x M63 + 2 x M20 plugged | | | | | xx | | |
| | Terminals | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | Polypropylene. Reinforced with glass fibre. | | | | | Polypropylene reinforced with glass fibre or aluminum. | | |
| Fan cover | Material | Hot dip galvanized steel | | | | | | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Stator winding | Material | Copper | | | | | | | |
| | Insulation | Insulation class F. | | | | | | | |
| | Winding protection | 3 pcs thermistors as standard | | | | | | | |
| Rotor winding | Material | Pressure die-cast aluminum | | | | | | | |
| Balancing | | Half key balancing | | | | | | | |
| Keyway | | Closed | | | Open | | | | |
| Heating elements | On request | 25 W | 60 W | | | 120 W | | | 200 W |
| Drain holes | | As standard. open on delivery | | | | | | | |
| External earthing bolt | | As standard | | | | | | | |
| Enclosure | | IP 55 | | | | | | | |
| Cooling method | | IC 411 | | | | | | | |

# Motor construction

## Increased safety motors, Ex ec




1 Stator frame
2 Endshield, D-end
3 Screws for endshield, D-end
4 Endshield, N-end
5 Screws for endshield, N-end
6 Rotor with shaft
7 Key, D-end
8 Terminal box
9 Terminal board
10 Intermediate flange
11 Screws for terminal box cover
12 Outer bearing cover, D-end
13 Valve disc with labyrinth seal, D-end; standard in 2-pole motors (V-ring in 4-8 pole)
14 Bearing, D-end
15 Inner bearing cover, D-end
16 Screws for bearing cover, D-end
17 Outer bearing cover, N-end
18 Seal, N-end
19 Wave spring
20 Valve disc, N-end
21 Bearing, N-end
22 Inner bearing cover, N-end
23 Screws for bearing cover, N-end
24 Fan
25 Fan cover
26 Screws for fan cover
27 Rating plate
28 Regreasing plate
29 Grease nipple, D-end
30 Grease nipple, N-end
31 SPM nipple, D-end
32 SPM nipple, N-end

# Dust ignition protection cast iron motors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# Ordering information

## Explanation of the product code

| Motor type | Motor size | Product code | Mounting arrangement code, Voltage and frequency code, Generation code | Variant codes |
|---|---|---|---|---|
| M3GP | 160MLA | 3GGP 161 | 410 - ADD | 002, etc. |
| | | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14 | |

| Positions 1 to 4 | |
|---|---|
| 3GGP: | Totally enclosed fan cooled squirrel cage motor with cast iron frame, dust ignition proof |
| 3GAA: | Totally enclosed fan cooled squirrel cage motor with aluminum frame, dust ignition proof |

| Positions 5 and 6 | |
|---|---|
| IEC size | |
| 63 | 63 |
| 71 | 71 |
| 08: | 80 |
| 09: | 90 |
| 10: | 100 |
| 11: | 112 |
| 13: | 132 |
| 16: | 160 |
| 18: | 180 |
| 20: | 200 |
| 22: | 225 |
| 25: | 250 |
| 28: | 280 |
| 31: | 315 |
| 35: | 355 |
| 40: | 400 |

| Position 7 | |
|---|---|
| Speed (Pole pairs) | |
| 1: | 2 poles |
| 2: | 4 poles |
| 3: | 6 poles |
| 4: | 8 poles |
| 5: | 10 poles |

| Positions 8 to 10 | |
|---|---|
| 8: | Frame lenght |
| 9: | Stator package length |
| 10: | Speed for two-speed induction, Permanent Magnet, SynRM and High Speed motors |

| Position 11 |
|---|
| -(dash) |

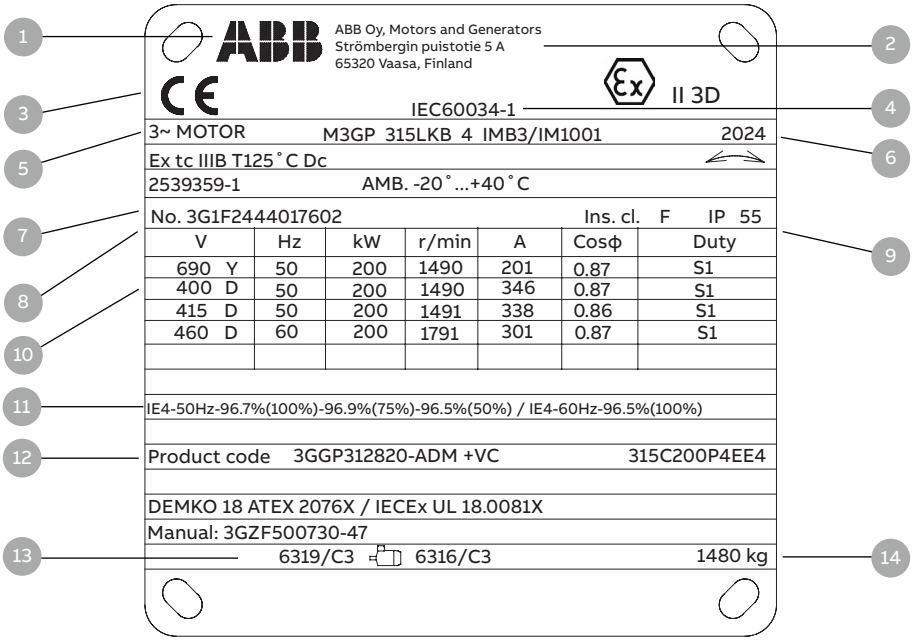
| Position 12 | |
|---|---|
| Mounting arrangement | |
| A: | Foot-mounted, top-mounted terminal box |
| R: | Foot-mounted, terminal box RHS seen from D-end |
| L: | Foot-mounted, terminal box LHS seen from D-end |
| B: | Flange-mounted, large flange |
| C: | Flange-mounted, small flange (sizes 71 to 112) |
| H: | Foot- and flange-mounted, terminal box top-mounted |
| J: | Foot- and flange-mounted, small flange with tapped holes |
| S: | Foot- and flange-mounted, terminal box RHS seen from D-end |
| T: | Foot- and flange-mounted, terminal box LHS seen from D-end |
| V: | Flange-mounted, special flange |
| F: | Foot- and flange-mounted. Special flange |

| Position 13 | |
|---|---|
| Voltage and frequency | |
| Single-speed motors | |
| B: | 380 VΔ 50 Hz |
| D: | 400 VΔ, 415 VΔ, 690 VY 50 Hz |
| E: | 500 VΔ 50 Hz |
| F: | 500 VY 50 Hz |
| S: | 230 VΔ, 400 VY, 415 VY 50 Hz |
| T: | 660 VΔ 50 Hz |
| U: | 690 VΔ 50 Hz |
| X: | Other rated voltage, connection or frequency, 690 V maximum |

| Position 14 | |
|---|---|
| Generation code | |
| G, H... | The product code must be, if needed, followed by variant codes. |

# Rating plates

01 Sample rating plate for IE4 Dust ignition protection Ex t motors.




01

1 ABB logo

2 Manufacturing place

3 CE mark on Ecodesign approved motors UKCA mark on UK approved motors

4 Manufacturing standard

5 Product description

6 Manufacturing year

7 Factory order reference number

8 Serial number

9 Insulation class, IP protection class

10 Voltage, Frequency, output, speed, current, power factory, duty

11 Product code

12 Bearing type

13 Weight

# Technical data

## IE4 Ex t cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 30 | M3GP 200MLA 2 | 3GGP201410-**M | 2967 | 94,5 | 94,6 | 93,9 | 0,88 | 51,7 | 9,2 | 96,6 | 3,3 | 3,7 | 0,217 | 309 | 72 |
| 37 | M3GP 200MLB 2 | 3GGP201420-**M | 2955 | 94,8 | 95,4 | 95,5 | 0,89 | 63,4 | 7,5 | 121 | 2,7 | 3,4 | 0,217 | 309 | 72 |
| 45 | M3GP 225SMA 2 | 3GGP221210-**M | 2971 | 95 | 95,2 | 94,5 | 0,88 | 77,3 | 8 | 145 | 3,4 | 3,6 | 0,323 | 395 | 74 |
| 55 | M3GP 250SMA 2 | 3GGP251210-**M | 2976 | 95,3 | 95,5 | 95,2 | 0,88 | 94,4 | 8,4 | 178 | 3,3 | 3,6 | 0,634 | 483 | 75 |
| 75 | M3GP 280SMB 2 | 3GGP281220-**M | 2980 | 95,6 | 95,6 | 95 | 0,87 | 129 | 7,8 | 240 | 2,5 | 3,3 | 0,9 | 665 | 77 |
| 90 | M3GP 280SMC 2 | 3GGP281230-**M | 2981 | 95,8 | 95,6 | 95 | 0,88 | 153 | 8 | 288 | 3 | 3,1 | 1,15 | 725 | 77 |
| 110 | M3GP 315SMB 2 | 3GGP311220-**M | 2982 | 96 | 96 | 95,3 | 0,88 | 189 | 6,7 | 352 | 1,9 | 2,6 | 1,4 | 940 | 77 |
| 132 | M3GP 315SMC 2 | 3GGP311230-**M | 2986 | 96,2 | 96,3 | 95,9 | 0,88 | 226 | 7,9 | 422 | 2,4 | 3 | 1,7 | 1025 | 77 |
| 160 | M3GP 315MLA 2 | 3GGP311410-**M | 2983 | 96,3 | 96,5 | 96,3 | 0,9 | 268 | 7,3 | 512 | 2,2 | 2,7 | 2,1 | 1190 | 77 |
| 200 | M3GP 355SMA 2 | 3GGP351210-**M | 2985 | 96,5 | 96,2 | 95,4 | 0,9 | 336 | 7,6 | 640 | 2 | 3,1 | 3 | 1600 | 83 |
| 250 | M3GP 355SMB 2 | 3GGP351220-**M | 2983 | 96,5 | 96,6 | 96,2 | 0,9 | 415 | 7,6 | 800 | 2,2 | 3 | 3,4 | 1680 | 83 |
| 315 | M3GP 355SMC 2 | 3GGP351230-**M | 2984 | 96,5 | 96,5 | 95,9 | 0,89 | 533 | 7,8 | 1008 | 2,3 | 2,8 | 3,6 | 1750 | 83 |
| 355 | M3GP 355MLA 2 | 3GGP351410-**M | 2981 | 96,5 | 96,7 | 96,3 | 0,9 | 595 | 7,5 | 1137 | 2,3 | 2,6 | 4,1 | 2000 | 83 |
| 400 | M3GP 355MLB 2 | 3GGP351420-**M | 2982 | 96,5 | 96,2 | 95,5 | 0,88 | 677 | 7,1 | 1280 | 2,3 | 2,9 | 4,1 | 2000 | 83 |
| 450 | M3GP 355MLC 2 | 3GGP351430-**M | 2983 | 96,5 | 96,5 | 95,7 | 0,9 | 743 | 7,9 | 1440 | 2,2 | 2,9 | 4,3 | 2080 | 83 |
| 500 | M3GP 355LKA 2 | 3GGP351810-**M | 2982 | 96,5 | 96,5 | 96 | 0,9 | 827 | 7,5 | 1601 | 2 | 3,9 | 4,8 | 2320 | 83 |
| 560 | M3GP 400LA 2 | 3GGP401510-**M | 2988 | 96,5 | 96,5 | 95,7 | 0,89 | 934 | 7,8 | 1789 | 2,5 | 3,7 | 7,9 | 2950 | 82 |
| 560 | M3GP 355LKB 2 | 3GGP351820-**M | 2983 | 96,5 | 96,4 | 95,9 | 0,92 | 903 | 10 | 1793 | 2,2 | 4,1 | 5,2 | 2460 | 83 |
| 630 | M3GP 400LB 2 | 3GGP401520-**M | 2987 | 96,5 | 96,2 | 95,6 | 0,89 | 1049 | 7,6 | 2014 | 2,6 | 3,7 | 8,2 | 2950 | 82 |
| 710 | M3GP 400LC 2 | 3GGP401530-**M | 2987 | 96,5 | 96,3 | 95,7 | 0,89 | 1178 | 7,2 | 2270 | 2,6 | 3,4 | 9,3 | 3050 | 82 |
| 800 | M3GP 450LA 2 | 3GGP451510-**M | 2990 | 96,5 | 96,2 | 95,4 | 0,87 | 1362 | 7,8 | 2555 | 1,3 | 3,4 | 12,2 | 4000 | 85 |
| 900 | M3GP 450LB 2 | 3GGP451520-**M | 2990 | 96,5 | 96,3 | 95,6 | 0,87 | 1534 | 7,6 | 2874 | 1,5 | 3,1 | 13,5 | 4000 | 85 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3GP 280SMD 2 | 3GGP281240-**M | 2979 | 96 | 96 | 95,3 | 0,85 | 192 | 8,4 | 352 | 2,9 | 3,7 | 1,15 | 725 | 77 |
| 132 | M3GP 280MLA 2 | 3GGP281410-**M | 2979 | 96,2 | 96,2 | 95,6 | 0,87 | 225 | 8,2 | 423 | 3 | 3,5 | 1,4 | 840 | 81 |
| 160 | M3GP 280MLB 2 | 3GGP281420-**M | 2968 | 96,3 | 96,6 | 96,6 | 0,9 | 266 | 6,7 | 515 | 2,4 | 2,6 | 1,55 | 890 | 81 |
| 200 | M3GP 315MLB 2 | 3GGP311420-**M | 2983 | 96,5 | 96,8 | 96,7 | 0,9 | 333 | 6,8 | 640 | 1,9 | 2,6 | 2,2 | 1220 | 77 |
| 250 | M3GP 315LKB 2 | 3GGP311820-**M | 2982 | 96,5 | 96,8 | 96,8 | 0,91 | 413 | 7,9 | 800 | 2,5 | 2,7 | 2,9 | 1540 | 77 |
| 315 | M3GP 315LKC 2 | 3GGP311830-**M | 2981 | 96,5 | 96,6 | 96,2 | 0,89 | 528 | 8,8 | 1009 | 3,2 | 3,2 | 3,3 | 1630 | 78 |

# Technical data

## IE4 Ex t cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 30 | M3GP 200MLA 4 | 3GGP202410-**M | 1486 | 94,9 | 94,9 | 94,3 | 0,76 | 59,8 | 8,7 | 194 | 4,1 | 4,2 | 0,369 | 304 | 63 |
| 37 | M3GP 225SMA 4 | 3GGP222210-**M | 1480 | 95,2 | 95,7 | 95,6 | 0,84 | 66,8 | 7,5 | 239 | 3,1 | 3,2 | 0,536 | 383 | 66 |
| 45 | M3GP 225SMC 4 | 3GGP222230-**M | 1484 | 95,4 | 95,7 | 95,5 | 0,82 | 83,4 | 8,5 | 290 | 3,6 | 3,8 | 0,607 | 433 | 66 |
| 55 | M3GP 250SMA 4 | 3GGP252210-**M | 1483 | 95,7 | 95,8 | 95,4 | 0,83 | 100 | 7,8 | 354 | 3,3 | 3,6 | 0,933 | 467 | 67 |
| 75 | M3GP 280SMC 4 | 3GGP282230-**M | 1487 | 96 | 96,4 | 96,1 | 0,86 | 130 | 7,8 | 481 | 2,8 | 2,9 | 1,85 | 725 | 72 |
| 90 | M3GP 280MLA 4 | 3GGP282410-**M | 1489 | 96,1 | 96,5 | 96,4 | 0,85 | 160 | 8,8 | 577 | 3,4 | 3,2 | 2,3 | 840 | 72 |
| 110 | M3GP 315SMC 4 | 3GGP312230-**M | 1491 | 96,3 | 96,5 | 96,1 | 0,85 | 194 | 7,8 | 704 | 2,4 | 3,1 | 2,9 | 1000 | 68 |
| 132 | M3GP 315SMD 4 | 3GGP312240-**M | 1490 | 96,4 | 96,6 | 96,2 | 0,85 | 234 | 7,9 | 846 | 2,6 | 3,2 | 3,2 | 1065 | 68 |
| 160 | M3GP 315MLB 4 | 3GGP312420-**M | 1490 | 96,6 | 96,8 | 96,4 | 0,86 | 278 | 7,9 | 1026 | 2,7 | 3 | 3,9 | 1220 | 68 |
| 200 | M3GP 355SMA 4 | 3GGP352210-**M | 1491 | 96,7 | 96,8 | 96,4 | 0,87 | 345 | 7,3 | 1282 | 2,1 | 2,7 | 5,9 | 1610 | 74 |
| 250 | M3GP 355SMB 4 | 3GGP352220-**M | 1491 | 96,7 | 96,8 | 96,5 | 0,87 | 433 | 7,8 | 1601 | 2,5 | 2,9 | 6,9 | 1780 | 74 |
| 315 | M3GP 355SMC 4 | 3GGP352230-**M | 1490 | 96,7 | 96,8 | 96,5 | 0,86 | 554 | 7,4 | 2017 | 2,4 | 2,9 | 7,2 | 1820 | 74 |
| 355 | M3GP 355MLA 4 | 3GGP352410-**M | 1491 | 96,7 | 96,9 | 96,5 | 0,87 | 616 | 7,9 | 2274 | 2,7 | 2,9 | 8,4 | 2140 | 78 |
| 400 | M3GP 355MLB 4 | 3GGP352420-**M | 1490 | 96,7 | 96,7 | 96,4 | 0,85 | 700 | 6,8 | 2563 | 2,1 | 2,8 | 8,4 | 2140 | 78 |
| 450 | M3GP 355MLC 4 | 3GGP352430-**M | 1489 | 96,7 | 96,8 | 96,5 | 0,86 | 779 | 6,8 | 2886 | 2,4 | 2,8 | 8,4 | 2140 | 78 |
| 500 | M3GP 355LKA 4 | 3GGP352810-**M | 1490 | 96,7 | 96,7 | 96,1 | 0,86 | 865 | 6,8 | 3204 | 2 | 3 | 10 | 2500 | 78 |
| 560 | M3GP 400LA 4 | 3GGP402510-**M | 1491 | 96,7 | 96,7 | 96,3 | 0,85 | 982 | 7,4 | 3586 | 2,4 | 2,8 | 15 | 3200 | 78 |
| 630 | M3GP 400LB 4 | 3GGP402520-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,86 | 1091 | 7,6 | 4034 | 2,2 | 2,9 | 16 | 3300 | 78 |
| 800 | M3GP 450LA 4 | 3GGP452510-**M | 1491 | 96,7 | 96,7 | 96,2 | 0,86 | 1388 | 7 | 5121 | 1,3 | 2,8 | 23 | 4050 | 85 |
| 900 | M3GP 450LB 4 | 3GGP452520-**M | 1491 | 96,7 | 96,5 | 96 | 0,85 | 1575 | 7 | 5761 | 1,3 | 2,8 | 25 | 4050 | 85 |
| 1000 | M3GP 450LC 4 | 3GGP452530-**M | 1491 | 96,7 | 96,7 | 96,1 | 0,86 | 1724 | 6,8 | 6404 | 1,3 | 2,7 | 30 | 4350 | 85 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_n$A | $I_s/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 110 | M3GP 280MLB 4 | 3GGP282420-**M | 1489 | 96,3 | 96,3 | 95,7 | 0,8 | 205 | 8,8 | 706 | 4 | 4 | 2,5 | 890 | 75 |
| 132 | M3GP 280MLC 4 | 3GGP282430-**M | 1489 | 96,4 | 96,4 | 95,8 | 0,8 | 247 | 8,3 | 846 | 3,5 | 4,1 | 2,5 | 890 | 75 |
| 200 | M3GP 315LKB 4 | 3GGP312820-**M | 1490 | 96,7 | 96,9 | 96,8 | 0,87 | 346 | 7,6 | 1282 | 2,5 | 2,9 | 5 | 1480 | 74 |
| 250 | M3GP 315LKC 4 | 3GGP312830-**M | 1490 | 96,7 | 96,9 | 96,8 | 0,87 | 432 | 7,8 | 1601 | 2,3 | 3 | 5,5 | 1600 | 74 |
| 315 | M3GP 315LKE 4 | 3GGP312850-**M | 1488 | 96,7 | 97 | 97 | 0,84 | 558 | 7,3 | 2029 | 2,5 | 3,1 | 4,6 | 1540 | 72 |

# Technical data

## IE4 Ex t cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE4 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_s/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 18.5 | M3GP 200MLA 6 | 3GGP203410-**M | 991 | 93,4 | 93,7 | 93,2 | 0,8 | 35,7 | 8,1 | 178 | 3 | 3,6 | 0,531 | 306 | 63 |
| 22 | M3GP 200MLC 6 | 3GGP203430-**M | 990 | 93,7 | 93,7 | 93,2 | 0,77 | 44,3 | 8,6 | 212 | 3 | 3,8 | 0,545 | 311 | 63 |
| 30 | M3GP 225SMA 6 | 3GGP223210-**M | 988 | 94,2 | 94,5 | 94,1 | 0,78 | 59,2 | 7,3 | 290 | 3 | 3,4 | 0,813 | 369 | 63 |
| 37 | M3GP 250SMA 6 | 3GGP253210-**M | 992 | 94,5 | 94,9 | 94,8 | 0,76 | 74 | 8,6 | 357 | 3,7 | 3,7 | 1,49 | 457 | 63 |
| 45 | M3GP 280SMB 6 | 3GGP283220-**M | 992 | 94,8 | 95,1 | 94,6 | 0,85 | 80,9 | 7,5 | 434 | 2,4 | 2,6 | 2,2 | 680 | 65 |
| 55 | M3GP 280SMC 6 | 3GGP283230-**M | 990 | 95,1 | 95,4 | 95,1 | 0,85 | 99,4 | 6,8 | 506 | 2,4 | 2,6 | 2,85 | 725 | 65 |
| 75 | M3GP 315SMC 6 | 3GGP313230-**M | 994 | 95,4 | 95,6 | 95,2 | 0,83 | 138 | 7 | 721 | 2,2 | 2,8 | 4,9 | 1000 | 67 |
| 90 | M3GP 315SMD 6 | 3GGP313240-**M | 994 | 95,6 | 95,8 | 95,4 | 0,81 | 170 | 7,2 | 864 | 2,4 | 2,9 | 4,9 | 1040 | 67 |
| 110 | M3GP 315MLB 6 | 3GGP313420-**M | 994 | 95,8 | 96 | 95,8 | 0,83 | 202 | 6,9 | 1057 | 2,3 | 2,7 | 6,3 | 1200 | 68 |
| 132 | M3GP 315LKA 6 | 3GGP313810-**M | 993 | 96 | 96,2 | 96 | 0,82 | 243 | 6,9 | 1269 | 2,4 | 2,7 | 7,3 | 1410 | 68 |
| 160 | M3GP 355SMB 6 | 3GGP353220-**M | 995 | 96,2 | 96,2 | 95,7 | 0,82 | 294 | 7 | 1536 | 2,1 | 2,7 | 9,7 | 1680 | 73 |
| 200 | M3GP 355SMC 6 | 3GGP353230-**M | 995 | 96,3 | 96,5 | 96,1 | 0,82 | 367 | 7,3 | 1920 | 2,3 | 2,8 | 11,3 | 1820 | 73 |
| 250 | M3GP 355MLB 6 | 3GGP353420-**M | 995 | 96,5 | 96,7 | 96,6 | 0,83 | 456 | 7,1 | 2399 | 2,3 | 2,7 | 13,5 | 2180 | 73 |
| 315 | M3GP 355LKA 6 | 3GGP353810-**M | 994 | 96,6 | 96,7 | 96,5 | 0,83 | 576 | 6,9 | 3026 | 2,3 | 2,6 | 15,5 | 2500 | 76 |
| 355 | M3GP 355LKB 6 | 3GGP353820-**M | 995 | 96,6 | 96,6 | 96 | 0,81 | 668 | 7,7 | 3407 | 2,7 | 2,9 | 16,5 | 2600 | 76 |
| 400 | M3GP 400LA 6 | 3GGP403510-**M | 994 | 96,6 | 96,7 | 96,3 | 0,8 | 747 | 7,5 | 3843 | 2,8 | 3,1 | 17 | 2900 | 76 |
| 450 | M3GP 400LB 6 | 3GGP403520-**M | 995 | 96,6 | 96,5 | 95,7 | 0,81 | 830 | 8,3 | 4319 | 3,4 | 3,6 | 22 | 3300 | 76 |
| 500 | M3GP 400LC 6 | 3GGP403530-**M | 995 | 96,6 | 96,5 | 95,9 | 0,82 | 911 | 7,8 | 4799 | 3,2 | 3,4 | 22 | 3300 | 76 |
| 560 | M3GP 400LD 6 | 3GGP403540-**M | 993 | 96,6 | 96,6 | 96,1 | 0,85 | 984 | 7,4 | 5386 | 2,4 | 2,8 | 24 | 3400 | 77 |
| 630 | M3GP 450LA 6 | 3GGP453510-**M | 995 | 96,6 | 96,6 | 95,9 | 0,82 | 1146 | 7,5 | 6046 | 1,4 | 3,2 | 31 | 4150 | 81 |
| 710 | M3GP 450LB 6 | 3GGP453520-**M | 995 | 96,6 | 96,7 | 96,2 | 0,85 | 1244 | 7 | 6814 | 1,3 | 2,5 | 37 | 4500 | 81 |
| 800 | M3GP 450LC 6 | 3GGP453530-**M | 995 | 96,6 | 96,6 | 96,1 | 0,84 | 1415 | 7,2 | 7677 | 1,3 | 2,7 | 41 | 4800 | 81 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_s/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 75 | M3GP 280SMD 6 | 3GGP283240-**M | 990 | 95,4 | 95,7 | 95,5 | 0,81 | 141 | 7 | 726 | 2,8 | 2,8 | 2,5 | 730 | 65 |
| 160 | M3GP 315LKC 6 | 3GGP313830-**M | 994 | 96,2 | 96,4 | 96,3 | 0,82 | 297 | 7,4 | 1537 | 2,7 | 2,9 | 9,2 | 1600 | 68 |
| 200 | M3GP 315LKE 6 | 3GGP313850-**M | 993 | 96,3 | 96,5 | 96,2 | 0,81 | 372 | 7 | 1923 | 2,2 | 2,8 | 9,2 | 1600 | 76 |

# Technical data

## IE3 Ex t cast iron motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.37 | M3GP 71MC 2 | 3GGP071330-**K | 2743 | 73,8 | 74,4 | 71,7 | 0,76 | 0,94 | 4,9 | 1,26 | 2,33 | 2,81 | 0,00088 | 10 | 58 |
| 0.55 | M3GP 71ME 2 | 3GGP071350-**K | 2755 | 77,8 | 79,6 | 78,8 | 0,83 | 1,25 | 6,8 | 1,9 | 2,8 | 3,1 | 0,00045 | 11 | 56 |
| 0.75 | M3GP 80MD 2 | 3GGP081340-**K | 2872 | 80,7 | 81,1 | 79,4 | 0,87 | 1,51 | 6,2 | 2,43 | 2,88 | 3,43 | 0,0012 | 18 | 57 |
| 1.1 | M3GP 80MG 2 | 3GGP081370-**K | 2862 | 82,7 | 83,7 | 82,8 | 0,87 | 2,1 | 6,3 | 3,65 | 3,03 | 3,5 | 0,0014 | 19 | 60 |
| 1.5 | M3GP 90LB 2 | 3GGP091520-**K | 2892 | 84,2 | 85,3 | 84,5 | 0,89 | 2,7 | 7,3 | 4,8 | 1,97 | 3,24 | 0,0031 | 31 | 69 |
| 2.2 | M3GP 90LC 2 | 3GGP091530-**K | 2900 | 85,9 | 86,7 | 85,7 | 0,89 | 4 | 9,1 | 7,27 | 3,35 | 4,09 | 0,0044 | 35 | 64 |
| 3 | M3GP 100LKA 2 | 3GGP101810-**K | 2907 | 87,1 | 87,6 | 86,5 | 0,89 | 5,4 | 8,8 | 9,9 | 3,25 | 4,32 | 0,0086 | 50 | 68 |
| 4 | M3GP 112MG 2 | 3GGP111370-**K | 2882 | 88,1 | 89,7 | 90,3 | 0,93 | 7 | 8,1 | 13,3 | 2,8 | 3,6 | 0,0132 | 56 | 70 |
| 5.5 | M3GP 132SMF 2 | 3GGP131260-**K | 2902 | 89,2 | 89,9 | 89,4 | 0,9 | 9,7 | 7,3 | 18,2 | 2,72 | 3,6 | 0,0218 | 77 | 67 |
| 7.5 | M3GP 132SMG 2 | 3GGP131270-**K | 2907 | 90,1 | 91 | 91 | 0,9 | 13,2 | 8,1 | 24,7 | 2,66 | 3,74 | 0,0218 | 77 | 70 |
| 11 | M3GP 160MLA 2 | 3GGP161410-**K | 2943 | 91,2 | 91,7 | 91,3 | 0,92 | 18,7 | 8,1 | 35,6 | 2,7 | 3,4 | 0,052 | 141 | 69 |
| 15 | M3GP 160MLB 2 | 3GGP161420-**K | 2943 | 91,9 | 92,8 | 92,6 | 0,92 | 25,4 | 8,4 | 48,6 | 3,1 | 3,4 | 0,062 | 170 | 69 |
| 18.5 | M3GP 160MLC 2 | 3GGP161430-**K | 2942 | 92,4 | 93 | 92,8 | 0,93 | 30,8 | 8,3 | 60 | 3,1 | 3,6 | 0,072 | 183 | 69 |
| 22 | M3GP 180MLA 2 | 3GGP181410-**K | 2957 | 92,7 | 93,2 | 93 | 0,91 | 37,4 | 8,1 | 71 | 2,6 | 3,2 | 0,116 | 234 | 69 |
| 30 | M3GP 200MLA 2 | 3GGP201410-**K | 2958 | 93,3 | 93,7 | 93,6 | 0,9 | 51 | 7,8 | 96,8 | 2,8 | 3,1 | 0,196 | 289 | 77 |
| 37 | M3GP 200MLB 2 | 3GGP201420-**K | 2960 | 93,7 | 94,1 | 93,9 | 0,86 | 65,5 | 8,8 | 119 | 3,1 | 3,4 | 0,217 | 314 | 72 |
| 45 | M3GP 225SMA 2 | 3GGP221210-**K | 2972 | 94 | 94,2 | 93,8 | 0,89 | 76,8 | 7,8 | 144 | 3,1 | 3 | 0,323 | 409 | 74 |
| 55 | M3GP 250SMA 2 | 3GGP251210-**K | 2975 | 94,3 | 94,5 | 94,1 | 0,89 | 93,6 | 8 | 176 | 2,8 | 3,3 | 0,579 | 452 | 75 |
| 75 | M3GP 280SMB 2 | 3GGP281220-**K | 2980 | 94,7 | 94,7 | 94 | 0,87 | 129 | 7,8 | 240 | 2,5 | 3,3 | 0,9 | 665 | 77 |
| 90 | M3GP 280SMC 2 | 3GGP281230-**K | 2981 | 95 | 94,8 | 94,1 | 0,88 | 153 | 8 | 288 | 2,95 | 3,1 | 1,15 | 725 | 77 |
| 110 | M3GP 315SMB 2 | 3GGP311220-**K | 2982 | 95,2 | 95,2 | 94,3 | 0,88 | 189 | 6,7 | 352 | 1,9 | 2,6 | 1,4 | 940 | 77 |
| 132 | M3GP 315SMC 2 | 3GGP311230-**K | 2986 | 95,4 | 95,5 | 95,1 | 0,88 | 226 | 7,9 | 422 | 2,4 | 3 | 1,7 | 1025 | 77 |
| 160 | M3GP 315MLA 2 | 3GGP311410-**K | 2983 | 95,6 | 95,9 | 95,6 | 0,9 | 268 | 7,3 | 512 | 2,2 | 2,7 | 2,1 | 1190 | 77 |
| 200 | M3GP 355SMA 2 | 3GGP351210-**K | 2985 | 95,8 | 95,5 | 94,5 | 0,89 | 336 | 7,6 | 640 | 2 | 3,1 | 3 | 1600 | 83 |
| 250 | M3GP 355SMB 2 | 3GGP351220-**K | 2983 | 95,8 | 96 | 95,5 | 0,9 | 415 | 7,6 | 800 | 2,2 | 3 | 3,4 | 1680 | 83 |
| 315 | M3GP 355SMC 2 | 3GGP351230-**K | 2984 | 95,8 | 95,8 | 95,1 | 0,89 | 533 | 7,8 | 1008 | 2,3 | 2,8 | 3,6 | 1750 | 83 |
| 355 | M3GP 355MLA 2 | 3GGP351410-**K | 2981 | 95,8 | 96,1 | 95,7 | 0,9 | 595 | 7,5 | 1137 | 2,3 | 2,6 | 4,1 | 2000 | 83 |
| 400 | M3GP 355MLB 2 | 3GGP351420-**K | 2982 | 95,8 | 95,6 | 94,7 | 0,88 | 677 | 7,1 | 1280 | 2,3 | 2,9 | 4,1 | 2000 | 83 |
| 450 | M3GP 355MLC 2 | 3GGP351430-**K | 2983 | 95,8 | 95,8 | 95 | 0,9 | 743 | 7,9 | 1440 | 2,2 | 2,9 | 4,3 | 2080 | 83 |
| 500 | M3GP 355LKA 2 | 3GGP351810-**K | 2982 | 95,8 | 95,8 | 95,3 | 0,9 | 827 | 7,5 | 1601 | 2 | 3,9 | 4,8 | 2320 | 83 |
| 560 | M3GP 400LA 2 | 3GGP401510-**K | 2988 | 95,8 | 95,8 | 94,9 | 0,89 | 934 | 7,8 | 1789 | 2,46 | 3,67 | 7,9 | 2950 | 82 |
| 560 | M3GP 355LKB 2 | 3GGP351820-**K | 2983 | 95,8 | 95,8 | 95,1 | 0,9 | 925 | 8 | 1792 | 2,2 | 4,1 | 5,2 | 2460 | 83 |
| 630 | M3GP 400LB 2 | 3GGP401520-**K | 2987 | 95,8 | 95,5 | 94,8 | 0,89 | 1049 | 7,6 | 2014 | 2,56 | 3,7 | 8,2 | 3050 | 82 |
| 710 | M3GP 400LC 2 | 3GGP401530-**K | 2987 | 95,8 | 95,7 | 94,9 | 0,89 | 1178 | 7,2 | 2270 | 2,56 | 3,4 | 9,3 | 3300 | 82 |
| 800 | M3GP 450LA 2 | 3GGP451510-**K | 2990 | 95,8 | 95,5 | 94,5 | 0,87 | 1362 | 7,8 | 2555 | 1,26 | 3,39 | 12,2 | 4000 | 85 |
| 900 | M3GP 450LB 2 | 3GGP451520-**K | 2990 | 95,8 | 95,5 | 94,7 | 0,87 | 1534 | 7,6 | 2874 | 1,49 | 3,09 | 13,5 | 4200 | 85 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3GP 315MLB 2 | 3GGP311420-**K | 2983 | 96,4 | 96,7 | 96,6 | 0,9 | 333 | 6,8 | 640 | 1,9 | 2,6 | 2,2 | 1220 | 77 |
| 250 | M3GP 315LKB 2 | 3GGP311820-**K | 2982 | 95,8 | 96,2 | 96,2 | 0,91 | 413 | 7,9 | 800 | 2,5 | 2,7 | 2,9 | 1540 | 77 |

# Technical data

## IE3 Ex t cast iron motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Efficiency IEC 60034-30-1: 2014 | | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_I/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.25 | M3GP 71MD 4 | 3GGP072340-**K | 1416 | 73,5 | 75,1 | 73,8 | 0,8 | 0,6 | 4,8 | 1,68 | 2 | 2,6 | 0,0009 | 11 | 45 |
| 0.37 | M3GP 71MLE 4 | 3GGP072450-**K | 1432 | 77,3 | 77,4 | 74,5 | 0,76 | 0,9 | 5,8 | 2,46 | 2,7 | 3,3 | 0,00122 | 15 | 45 |
| 0.55 | M3GP 80MLD 4 | 3GGP082440-**K | 1439 | 80,8 | 82,2 | 81,4 | 0,81 | 1,18 | 6,3 | 3,6 | 2,3 | 3,29 | 0,0028 | 20 | 45 |
| 0.75 | M3GP 80MLG 4 | 3GGP082470-**K | 1445 | 82,5 | 83,5 | 82,2 | 0,79 | 1,62 | 6,9 | 4,97 | 2,6 | 3,76 | 0,0033 | 22 | 57 |
| 1.1 | M3GP 90LC 4 | 3GGP092530-**K | 1444 | 84,1 | 84,6 | 83,2 | 0,79 | 2,3 | 7,2 | 7,28 | 3,64 | 4,2 | 0,0067 | 33 | 56 |
| 1.5 | M3GP 90LD 4 | 3GGP092540-**K | 1439 | 85,3 | 86,4 | 85,9 | 0,78 | 3,1 | 7,8 | 9,95 | 3,35 | 4,47 | 0,0072 | 34 | 56 |
| 2.2 | M3GP 100LKA 4 | 3GGP102810-**K | 1452 | 86,7 | 87,8 | 87,7 | 0,83 | 4,2 | 8,9 | 14,46 | 3,4 | 4,1 | 0,0146 | 49 | 56 |
| 3 | M3GP 100LKB 4 | 3GGP102820-**K | 1452 | 87,7 | 89 | 89 | 0,83 | 5,8 | 9 | 19,7 | 3,2 | 4 | 0,0146 | 49 | 58 |
| 4 | M3GP 112MG 4 | 3GGP112370-**K | 1454 | 88,6 | 89,2 | 88,3 | 0,75 | 8,7 | 6,9 | 26,3 | 3,1 | 3,3 | 0,0176 | 52 | 59 |
| 5.5 | M3GP 132SMF 4 | 3GGP132260-**K | 1462 | 89,6 | 90,6 | 90,6 | 0,81 | 10,8 | 7,3 | 35,87 | 2,41 | 3,39 | 0,0401 | 81 | 67 |
| 7.5 | M3GP 132SMG 4 | 3GGP132270-**K | 1457 | 90,4 | 91,4 | 91,5 | 0,81 | 14,8 | 7,3 | 49,1 | 2,39 | 3,38 | 0,0401 | 81 | 64 |
| 11 | M3GP 160MLA 4 | 3GGP162410-**K | 1473 | 91,4 | 91,8 | 91,3 | 0,84 | 20,4 | 7,7 | 71,3 | 2,6 | 2,9 | 0,108 | 188 | 62 |
| 15 | M3GP 160MLB 4 | 3GGP162420-**K | 1474 | 92,1 | 92,7 | 92,4 | 0,84 | 27,8 | 7,9 | 97,1 | 2,8 | 3,3 | 0,125 | 187 | 62 |
| 18.5 | M3GP 180MLA 4 | 3GGP182410-**K | 1481 | 92,6 | 92,9 | 92,3 | 0,82 | 34,9 | 7,6 | 119 | 3 | 3,1 | 0,217 | 235 | 62 |
| 22 | M3GP 180MLB 4 | 3GGP182420-**K | 1480 | 93 | 93,5 | 93,2 | 0,82 | 41,5 | 8,2 | 141 | 2,8 | 3,1 | 0,217 | 235 | 62 |
| 30 | M3GP 200MLA 4 | 3GGP202410-**K | 1484 | 93,6 | 93,8 | 93,2 | 0,84 | 54,6 | 8,3 | 193 | 3 | 3,3 | 0,366 | 319 | 63 |
| 37 | M3GP 225SMA 4 | 3GGP222210-**K | 1482 | 93,9 | 94,6 | 94,5 | 0,86 | 65,4 | 7,7 | 238 | 2,8 | 3,1 | 0,536 | 398 | 66 |
| 45 | M3GP 225SMB 4 | 3GGP222220-**K | 1482 | 94,2 | 94,7 | 94,6 | 0,85 | 80,2 | 7,9 | 289 | 2,8 | 3,2 | 0,536 | 398 | 66 |
| 55 | M3GP 250SMA 4 | 3GGP252210-**K | 1485 | 94,6 | 95,2 | 94,9 | 0,85 | 97,8 | 7,9 | 353 | 3 | 3,3 | 0,933 | 476 | 67 |
| 75 | M3GP 280SMB 4 | 3GGP282220-**K | 1486 | 95 | 95,4 | 95,3 | 0,85 | 134 | 7,4 | 482 | 2,5 | 2,8 | 1,5 | 665 | 72 |
| 90 | M3GP 280SMC 4 | 3GGP282230-**K | 1487 | 95,2 | 95,5 | 95,1 | 0,85 | 161 | 7,9 | 578 | 2,9 | 3 | 1,85 | 725 | 72 |
| 110 | M3GP 315SMC 4 | 3GGP312230-**K | 1491 | 95,4 | 95,7 | 95,2 | 0,85 | 194 | 7,8 | 704 | 2,4 | 3,1 | 2,9 | 1000 | 68 |
| 132 | M3GP 315SMD 4 | 3GGP312240-**K | 1490 | 95,6 | 95,8 | 95,4 | 0,85 | 234 | 7,9 | 846 | 2,6 | 3,2 | 3,2 | 1065 | 68 |
| 160 | M3GP 315MLB 4 | 3GGP312420-**K | 1490 | 95,8 | 96 | 95,6 | 0,86 | 278 | 7,9 | 1026 | 2,7 | 3 | 3,9 | 1220 | 68 |
| 200 | M3GP 355SMA 4 | 3GGP352210-**K | 1491 | 96 | 96,1 | 95,7 | 0,87 | 345 | 7,3 | 1282 | 2,1 | 2,7 | 5,9 | 1610 | 74 |
| 250 | M3GP 355SMB 4 | 3GGP352220-**K | 1491 | 96 | 96,1 | 95,9 | 0,87 | 433 | 7,8 | 1601 | 2,5 | 2,9 | 6,9 | 1780 | 74 |
| 315 | M3GP 355SMC 4 | 3GGP352230-**K | 1490 | 96 | 96,1 | 95,9 | 0,85 | 554 | 7,4 | 2017 | 2,4 | 2,9 | 7,2 | 1820 | 74 |
| 355 | M3GP 355MLA 4 | 3GGP352410-**K | 1491 | 96 | 96,3 | 95,9 | 0,87 | 616 | 7,9 | 2274 | 2,7 | 2,9 | 8,4 | 2140 | 78 |
| 400 | M3GP 355MLB 4 | 3GGP352420-**K | 1489 | 96 | 96 | 95,5 | 0,85 | 705 | 6,8 | 2565 | 2,3 | 2,6 | 8,4 | 2140 | 78 |
| 450 | M3GP 355MLC 4 | 3GGP352430-**K | 1490 | 96 | 96,1 | 95,6 | 0,86 | 780 | 6,9 | 2884 | 2,3 | 2,9 | 8,4 | 2140 | 78 |
| 500 | M3GP 355LKA 4 | 3GGP352810-**K | 1490 | 96 | 96 | 95,3 | 0,86 | 865 | 6,8 | 3204 | 2 | 3 | 10 | 2500 | 78 |
| 560 | M3GP 400LA 4 | 3GGP402510-**K | 1491 | 96 | 96 | 95,4 | 0,85 | 982 | 7,4 | 3586 | 2,4 | 2,8 | 15 | 3200 | 78 |
| 630 | M3GP 400LB 4 | 3GGP402520-**K | 1491 | 96 | 96 | 95,4 | 0,86 | 1077 | 7,6 | 4034 | 2,2 | 2,9 | 16 | 3300 | 78 |
| 680 | M3GP 400LC 4 | 3GGP402530-**K | 1491 | 96 | 96 | 95,4 | 0,85 | 1206 | 7,7 | 4354 | 2,5 | 3,1 | 17 | 3400 | 78 |
| 800 | M3GP 450LA 4 | 3GGP452510-**K | 1491 | 96 | 96 | 95,4 | 0,86 | 1396 | 7 | 5121 | 1,3 | 2,8 | 23 | 4050 | 85 |
| 900 | M3GP 450LB 4 | 3GGP452520-**K | 1492 | 96 | 95,9 | 95,2 | 0,86 | 1573 | 7 | 5761 | 1,3 | 2,8 | 25 | 4350 | 85 |
| 1000 | M3GP 450LC 4 | 3GGP452530-**K | 1491 | 96 | 96 | 95,3 | 0,86 | 1724 | 6,8 | 6404 | 1,3 | 2,7 | 30 | 4700 | 85 |

| Output kW | Motor type | Product code | Efficiency IEC 60034-30-1: 2014 | | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_I/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 200 | M3GP 315LKB 4 | 3GGP312820-**K | 1490 | 96,6 | 96,8 | 96,7 | 0,87 | 346 | 7,6 | 1282 | 2,5 | 2,9 | 5 | 1480 | 74 |
| 250 | M3GP 315LKC 4 | 3GGP312830-**K | 1490 | 96 | 96,2 | 96,1 | 0,87 | 432 | 7,8 | 1601 | 2,3 | 3 | 5,5 | 1600 | 74 |

# Technical data

## IE3 Ex t cast iron motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.18 | M3GP 71ME 6 | 3GGP073350-**K | 887 | 63,9 | 63,3 | 57,6 | 0,74 | 0,57 | 3,2 | 1,9 | 1,9 | 2,2 | 0,0009 | 10 | 45 |
| 0.25 | M3GP 80MA 6 | 3GGP083310-**K | 937 | 68,6 | 67,3 | 61,9 | 0,64 | 0,76 | 2,6 | 2,52 | 2,8 | 3,4 | 0,0019 | 14 | 47 |
| 0.37 | M3GP 80MD 6 | 3GGP083340-**K | 930 | 73,5 | 74,3 | 72 | 0,68 | 1 | 4,6 | 3,75 | 2,8 | 3,2 | 0,0028 | 16 | 47 |
| 0.55 | M3GP 80MLG 6 | 3GGP083470-**K | 937 | 77,2 | 77,9 | 76,1 | 0,63 | 1,56 | 4,4 | 5,6 | 2,8 | 3,2 | 0,0044 | 21 | 60 |
| 0.75 | M3GP 90LG 6 | 3GGP093570-**K | 938 | 78,9 | 80,4 | 79,7 | 0,74 | 1,8 | 4,8 | 7,7 | 2,42 | 2,73 | 0,0072 | 34 | 44 |
| 1.1 | M3GP 100LKG 6 | 3GGP103870-**K | 969 | 81 | 81,1 | 79 | 0,68 | 2,6 | 5,9 | 10,9 | 1,99 | 2,18 | 0,0025 | 47 | 49 |
| 1.5 | M3GP 112MH 6 | 3GGP113380-**K | 972 | 82,5 | 82,2 | 79,6 | 0,64 | 3,8 | 7 | 14,7 | 2,66 | 4,45 | 0,0196 | 53 | 66 |
| 2.2 | M3GP 132SMC 6 | 3GGP133230-**K | 978 | 84,3 | 84,4 | 82,7 | 0,69 | 5,1 | 5,4 | 21,5 | 1,96 | 2,6 | 0,0416 | 81 | 57 |
| 3 | M3GP 132SMD 6 | 3GGP133240-**K | 977 | 85,6 | 85,9 | 84,3 | 0,69 | 6,9 | 5,9 | 29 | 1,9 | 3,3 | 0,0416 | 82 | 57 |
| 4 | M3GP 132SMG 6 | 3GGP133270-**K | 974 | 86,8 | 87,4 | 86,6 | 0,69 | 9,3 | 5,6 | 38,7 | 1,8 | 2,84 | 0,0416 | 82 | 57 |
| 5.5 | M3GP 132SMH 6 | 3GGP133280-**K | 966 | 88 | 88,9 | 88,7 | 0,73 | 12,1 | 5 | 54,1 | 1,83 | 2,7 | 0,0654 | 79 | 57 |
| 7.5 | M3GP 160MLA 6 | 3GGP163410-**K | 980 | 89,1 | 89,9 | 89,3 | 0,78 | 15,2 | 7,9 | 73 | 1,7 | 2,8 | 0,114 | 172 | 59 |
| 11 | M3GP 160MLB 6 | 3GGP163420-**K | 979 | 90,3 | 90,9 | 90,2 | 0,74 | 23,5 | 8,5 | 107 | 2,2 | 3,9 | 0,131 | 198,7 | 59 |
| 15 | M3GP 180MLA 6 | 3GGP183410-**K | 981 | 91,2 | 91,5 | 90,4 | 0,77 | 30,4 | 5,5 | 146 | 1,7 | 2,7 | 0,225 | 234 | 59 |
| 18.5 | M3GP 200MLA 6 | 3GGP203410-**K | 990 | 91,7 | 92,1 | 91,4 | 0,77 | 37,3 | 7,5 | 178 | 2,6 | 3,2 | 0,448 | 291 | 63 |
| 22 | M3GP 200MLB 6 | 3GGP203420-**K | 990 | 92,2 | 92,6 | 91,9 | 0,79 | 43 | 7,8 | 212 | 2,6 | 3,2 | 0,531 | 318 | 63 |
| 30 | M3GP 225SMA 6 | 3GGP223210-**K | 989 | 92,9 | 93,5 | 93,3 | 0,81 | 56,8 | 7,9 | 289 | 2,8 | 3,1 | 0,813 | 392 | 63 |
| 37 | M3GP 250SMA 6 | 3GGP253210-**K | 991 | 93,3 | 93,8 | 93,6 | 0,83 | 68 | 7,7 | 356 | 2,7 | 2,9 | 1,49 | 467 | 63 |
| 45 | M3GP 280SMB 6 | 3GGP283220-**K | 992 | 93,7 | 94,1 | 93,5 | 0,85 | 80,9 | 7,5 | 434 | 2,4 | 2,6 | 2,2 | 680 | 65 |
| 55 | M3GP 280SMC 6 | 3GGP283230-**K | 990 | 94,1 | 94,4 | 94,1 | 0,85 | 99,4 | 6,8 | 506 | 2,4 | 2,6 | 2,85 | 725 | 65 |
| 75 | M3GP 315SMC 6 | 3GGP313230-**K | 994 | 94,6 | 94,8 | 94,4 | 0,83 | 138 | 7 | 721 | 2,2 | 2,8 | 4,9 | 1000 | 67 |
| 90 | M3GP 315SMD 6 | 3GGP313240-**K | 994 | 94,9 | 95,1 | 94,7 | 0,81 | 170 | 7,2 | 864 | 2,4 | 2,9 | 4,9 | 1040 | 67 |
| 110 | M3GP 315MLB 6 | 3GGP313420-**K | 994 | 95,1 | 95,3 | 95,1 | 0,83 | 202 | 6,9 | 1058 | 2,3 | 2,7 | 6,3 | 1200 | 68 |
| 132 | M3GP 315LKA 6 | 3GGP313810-**K | 993 | 95,4 | 95,6 | 95,4 | 0,82 | 243 | 6,9 | 1269 | 2,4 | 2,7 | 7,3 | 1410 | 68 |
| 160 | M3GP 355SMB 6 | 3GGP353220-**K | 995 | 95,6 | 95,6 | 95 | 0,82 | 294 | 7 | 1536 | 2,1 | 2,7 | 9,7 | 1680 | 73 |
| 200 | M3GP 355SMC 6 | 3GGP353230-**K | 995 | 95,8 | 96 | 95,6 | 0,82 | 367 | 7,3 | 1920 | 2,3 | 2,8 | 11,3 | 1820 | 73 |
| 250 | M3GP 355MLB 6 | 3GGP353420-**K | 995 | 95,8 | 96 | 95,9 | 0,83 | 456 | 7,1 | 2399 | 2,3 | 2,7 | 13,5 | 2180 | 73 |
| 315 | M3GP 355LKA 6 | 3GGP353810-**K | 994 | 95,8 | 96 | 95,6 | 0,83 | 576 | 6,9 | 3026 | 2,3 | 2,6 | 15,5 | 2500 | 76 |
| 355 | M3GP 355LKB 6 | 3GGP353820-**K | 995 | 95,8 | 95,9 | 95,3 | 0,81 | 668 | 7,7 | 3407 | 2,7 | 2,9 | 16,5 | 2600 | 76 |
| 400 | M3GP 400LA 6 | 3GGP403510-**K | 993 | 95,8 | 95,8 | 95,1 | 0,82 | 731 | 7,1 | 3846 | 2,3 | 2,7 | 17 | 2900 | 76 |
| 450 | M3GP 400LB 6 | 3GGP403520-**K | 994 | 95,8 | 95,8 | 95,2 | 0,82 | 819 | 7,4 | 4323 | 2,4 | 2,5 | 20,5 | 3150 | 76 |
| 500 | M3GP 400LC 6 | 3GGP403530-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3300 | 76 |
| 500 | M3GP 400LKC 6 | 3GGP403830-**K | 993 | 95,8 | 95,6 | 95,2 | 0,83 | 891 | 7,2 | 4809 | 2,5 | 2,7 | 22 | 3300 | 76 |
| 560 | M3GP 400LD 6 | 3GGP403540-**K | 993 | 95,8 | 95,8 | 95,2 | 0,85 | 984 | 7,4 | 5386 | 2,4 | 2,8 | 24 | 3400 | 77 |
| 630 | M3GP 450LA 6 | 3GGP453510-**K | 994 | 95,8 | 95,9 | 95,3 | 0,84 | 1127 | 6,5 | 6053 | 1,1 | 2,5 | 31 | 4150 | 81 |
| 710 | M3GP 450LB 6 | 3GGP453520-**K | 995 | 95,8 | 95,9 | 95,3 | 0,85 | 1244 | 7 | 6814 | 1,3 | 2,5 | 37 | 4500 | 81 |
| 800 | M3GP 450LC 6 | 3GGP453530-**K | 995 | 95,8 | 95,8 | 95,1 | 0,84 | 1415 | 7,2 | 7677 | 1,3 | 2,7 | 41 | 4800 | 81 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 160 | M3GP 315LKC 6 | 3GGP313830-**K | 994 | 95,6 | 95,8 | 95,7 | 0,82 | 297 | 7,4 | 1537 | 2,7 | 2,9 | 9,2 | 1600 | 68 |

# Technical data

## IE3 Ex t cast iron motors, 800 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_s/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **800 r/min = 8 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.12 | M3GP 71ME 8 | 3GGP074350-**K | 659 | 50,7 | 48,9 | 41,9 | 0,68 | 0,49 | 2,5 | 1,7 | 1,9 | 2,1 | 0,00107 | 11 | 43 |
| 0.75 | M3GP 100LKA 8 | 3GGP104810-**K | 710 | 75 | 74,5 | 70,5 | 0,65 | 2,13 | 4,4 | 10 | 2,35 | 2,8 | 0,00855 | 37 | 53 |
| 1.1 | M3GP 100LKB 8 | 3GGP104820-**K | 703 | 77,7 | 77,7 | 74,7 | 0,65 | 3,08 | 4,4 | 14,9 | 2,7 | 2,9 | 0,0128 | 45 | 53 |
| 1.5 | M3GP 112MC 8 | 3GGP114330-**K | 717 | 79,7 | 80,1 | 78,8 | 0,62 | 4,12 | 4,3 | 19,9 | 1,8 | 2,6 | 0,0194 | 53 | 55 |
| 2.2 | M3GP 132SMA 8 | 3GGP134210-**K | 725 | 81,9 | 82,3 | 80,2 | 0,64 | 5,8 | 5,2 | 28,9 | 2 | 3 | 0,0291 | 66 | 57 |
| 3 | M3GP 132SMG 8 | 3GGP134270-**K | 723 | 83,5 | 84,1 | 82,8 | 0,66 | 7,5 | 4,8 | 39,6 | 1,8 | 2,8 | 0,0375 | 76 | 57 |
| 4 | M3GP 160MLA 8 | 3GGP164410-**K | 734 | 84,8 | 85,1 | 83,2 | 0,65 | 10,3 | 4,5 | 52 | 1,8 | 2,3 | 0,091 | 148 | 59 |
| 5.5 | M3GP 160MLB 8 | 3GGP164420-**K | 732 | 86,2 | 87,1 | 86,1 | 0,69 | 13 | 5 | 71,7 | 2 | 2,35 | 0,091 | 150 | 59 |
| 7.5 | M3GP 160MLC 8 | 3GGP164430-**K | 733 | 87,3 | 88,2 | 87,2 | 0,69 | 17,6 | 5,1 | 97,7 | 2 | 2,4 | 0,12 | 167 | 59 |
| 11 | M3GP 180MLA 8 | 3GGP184410-**K | 731 | 88,6 | 89,2 | 88,4 | 0,7 | 25,3 | 5 | 143,6 | 2,1 | 2,1 | 0,2 | 219 | 59 |
| 15 | M3GP 200MLA 8 | 3GGP204410-**K | 737 | 89,6 | 90,5 | 90,1 | 0,74 | 32,5 | 5,2 | 194 | 2,1 | 2,4 | 0,45 | 290 | 60 |
| 18.5 | M3GP 225SMA 8 | 3GGP224210-**K | 736 | 90,1 | 90,8 | 90,1 | 0,74 | 39,8 | 5,2 | 240 | 2 | 2,25 | 0,669 | 350 | 63 |
| 22 | M3GP 225SMB 8 | 3GGP224220-**K | 736 | 90,6 | 91,6 | 91,5 | 0,73 | 47,5 | 5,3 | 285 | 2,26 | 2,47 | 0,722 | 363 | 63 |
| 30 | M3GP 250SMA 8 | 3GGP254210-**K | 741 | 91,3 | 91,7 | 91 | 0,71 | 67 | 5,6 | 386 | 2,7 | 2,7 | 1,4 | 440 | 63 |
| 37 | M3GP 280SMA 8 | 3GGP284210-**K | 741 | 91,8 | 92 | 91,3 | 0,79 | 72,6 | 7,3 | 476 | 1,7 | 3 | 1,85 | 605 | 65 |
| 45 | M3GP 280SMB 8 | 3GGP284220-**K | 741 | 92,2 | 92,3 | 91,7 | 0,78 | 89,2 | 7,6 | 579 | 1,8 | 3,1 | 2,2 | 645 | 65 |
| 55 | M3GP 315SMA 8 | 3GGP314210-**K | 742 | 92,5 | 93,1 | 92,5 | 0,8 | 106 | 7,1 | 707 | 1,6 | 2,7 | 3,2 | 830 | 62 |
| 75 | M3GP 315SMB 8 | 3GGP314220-**K | 741 | 93,1 | 93,2 | 93,1 | 0,82 | 146 | 7,1 | 966 | 1,7 | 2,7 | 4,1 | 930 | 62 |
| 90 | M3GP 315SMC 8 | 3GGP314230-**K | 741 | 93,4 | 93,7 | 93,4 | 0,82 | 170 | 7,4 | 1159 | 1,8 | 2,7 | 4,9 | 1000 | 64 |
| 110 | M3GP 315MLA 8 | 3GGP314410-**K | 740 | 93,7 | 94 | 94,1 | 0,83 | 211 | 7,3 | 1419 | 1,8 | 2,7 | 5,8 | 1150 | 72 |
| 132 | M3GP 355SMA 8 | 3GGP354210-**K | 744 | 94 | 93,9 | 93,4 | 0,79 | 256 | 7,5 | 1694 | 1,5 | 2,6 | 7,9 | 1520 | 69 |
| 160 | M3GP 355SMB 8 | 3GGP354220-**K | 744 | 94,3 | 94,3 | 93,8 | 0,79 | 293 | 7,6 | 2053 | 1,6 | 2,6 | 9,7 | 1680 | 69 |
| 200 | M3GP 355SMC 8 | 3GGP354230-**K | 742 | 94,6 | 95 | 94,8 | 0,79 | 385 | 7,4 | 2576 | 1,6 | 2,6 | 11,3 | 1820 | 69 |
| 250 | M3GP 355MLB 8 | 3GGP354420-**K | 743 | 94,6 | 94,7 | 94,1 | 0,8 | 472 | 7,5 | 3213 | 1,6 | 2,7 | 13,5 | 2180 | 72 |
| 315 | M3GP 400LA 8 | 3GGP404510-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 2900 | 71 |
| 315 | M3GP 400LKA 8 | 3GGP404810-**K | 744 | 94,6 | 94,5 | 94 | 0,8 | 592 | 7 | 4043 | 1,2 | 2,6 | 17 | 2900 | 71 |
| 355 | M3GP 400LB 8 | 3GGP404520-**K | 743 | 94,6 | 94,9 | 94,6 | 0,83 | 641 | 6,8 | 4562 | 1,2 | 2,5 | 21 | 3200 | 71 |
| 400 | M3GP 400LC 8 | 3GGP404530-**K | 744 | 94,6 | 94,9 | 94,3 | 0,81 | 735 | 6 | 5134 | 1,3 | 2,7 | 24 | 3400 | 71 |
| 450 | M3GP 450LA 8 | 3GGP454510-**K | 744 | 94,6 | 95 | 94,6 | 0,83 | 813 | 6 | 5775 | 1 | 2,5 | 26 | 3750 | 80 |
| 500 | M3GP 450LB 8 | 3GGP454520-**K | 744 | 94,6 | 94,7 | 94,5 | 0,83 | 902 | 6,4 | 6417 | 1 | 2,6 | 29 | 4000 | 80 |
| 560 | M3GP 450LC 8 | 3GGP454530-**K | 744 | 94,6 | 94,9 | 94,2 | 0,81 | 1038 | 7 | 7188 | 1,2 | 2,9 | 35 | 4350 | 80 |
| 630 | M3GP 450LD 8 | 3GGP454540-**K | 745 | 94,6 | 94,8 | 94 | 0,82 | 1162 | 7,6 | 8075 | 1,3 | 3,2 | 41 | 4800 | 80 |

# Variant codes

## Cast iron motors

Variant codes specify additional options and features to the standard motor. The desired features are listed as three-digit variant codes in the motor order. Note also that there are variants that cannot be used together

Most of the variant codes apply to IE2, IE3, and IE4 motors. However, confirm the availability of variants for IE3 motors with your ABB sales office before making an order.

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| **Administration** | | | | | | | | | | | | | | | | | |
| 529 | Customer witnessed visual inspection of complete order line. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 530 | Two-year extension on standard warranty | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 531 | Sea freight packing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 533 | Wooden sea freight packing | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 590 | Mounting of customer supplied part other than coupling. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 648 | Rating plate in special language | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 999 | Case specific design requiring a quotation | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Balancing** | | | | | | | | | | | | | | | | | |
| 417 | Vibration acc. to Grade B (IEC 60034-14). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 423 | Balanced without key. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 424 | Full-key balancing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Bearings and Lubrication** | | | | | | | | | | | | | | | | | |
| 036 | Transport lock for bearings. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 037 | Roller bearing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 040 | Heat-resistant grease | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 043 | SPM compatible nipples for vibration measurement | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| 058 | Angular contact bearing at D-end, shaft force away from bearing. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 059 | Angular contact bearing at N-end, shaft force towards bearing. | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● |
| 060 | Angular contact bearing at D-end, shaft force towards bearing. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 061 | Angular contact bearing at N-end, shaft force away from bearing. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 107 | Pt100 2-wire in bearings. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 128 | Double PT100, 2-wire in bearings | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 129 | Double PT100, 3-wire in bearings | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 130 | Pt100 3-wire in bearings. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 188 | 63-series bearing in D-end | ● | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 194 | 2Z bearings greased for life at both ends. | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | - | - | - | - | - |
| 433 | Outlet grease collector | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 506 | Nipples for vibration measurement : SKF Marlin Quick Connect stud CMSS-2600-3 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 593 | Bearings grease suitable for food and beverage industry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 654 | Provision for vibration sensors (M8x1) | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 795 | Lubrication information plate | - | - | - | - | - | - | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| 796 | Grease nipples JIS B 1575 PT 1/8 Type A | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 797 | Stainless steel SPM nipples | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 798 | Stainless steel grease nipples | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 799 | Grease nipples flat type DIN 3404, thread M10x1 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 800 | Grease nipples JIS B 1575 PT 1/8" pin type | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Branch standard designs** | | | | | | | | | | | | | | | | | |
| 178 | Stainless steel / acid proof bolts. | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 204 | Jacking bolts for foot mounted motors. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ |
| 209 | Non-standard voltage or frequency, (special winding). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 396 | Motor designed for minimum ambient temperature -20 °C to -40 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 397 | Motor designed for minimum ambient temperature -40 °C to -55 °C, with space heaters (code 450/451 must be added) | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 398 | Motor designed for minimum ambient temperature -20 °C to -40 °C | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 399 | Motor designed for minimum ambient temperature -40 °C to -55 °C | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 425 | Corrosion protected stator and rotor core. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 524 | Special run-out tolerances on flange and shaft for close coupled pump applications. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 786 | Special design shaft upwards (V3, V35, V6) for outdoor mounting. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - |
| **Cooling system** | | | | | | | | | | | | | | | | | |
| 044 | Unidirectional fan for reduced noise level. Rotation clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 045 | Unidirectional fan for reduced noise level. Rotation counter clockwise seen from D-end. Available only for 2-pole motors. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 068 | Light alloy metal fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 183 | Separate motor cooling (fan axial, N-end). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 206 | Steel fan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 514 | Separate motor cooling (fan on top) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● |
| 791 | Stainless steel fan cover | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Coupling** | | | | | | | | | | | | | | | | | |
| 035 | Assembly of customer supplied coupling-half. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Documentation** | | | | | | | | | | | | | | | | | |
| 141 | Binding 2D main dimension drawing. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 370 | Motor model drawing in 3D | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 374 | Binding 2D motor detailed drawing | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 536 | Photos of manufactured motors | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 537 | Advanced data sheet | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 722 | Rotor dimension drawing (incl. torsional stiffness). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 777 | Premium documentation package | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Drain holes** | | | | | | | | | | | | | | | | | |
| 065 | Plugged existing drain holes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 448 | Draining holes with metal plugs. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Earthing Bolt** | | | | | | | | | | | | | | | | | |
| 525 | External earthing bolts on motor feet | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Hazardous Environments** | | | | | | | | | | | | | | | | | |
| 336 | Ex t, Dust group III C T125 Db, IP6X (conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 337 | Ex t, Dust group III C T125 Dc, IP6X (conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 338 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIB T125C Dc (non-conductive dust), IP5X. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 339 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIC T125C Dc (conductive dust), IP6X. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 516 | Temperature detectors approved to be connected to an Ex i circuit | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 807 | UL certified Class 1, Div.2 Group A, B, C and D, T3. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 810 | UL certified Class II, Div. 2 Group F and G, T4. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 813 | Thermistor-based surface temperature protection T4 for frequency converter duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 814 | Ex t (DIP) motors, temperature class T 150C. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 334 | Ex t, Dust group III B T125C Db, IP6X (non-conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 335 | Ex t, Dust group III B T125C Dc, IP5X (non-conductive dust) acc. IEC/EN60079-31. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Heating elements** | | | | | | | | | | | | | | | | | |
| 450 | Heating element, 100-120 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 451 | Heating element, 200 - 240 V | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Insulation system** | | | | | | | | | | | | | | | | | |
| 014 | Winding insulation class H. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 405 | Special winding insulation for frequency converter supply. | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 406 | Winding insulation for supply > 690 <= 1000 volts | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Marine** | | | | | | | | | | | | | | | | | |
| 024 | Fulfilling Bureau Veritas (BV) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 025 | Fulfilling DNV requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 026 | Fulfilling Lloyds Register of Shipping (LR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 027 | Fulfilling American Bureau of Shipping (ABS) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 050 | Fulfilling Registro Italiano Navale (RINA) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 096 | Fulfilling Lloyds Register of Shipping (LR) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 186 | Fulfilling DNV requirements, without certificate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 481 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 483 | Fulfilling China Classification Societies (CCS) requirements (Beijing), with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 484 | Fulfilling Korea Register of Shipping (KR) requirements, with certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 491 | Fulfilling Nippon Kaiji Kyokai (NK) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 492 | Fulfilling Registro Italiano Navale (RINA) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 493 | Fulfilling China Classification Societies (CCS) requirements (Beijing), without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 494 | Fulfilling Korea Register of Shipping (KR) requirements, without certificate. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 496 | Fulfilling Bureau Veritas (BV) requirements, without certificate(non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 675 | Fulfilling American Bureau of Shipping (ABS) requirements, without certificate (non-essential duty only) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mounting arrangements** | | | | | | | | | | | | | | | | | |
| 008 | IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3). | ● | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 009 | IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 047 | IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5). | ● | ● | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 066 | Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 235 | Flange FF 165. | - | ○ | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 236 | Flange FT 165. | - | - | ● | ● | ● | ● | - | - | - | - | - | - | - | - | - | - |
| 305 | Additional lifting lugs. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| **Painting** | | | | | | | | | | | | | | | | | |
| 105 | Paint thickness report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 114 | Special paint color, standard grade | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 115 | Painting system C4,durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 168 | Primer paint only. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 303 | Painted insulation layer on inside of the terminal boxes. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 710 | Norsok M-501 rev. 7 Coating system no. 2B | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 711 | Painting system C5, durability High | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 712 | Painting system C5-M according to Petrobras specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 713 | Painting system according Total Egina specification. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 717 | Painting system C4, durability High | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 719 | Painting system CX | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 754 | Painting system C5, durability Medium | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 755 | Norsok M-501 revision 6, Coating system no. 1 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Protection** | | | | | | | | | | | | | | | | | |
| 005 | Protective roof | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 072 | Radial seal at D-end. Not possible for 2-pole , 280 and 315 frames | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | - | - | - |
| 073 | Sealed against oil at D-end. | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | - | - | - |
| 158 | Degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 250 | Degree of protection IP66 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 401 | Protective roof, horizontal motor. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 403 | Degree of protection IP56. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 434 | Degree of protection IP56, open deck. | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 783 | Labyrinth sealing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| **Rating & instruction plates** | | | | | | | | | | | | | | | | | |
| 002 | Restamping voltage, frequency and output, continuous duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 004 | Additional text on std rating plate (max 12 digits on free text line). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 095 | Restamping output (maintained voltage, frequency), intermittent duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 126 | Tag plate | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 135 | Mounting of additional identification plate, stainless. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 139 | Additional identification plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 159 | Additional plate with text "Made in ...." | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 160 | Additional rating plate affixed. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 161 | Additional rating plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 163 | Frequency converter rating plate. Rating data according to quotation. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 181 | Rating plate with ABB standard loadability values for VSD operation. Other auxiliaries for VSD operation to be selected as necessary. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 332 | Baldor Catalogue # | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 333 | Not for use in the USA | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 528 | Rating plate sticker | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Shaft & rotor** | | | | | | | | | | | | | | | | | |
| 069 | Two shaft extensions according to catalog drawings. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 070 | Special shaft extension at D-End, standard shaft material | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 155 | Cylindrical shaft extension, D-end, without key-way. | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● |
| 164 | Shaft extension with closed keyway | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 165 | Shaft extension with open keyway | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | - | - |
| 410 | Shaft material stainless steel | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 591 | Special shaft extension according to customer specification. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 600 | Special shaft extension at N-end, standard shaft material. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 630 | Shaft material certificate 3.1/3.2 according to EN10204:2004 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Standards and Regulations** | | | | | | | | | | | | | | | | | |
| 331 | Motor not for sale for use in EU or UK. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 381 | Frame agreement betw. ABB and Shell according to Shell DEP 33.66.05.31-GEN February 2018 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 421 | VIK design (Verband der Industriellen Energie- und Kraftwirtschaft e.V.). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 509 | Fulfilling US Integral Horsepower Motor Rule (IHP). | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 523 | Neste Rotterdam design. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 535 | NBR IR3 design | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 540 | Fulfilling energy efficiency requirements for China | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 541 | Inmetro certification | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 543 | Australian MEPS | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 544 | Australian HE MEPS | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 551 | IA certificate of conformity for South Africa | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 558 | Saudi Arabian MEPS (SASO) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 586 | Fulfilling UK Conformity Assessment (UKCA) requirements. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 599 | EQM – Emirates Quality Mark | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 682 | CCC Ex certificate for China | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 758 | Saudi Aramco design. | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 803 | PESO/CCoE certificate for India | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 811 | JIP-33 standard design | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 827 | Petrobras N-2919 Specification design | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 841 | Shell DEP 33.66.05.31-GEN February 2022 | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| **Stator winding temperature sensors** | | | | | | | | | | | | | | | | | |
| 328 | PTC - thermistors (3 in series), 120ºC, in stator winding | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 435 | PTC - thermistors (3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 439 | PTC - thermistors (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 441 | PTC - thermistors (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 445 | Pt100 2-wire in stator winding, 1 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 446 | Pt100 2-wire in stator winding, 2 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 502 | Pt100 3-wire in stator winding, 1 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 503 | Pt100 3-wire in stator winding, 2 per phase | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 511 | PTC thermistors (2 x 3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Terminal box** | | | | | | | | | | | | | | | | | |
| 019 | Larger than standard terminal box. | ● | ● | ● | ● | ● | ● | - | - | - | - | - | ● | ● | ● | ● | - |
| 021 | Terminal box LHS (seen from D-end). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 022 | Cable entry LHS (seen from D-end). | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 157 | Terminal box degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 180 | Terminal box RHS (seen from D-end). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 230 | Standard metal cable gland. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 292 | Adapter C-C | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
| 293 | Adapter D-D | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - |
| 294 | Adapter E-D | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● |
| 295 | Adapter E-2D | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ○ | - |
| 296 | Adapter E-3D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● |
| 351 | Terminal block turned according to cable entry | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● |
| 380 | Separate terminal box for temperature detectors, std. material | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 400 | 4 x 90 degr turnable terminal box. | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - |
| 413 | Extended cable connection, no terminal box. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 418 | Separate terminal box for auxiliaries, standard material. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 466 | Terminal box at N-end. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 468 | Cable entry from D-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 469 | Cable entry from N-end. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 553 | Terminal box degree of protection IP66. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - |
| 554 | Cast iron flange for cable glands drilled and tapped according to order. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 557 | Nickel plated cable glands mounted according to order. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 565 | Adapter for terminal box on the side (RHS) | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | - | - |
| 566 | Adapter for terminal box on the side (LHS) | - | - | - | - | - | - | - | - | - | ● | ● | ● | ● | ● | - | - |
| 567 | Separate terminal box material: cast Iron | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 568 | Separate terminal box for heating elements, std. material | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 624 | Prepared for inch cable glands according to BSPP standard. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | - |
| 727 | Stainless steel flange for cable glands drilled and tapped according to order. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 730 | Prepared for NPT cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 731 | Two standard metal cable glands. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 734 | Standard cable gland, Ex d IIC, armoured cable. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 735 | Standard cable gland, Ex d IIC, non-armoured cable. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 741 | Motor equipped with Ex eb terminal box (IEC/EN 60079-7). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 743 | Non-drilled cast iron flange for cable glands | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 744 | Stainless steel non-drilled flange for cable glands. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 745 | Painted cast iron flange equipped with nickel plated brass cable glands | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 746 | Stainless steel cable flange equipped with standard nickel plated brass cable glands | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Testing** | | | | | | | | | | | | | | | | | |
| 145 | Type test report from a catalogue motor, 400V 50Hz. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 146 | Type test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 148 | Routine test report. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 150 | Customer witnessed testing. Specify test procedure with other codes. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 222 | Torque/speed test, type test and multi-point load test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 560 | Shaft voltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 561 | Overspeed test,for one motor from specific delivery batch | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 562 | Overvoltage test, for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 760 | Vibration level test | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 761 | Vibration spectrum test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 762 | Noise level test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 763 | Noise spectrum test for one motor from specific delivery batch. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 764 | Test for one motor from specific delivery batch with ABB frequency converter available at ABB test field. ABB standard test procedure. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Variable speed drives** | | | | | | | | | | | | | | | | | |
| 182 | Mounting of non-listed pulse tacho. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 470 | Prepared for hollow shaft pulse tacho (L&L equivalent). | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 479 | Mounting of other type of pulse tacho with shaft extension, tacho not included. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 701 | Insulated bearing at N-end. | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 704 | EMC cable entry. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 747 | 1024 pulse tacho, Ex d, tD, L&L 841910002 | - | - | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

# Mechanical design

## Motor frame and drain holes

### Motor frame

The motor frame, end shields and main terminal box are made of cast iron. Feet are integrated with the frame.

Motors can be supplied for foot mounting, flange mounting, and combinations of these.

### Drain holes

Dust ignition protection motors are provided with drain holes fitted with plugs as standard. The plugs are made of plastic material and delivered in closed position.

When mounting arrangement differs from foot mounted IM B3, mention variant code 066 when ordering to ensure the drain plug is mounted in the lowest position.

# Mechanical design

## Lifting lugs

The motors are provided as standard with lifting lugs according to the table below. For improved lifting possibilities can variant code 305 be added, please refer to the variant code section for information about availability.

| Frame size | Type of lugs | Foot mounted motors | Flange mounted motors |
|---|---|---|---|
| 71, 80 | No lugs, weight of motors is less than 25kg | – | – |
| 90–132 | Detachable eye bolt | 2 pcs on top of motor diagonally placed, size M8 | 2 pcs on top of motor diagonally placed, size M8 |
| 160–200 | Integrated in casting / detachable eye bolt | 2 pcs on top of motor diagonally placed, integrated in frame casting | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end. 2 pcs eye bolts size M12 delivered with each motor |
| 225–250 | Integrated in casting / detachable eye bolt | 2 pcs on top of motor diagonally placed, integrated in frame casting | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end. 2 pcs eye bolts size M16 delivered with each motor |
| 280, 315 | Detachable eye bolt | 1 pcs close to terminal box on top, size M24 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M24 delivered with each motor |
| 355 | Detachable eye bolt | 1 pcs close to terminal box on top, size M30 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M30 delivered with each motor |
| 400 | Detachable eye bolt | 1 pcs close to terminal box on top, size M36 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M36 delivered with each motor |
| 450 | Detachable eye bolt | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 3 pcs eye bolts size M42 delivered with each motor | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M42 delivered with each motor |

# Mechanical design

## Heating elements

Heating elements are installed into windings to keep them free of corrosion in humid conditions. The required power of heating elements is shown in the table. You can order heating elements with variant code 450 or 451.

| Motor size | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| Motor size | 200 | 225 | 250 | 280 | 315 | 355 | 400 |
|---|---|---|---|---|---|---|---|
| Power (W) | 25 | 60 | 60 | 60 | 2x60 | 2x60 | 2x60 |

# Mechanical design
## Bearings

ABB's dust ignition protection motors are normally fitted with single-row deep-groove grease lubricated ball bearings, as shown in the table below.

If the bearing at the D-end is replaced with a roller bearing (NU- or NJ-), higher radial forces can be handled. Roller bearings are suitable for belt-drive applications and can be ordered with variant code 037.

When high axial forces are involved, angular-contact ball bearings should be used. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force to ensure that optimal bearing system design is chosen. The variant codes for ordering angular-contact ball bearings at D-end are 058 and 060.

### Axially-locked bearings

All motors with deep groove ball bearings are equipped with an axially locked bearing at the D-end, as a standard feature.

### Transport locking

Motors with roller bearings or an angular-contact ball bearing are fitted with a transport lock before dispatch to prevent damage to bearings during transport. A warning label is attached to motors when transport locking is used.

When high axial forces are involved, angular-contact ball bearings should be used. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force to ensure that optimal bearing system design is chosen. The variant codes for ordering angular-contact ball bearings are 058 and 059.

Locking may also be fitted in other cases if severe transport conditions are expected.

## Standard and alternative bearing designs

### Standard and alternative designs

| Motor size | Number of poles | Standard design | Alternative designs | | |
|---|---|---|---|---|---|
| | | Deep groove ball bearings | Roller bearings (037) | | Ang. contact ball bearings (058, 059) |
| | | D-end | N-end | D-end | D-end |
| 71 | 2-8 | 6203-2Z/C3 | 6202-2Z/C3 | NA | NA |
| 80 | 2-8 | 6204-2Z/C3 | 6203-2Z/C3 | NA | NA |
| 90 | 2-8 | 6205-2Z/C3 | 6204-2Z/C3 | NA | NA |
| 100 | 2-8 | 6206-2Z/C3 | 6205-2Z/C3 | NA | NA |
| 112 | 2-8 | 6206-2Z/C3 | 6205-2Z/C3 [1] | NA | NA |
| 132 | 2-8 | 6208-2Z/C3 | 6208-2Z/C3 | NA | NA |
| 160 | 2-12 | 6309/C3 | 6209/C3 | NU 309 ECP/C3 | 7309 B |
| 180 | 2-12 | 6310/C3 | 6209/C3 | NU 310 ECP/C3 | 7310 B |
| 200 | 4-12 | 6312/C3 | 6210/C3 | NU 312 ECP/C3 | 7312 B |
| 225 | 4-12 | 6313/C3 | 6212/C3 | NU 313 ECP/C3 | 7313 B |
| 250 | 4-12 | 6315/C3 | 6213/C3 | NU 315 ECP/C3 | 7315 B |
| 280 | 2 | 6316/C3 | 6316/C3 | [2] | 7316 B |
| | 4-12 | 6316/C3 | 6316/C3 | NU 316 ECP/C3 | 7316 B |
| 315 | 2 | 6316/C3 | 6316/C3 | [2] | 7316 B |
| | 4-12 | 6319/C3 | 6316/C3 | NU 319 ECP/C3 | 7319 B |
| 355 | 2 | 6316M/C3 | 6316M/C3 | [2] | 7316 B |
| | 4-12 | 6322/C3 | 6316/C3 | NU 322 ECP/C3 | 7322 B |
| 400 | 2 | 6317M/C3 | 6317M/C3 | [2] | 7317 B |
| | 4-12 | 6324/C3 | 6319/C3 | NU 324 ECP/C3 | 7324 B |
| 450 | 2 | 6317M/C3 | 6317M/C3 | [2] | 7317 B |
| | 4-12 | 6326M/C3 | 6322/C3 | NU 326 ECP/C3 | 7326 B |

[1] N-end bearing 6206-2Z/C3 on IE3 and IE4 motors

[2] On request

## Bearing seals

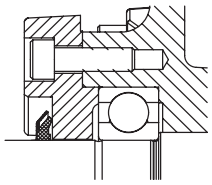
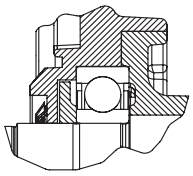
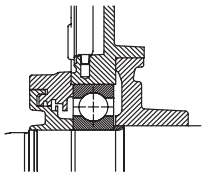
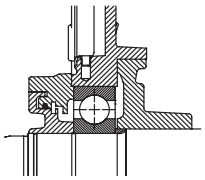
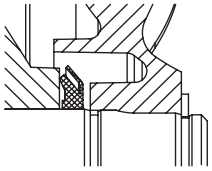
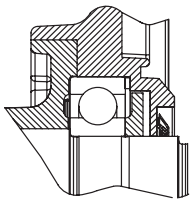
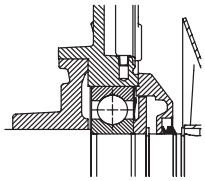
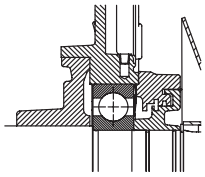
Table below present the standard and alternative and types of bearing seals per motor size.

### Bearing seals

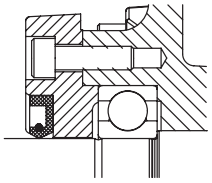
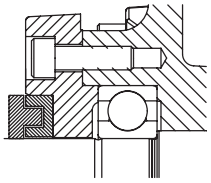
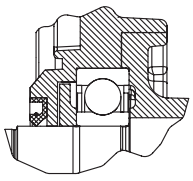
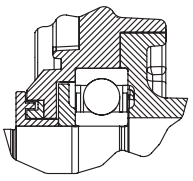
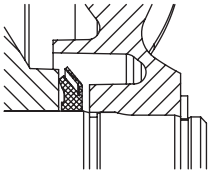
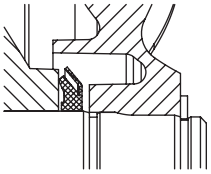
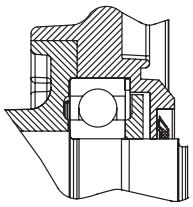
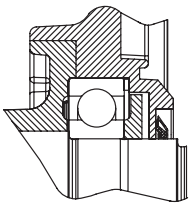
| Motor size | Number of poles | Standard design | | Alternative design | |
|---|---|---|---|---|---|
| | | D-end | N-end | Radial seal at D-end (variant code 072 [1]) | Labyrinth seal at D-end (variant code 783) [1] |
| 71 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 80 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 90 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 100 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 112 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 132 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | NA |
| 160 | 2.elo | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 180 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 200 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 225 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 250 | 2 – 8 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 280 | 2 | Labyrinth seal | V-ring | NA | Standard |
| | 4 - 8 | V-ring | V-ring | NA | Labyrinth seal |
| 315SM, ML | 2 | Labyrinth seal | V-ring | NA | Standard |
| | 4 - 8 | V-ring | V-ring | NA | Labyrinth seal |
| 315LK | 2- 8 | Labyrinth seal | V-ring | NA | Standard |
| 355 | 2 - 12 | Labyrinth seal | V-ring | NA | Standard |
| 400 | 2 | Labyrinth seal | Labyrinth seal | NA | Standard |
| 400 | 4 - 12 | Labyrinth seal | V-ring | NA | Standard |
| 450 | 2 - 12 | Labyrinth seal | Labyrinth seal | NA | Standard |

[1] N-end bearing seal of standard design, special N-end bearing seal arrangements on request

### Standard design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 71-132, gamma/ gamma seal | 160-250, gamma/ gamma seal | 280, 315 2pole, 335 all pole numbers and 400 4-12 pole, labyrinth/ V-ring seal | 400 2-pole, labyrinth/ labyrinth seal |

### Alternative design

| | | | | |
|---|---|---|---|---|
| **D-end** |  |  |  |  |
| **N-end** |  |  |  |  |
| Motor size, seal type D-end/N-end | 80-132, VC072 radial/ gamma seals | 80-132, VC783 labyrinth/ gamma seals | 160-250, VC072 radial/ gamma seals | 160-250, VC783 labyrinth/gamma seals |

### Bearing life

The nominal life $L_{10h}$ of a bearing is defined according to ISO 281 as the number of operating hours achieved or exceeded by 90 % of identical bearings in a large test series under specified conditions. 50 % of bearings achieve at least five times this lifetime.

The calculated bearing life $L_{10h}$ for power transmission by means of coupling is for horizontally mounted motors in sizes up to 315 ≥ 100,000 hours.

### Lubrication

On delivery, motors in frame size 160 and above are pre-lubricated with high-quality grease. Before first start-up, see instructions for re-lubrication and recommended grease in the installation, operation, maintenance and safety manual for low voltage motors for explosive atmospheres delivered together with the motor, or see the lubrication plate on the motor.

### Motors with bearings greased for life

Motors in frame sizes 71-132 are equipped with bearings greased for life, while this is available as an option for frame sizes 160-250. Bearings are lubricated with high-quality, high-temperature grease. Bearing types are stated on the rating plate.

The approximate lifetime of bearings in four-pole motors is about 40 0000 duty hours. Lifetime is subject to the load conditions of the application run by the motor.

### Motors with re-lubrication nipples

In frame sizes 160-400, the bearing system is provided with valve discs to ease lubrication. Motors are lubricated while running. The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1-2 hours after re-greasing. This ensures that the construction is tight and bearings remain dust- and dirt-free.

A grease-collection method can be used optionally.

The following tables show lubrication intervals according to the L1 principle for various nominal speeds in 25 °C ambient temperature. These values apply to horizontally mounted motors (B3) with 80 °C bearing temperature and high-quality grease containing lithium-complex soap and mineral or PAO-oil.

## Lubrication intervals

### Lubrication intervals in duty hours for ball bearings

| Frame size | Amount of grease g/ bearing | Amount of grease g/N- end | Speed 3600 r/ min | Speed 3000 r/ min | Speed 1800 r/ min | Speed 1500 r/ min | Speed 1000 r/ min | Speed 500-900 r/min |
|---|---|---|---|---|---|---|---|---|
| **Ball bearings** | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | |
| 160 | 13 | 13 | 7100 | 8900 | 14300 | 16300 | 20500 | 21600 |
| 180 | 15 | 15 | 6100 | 7800 | 13100 | 15100 | 19400 | 20500 |
| 200 | 20 | 15 | 4300 | 5900 | 11000 | 13000 | 17300 | 18400 |
| 225 | 23 | 20 | 3600 | 5100 | 10100 | 12000 | 16400 | 17500 |
| 250 | 30 | 23 | 2400 | 3700 | 8500 | 10400 | 14700 | 15800 |
| 280 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 280 | 40 | 40 | - | - | 7800 | 9600 | 13 900 | 15 000 |
| 315 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 315 | 55 | 40 | - | - | 5900 | 7600 | 11 800 | 12 900 |
| 355 | 35 | 35 | 1900 | 3200 | - | - | - | - |
| 355 | 70 | 40 | - | - | 4000 | 5600 | 9600 | 10 700 |
| 400 | 40 | 40 | 1500 | 2700 | - | - | - | - |
| 400 | 85 | 55 | - | - | 3200 | 4700 | 8600 | 9700 |
| 450 | 95 | 70 | - | - | 2500 | 3900 | 7700 | 8700 |

### Lubrication intervals in duty hours for roller bearings

| Frame size | Amount of grease g/ bearing | Amount of grease g/N- end | Output kW | Speed 3600 r/min | Speed 3000 r/min | Output kW | Speed 1800 r/min | Speed 1500 r/min | Output kW | Speed 1000 r/min | Output kW | Speed 500-900 r/min |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ball bearings** | | | | | | | | | | | | |
| **Lubrication intervals in duty hours** | | | | | | | | | | | | |
| 160 | 13 | 13 | all | 3600 | 4500 | all | all 7200 | 8100 | all | 10300 | all | 10800 |
| 180 | 15 | 15 | | 3000 | 3900 | all | all 6600 | 7500 | all | 9700 | all | 10200 |
| 200 | 20 | 15 | | 2100 | 3000 | all | all 5500 | 6500 | all | 8600 | all | 9200 |
| 225 | 23 | 20 | | 1800 | 1600 | all | all 5100 | 6000 | all | 8200 | all | 8700 |
| 250 | 30 | 23 | | 1200 | 1900 | all | all 4200 | 5200 | all | 7300 | all | 7900 |
| 280 | 40 | 40 | | - | - | all | all 4000 | 5300 | all | 7000 | all | 8500 |
| 315 | 55 | 40 | | - | - | all | all 2900 | 3800 | all | 5900 | all | 6500 |

# Mechanical design

## Radial forces

### Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated with FR as follows:

$$D = \frac{1.9 \cdot 10^7 \cdot K \cdot P}{n \cdot F_R}$$

| Where: | |
|---|---|
| D: | pulley diameter, mm |
| P: | power requirement, kW |
| n: | motor speed, r/min. |
| K: | belt tension factor, dependent on belt type and type of duty. A common value for V-belts is 2.5 |
| $F_R$: | permissible radial force, refer to tables below. |

### Permissible loading on the shaft

The following table shows permissible radial forces on the shaft in Newtons, assuming zero axial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life $L_{10h}$ of 40 000 hours per motor size.

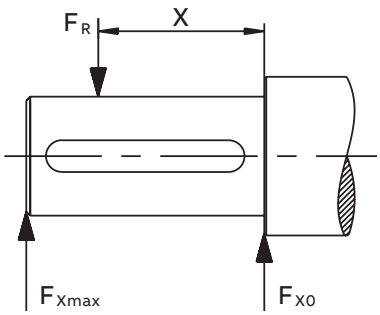
Permissible loads of simultaneous radial and axial forces can be supplied on request.

These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft together with flame path dimensions affects permissible forces.

If the radial force is applied between points X0 and Xmax, the permissible force $F_R$ can be calculated with the following formula:

$$F_R = F_{X0} - \frac{X}{E}(F_{X0} - F_{Xmax})$$

| Where: | |
|---|---|
| E: | length of the shaft extension in the standard version |



## Permissible radial forces

| Motor size | Poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings | | | | Roller bearings | | Roller bearings | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | | | | |
| | | | Ball bearings | | | | | | | |
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 71 | 2 | 30 | 540 | 460 | 420 | 360 | 1285 | 650 | 1040 | 650 |
| | 4 | 30 | 700 | 605 | 555 | 480 | 1615 | 650 | 1310 | 650 |
| | 6 | 30 | 780 | 665 | 620 | 530 | 1640 | 650 | 1450 | 650 |
| | 8 | 30 | 860 | 730 | 685 | 580 | 1640 | 600 | 1580 | 650 |
| 80 | 2 | 40 | 710 | 600 | 385 | 350 | 1910 | 865 | 1555 | 865 |
| | 4 | 40 | 940 | 810 | 725 | 625 | 2335 | 865 | 1945 | 865 |
| | 6 | 40 | 1060 | 895 | 840 | 710 | 2335 | 865 | 2160 | 865 |
| | 8 | 40 | 1185 | 1020 | 940 | 810 | 2335 | 865 | 2335 | 865 |
| 90 | 2 | 50 | 820 | 690 | 650 | 545 | 2205 | 1330 | 1790 | 1330 |
| | 4 | 50 | 1035 | 870 | 820 | 690 | 2715 | 1330 | 2205 | 1330 |
| | 6 | 50 | 1185 | 995 | 940 | 790 | 3054 | 1330 | 2490 | 1330 |
| | 8 | 50 | 1300 | 1095 | 1035 | 870 | 3340 | 1330 | 2715 | 1330 |
| 100 | 2 | 60 | 1130 | 925 | 900 | 735 | 2905 | 1900 | 2360 | 1900 |
| | 4 | 60 | 1425 | 1165 | 1135 | 925 | 3575 | 1900 | 2905 | 1900 |
| | 6 | 60 | 1635 | 1335 | 1295 | 1060 | 4040 | 1900 | 3280 | 1900 |
| | 8 | 60 | 1820 | 1520 | 1445 | 1205 | 4460 | 1900 | 3620 | 1900 |
| 112 | 2 | 60 | 1170 | 980 | 925 | 775 | 3000 | 1970 | 2435 | 1970 |
| | 4 | 60 | 1475 | 1235 | 1170 | 980 | 3695 | 1970 | 3000 | 1970 |
| | 6 | 60 | 1690 | 1310 | 1340 | 1120 | 4170 | 1970 | 3390 | 1970 |
| | 8 | 60 | 1860 | 1310 | 1475 | 1235 | 4450 | 1970 | 3695 | 1970 |
| 132 | 2 | 80 | 1840 | 1500 | 1460 | 1190 | 4255 | 3465 | 3455 | 2815 |
| | 4 | 80 | 2320 | 1890 | 1840 | 1500 | 5240 | 4265 | 4255 | 3465 |
| | 6 | 80 | 2660 | 2165 | 2110 | 1715 | 5915 | 3680 | 4805 | 3680 |
| | 8 | 80 | 2925 | 2380 | 2320 | 1890 | 6450 | 3680 | 5240 | 3680 |
| 160 MLA | 2 | 110 | 3540 | 2740 | 2955 | 2285 | 7100 | 4300 | 6140 | 4300 |
| | 4 | 110 | 4000 | 3100 | 3325 | 2570 | 8000 | 4300 | 6870 | 4300 |
| | 6 | 110 | 4170 | 3200 | 3440 | 2655 | 8600 | 4300 | 7270 | 4300 |
| | 8 | 110 | 4600 | 3585 | 3855 | 2985 | 9300 | 4300 | 7955 | 4300 |
| 160 MLB | 2 | 110 | 3540 | 2740 | 2955 | 2270 | 7085 | 4300 | 6070 | 4300 |
| | 4 | 110 | 4085 | 3300 | 3370 | 2725 | 8300 | 4300 | 7055 | 4300 |
| | 6 | 110 | 4100 | 3355 | 3400 | 2755 | 8600 | 4300 | 7300 | 4300 |
| | 8 | 110 | 4200 | 3270 | 3455 | 2670 | 9000 | 4300 | 7570 | 4300 |
| 160 MLC | 2 | 110 | 3400 | 2600 | 2855 | 2200 | 6800 | 4300 | 5885 | 4300 |
| | 4 | 110 | 3700 | 3000 | 3070 | 2485 | 7800 | 4300 | 6640 | 4300 |
| | 6 | 110 | 3600 | 2900 | 2870 | 2325 | 8000 | 4300 | 6700 | 4300 |
| | 8 | 110 | 4170 | 3370 | 3370 | 2725 | 9000 | 4300 | 7585 | 4300 |
| 160 MLD | 2 | 110 | 3585 | 2900 | 3000 | 2440 | 7100 | 4300 | 6140 | 4300 |
| | 4 | 110 | 3400 | 2755 | 2755 | 2240 | 7600 | 4300 | 6370 | 4300 |
| 160 MLE | 2 | 110 | 3185 | 2570 | 2640 | 2140 | 6785 | 4300 | 5770 | 4300 |
| 180 MLA | 2 | 110 | 4100 | 3385 | 3455 | 2825 | 8125 | 5500 | 7025 | 5500 |
| | 4 | 110 | 4270 | 3485 | 3525 | 2885 | 8600 | 5500 | 7300 | 5500 |
| | 6 | 110 | 4700 | 3800 | 3855 | 3155 | 9400 | 5500 | 7900 | 5500 |
| | 8 | 110 | 4785 | 3900 | 3870 | 3170 | 9800 | 5500 | 8255 | 5500 |
| 180 MLB | 2 | 110 | 4170 | 3400 | 3470 | 2825 | 7900 | 5500 | 6770 | 5500 |
| | 4 | 110 | 4185 | 3400 | 3440 | 2810 | 8500 | 5500 | 7200 | 5500 |
| | 6 | 110 | 4370 | 3570 | 3525 | 2885 | 9000 | 5500 | 7600 | 5500 |
| 180 MLC | 4 | 110 | 3700 | 3055 | 3010 | 2470 | 7900 | 5500 | 6655 | 5440 |
| 200 MLA | 2 | 110 | 5600 | 4685 | 4700 | 3925 | 10900 | 9100 | 9470 | 7900 |
| | 4 | 110 | 6285 | 5200 | 5240 | 4370 | 12500 | 9550 | 10700 | 8900 |
| | 6 | 110 | 6800 | 5700 | 5700 | 4770 | 13600 | 9550 | 11670 | 9550 |
| | 8 | 110 | 6800 | 5700 | 5600 | 4685 | 14100 | 9550 | 12000 | 9550 |
| 200 MLB | 2 | 110 | 5670 | 4700 | 4700 | 3925 | 11000 | 9200 | 9500 | 7900 |
| | 4 | 110 | 5700 | 4700 | 4700 | 3925 | 12000 | 9550 | 10185 | 8500 |
| | 6 | 110 | 6400 | 5370 | 5300 | 4425 | 13200 | 9550 | 11200 | 9385 |
| 200 MLC | 2 | 110 | 5000 | 4185 | 4185 | 3500 | 10400 | 8700 | 8900 | 7455 |
| | 4 | 110 | 5400 | 4500 | 4425 | 3685 | 11600 | 9550 | 9800 | 8200 |
| | 6 | 110 | 5800 | 4885 | 4740 | 3955 | 12500 | 9550 | 10600 | 8800 |
| 200 MLD | 2 | 110 | 4985 | 4170 | 4170 | 3485 | 10400 | 8700 | 8900 | 7400 |
| 225 SMA | 2 | 110 | 6400 | 5400 | 5355 | 4500 | 13300 | 10700 | 11500 | 9700 |
| | 4 | 140 | 7300 | 5900 | 6155 | 4970 | 15400 | 10250 | 13200 | 10250 |
| | 6 | 140 | 7600 | 6200 | 6370 | 5140 | 16400 | 10250 | 14000 | 10250 |
| | 8 | 140 | 8500 | 6900 | 7100 | 5725 | 17900 | 10250 | 15300 | 10250 |

| Motor size | Poles | Length of shaft extension E (mm) | Basic design with deep groove ball bearings | | | | Roller bearings | | Roller bearings | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mounting arrangement IM B3 | | | | | | | |
| | | | Ball bearings | | | | | | | |
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) | $F_{x0}$(N) | $F_{Xmax}$(N) |
| 225 SMB | 2 | 110 | 6100 | 5185 | 5155 | 4340 | 13000 | 10700 | 11200 | 9455 |
| | 4 | 140 | 7085 | 5700 | 5885 | 4755 | 15100 | 10250 | 12900 | 10250 |
| | 6 | 140 | 7100 | 5700 | 5840 | 4700 | 16000 | 10250 | 13500 | 10250 |
| | 8 | 140 | 8000 | 6485 | 6600 | 5340 | 17300 | 10250 | 14700 | 10250 |
| 225 SMC | 2 | 110 | 5600 | 4700 | 4685 | 3940 | 12600 | 10600 | 10770 | 9070 |
| | 4 | 140 | 6400 | 5200 | 5300 | 4285 | 14500 | 10250 | 12385 | 10000 |
| 225 SMD | 2 | 110 | 5500 | 4640 | 4600 | 3880 | 12420 | 10460 | 10640 | 8960 |
| | 4 | 140 | 5800 | 4700 | 4725 | 3800 | 13500 | 10250 | 11400 | 9270 |
| 250 SMA | 2 | 140 | 7700 | 6285 | 6500 | 5285 | 17100 | 10900 | 14900 | 10900 |
| | 4 | 140 | 8700 | 7000 | 7300 | 5900 | 19800 | 13800 | 17000 | 13785 |
| | 6 | 140 | 9400 | 7600 | 7800 | 6355 | 21600 | 13800 | 18400 | 13800 |
| | 8 | 140 | 9600 | 7800 | 7900 | 6400 | 22700 | 13800 | 19300 | 13800 |
| 250 SMB | 2 | 140 | 7100 | 5800 | 6000 | 4885 | 16700 | 10900 | 14400 | 10900 |
| | 4 | 140 | 7800 | 6300 | 6470 | 5240 | 18900 | 13800 | 16200 | 13100 |
| | 6 | 140 | 8900 | 7200 | 7355 | 5955 | 21200 | 13800 | 18000 | 13800 |
| 250 SMC | 2 | 140 | 6800 | 5500 | 5670 | 4600 | 16300 | 10900 | 14000 | 10900 |
| | 4 | 140 | 7400 | 6000 | 6055 | 4900 | 18100 | 13800 | 15400 | 12485 |
| | 6 | 140 | 8200 | 6600 | 6670 | 5400 | 20300 | 13800 | 17200 | 13800 |
| 280 SM_ | 2 | 140 | 7300 | 6000 | 5800 | 4900 | 20400 | 6000 | 16500 | 6000 |
| | 4 | 140 | 9200 | 7800 | 7300 | 6200 | 25100 | 9200 | 20300 | 9200 |
| | 6 | 140 | 10600 | 8900 | 8400 | 7000 | 28300 | 9200 | 23000 | 9200 |
| | 8 | 140 | 11700 | 9200 | 9200 | 7800 | 30900 | 9200 | 25100 | 9200 |
| 280 ML_ | 2 | 140 | 7400 | 6200 | 5800 | 5000 | 20600 | 6200 | 16700 | 6200 |
| | 4 | 140 | 9200 | 7900 | 7300 | 6200 | 25000 | 9500 | 20300 | 9500 |
| | 6 | 140 | 10500 | 9000 | 8300 | 7100 | 28300 | 9400 | 22900 | 9400 |
| | 8 | 140 | 11600 | 9500 | 9200 | 7900 | 30800 | 9500 | 25000 | 9500 |
| 315 SM_ | 2 | 140 | 7300 | 6000 | 5800 | 4950 | 20300 | 6000 | 16500 | 6000 |
| | 4 | 170 | 11400 | 9400 | 9000 | 7450 | 32500 | 9600 | 26600 | 9600 |
| | 6 | 170 | 13000 | 9600 | 10300 | 8500 | 37000 | 9600 | 30000 | 9600 |
| | 8 | 170 | 14400 | 9600 | 11400 | 9400 | 40300 | 9600 | 32700 | 9600 |
| 315 ML_ | 2 | 140 | 7400 | 6400 | 5850 | 5050 | 20600 | 5850 | 16700 | 5850 |
| | 4 | 170 | 11500 | 9700 | 9100 | 7650 | 32700 | 13600 | 26500 | 13600 |
| | 6 | 170 | 13200 | 11100 | 10400 | 8800 | 36900 | 13600 | 29900 | 13600 |
| | 8 | 170 | 14500 | 12200 | 11500 | 9700 | 40200 | 13600 | 32600 | 13600 |
| 315 LK_ | 2 | 140 | 7400 | 6550 | 5800 | 5150 | 20800 | 5550 | 16800 | 5550 |
| | 4 | 170 | 11500 | 10000 | 9100 | 7850 | 33100 | 13350 | 26800 | 13350 |
| | 6 | 170 | 13200 | 11400 | 10450 | 9050 | 37300 | 13350 | 30300 | 13350 |
| | 8 | 170 | 14600 | 12600 | 11550 | 10000 | 40800 | 13350 | 33100 | 13350 |
| 355 SM_ | 2 | 140 | 7350 | 6450 | 5750 | 5050 | 20600 | 7200 | 16700 | 7200 |
| | 4 | 210 | 15200 | 12600 | 12000 | 9950 | 45500 | 14000 | 36900 | 14000 |
| | 6 | 210 | 17500 | 14000 | 13800 | 11400 | 51400 | 14000 | 41700 | 14000 |
| | 8 | 210 | 19300 | 14000 | 15250 | 12600 | 56000 | 14000 | 45500 | 14000 |
| 355 ML_ | 2 | 140 | 7350 | 6550 | 5750 | 5100 | 20800 | 6750 | 16800 | 6750 |
| | 4 | 210 | 15300 | 12900 | 12000 | 10100 | 45900 | 13600 | 37200 | 13600 |
| | 6 | 210 | 17600 | 13600 | 13900 | 11600 | 51500 | 13600 | 42100 | 13600 |
| | 8 | 210 | 19400 | 13600 | 15300 | 12900 | 56000 | 13600 | 45900 | 13600 |
| 355 LK_ | 2 | 140 | 7350 | 6650 | 5650 | 5100 | 21000 | 6550 | 17000 | 6550 |
| | 4 | 210 | 15200 | 13000 | 11850 | 10200 | 46000 | 13000 | 37300 | 13000 |
| | 6 | 210 | 17500 | 13000 | 13700 | 11900 | 52000 | 13000 | 42000 | 13000 |
| | 8 | 210 | 19400 | 13000 | 15200 | 13000 | 56500 | 13000 | 46000 | 13000 |
| 400 L_ | 2 | 170 | 7650 | 6850 | 4400 | 3900 | 23900 | 9050 | 19350 | 9050 |
| | 4 | 210 | 15600 | 13550 | 12150 | 10550 | 52500 | 16000 | 43300 | 16000 |
| | 6 | 210 | 17800 | 15450 | 13850 | 12000 | 60000 | 16000 | 48800 | 16000 |
| | 8 | 210 | 19700 | 16000 | 15350 | 13350 | 65700 | 16000 | 53200 | 16000 |
| 400 LK_ | 2 | 170 | 7650 | 6850 | 4400 | 3900 | 23900 | 9050 | 19350 | 9050 |
| | 4 | 210 | 15600 | 11500 | 12150 | 10550 | 52500 | 11500 | 43300 | 11500 |
| | 6 | 210 | 17800 | 11500 | 13850 | 11500 | 60000 | 11500 | 48800 | 11500 |
| | 8 | 210 | 19700 | 11500 | 15350 | 11500 | 65700 | 11500 | 53200 | 11500 |
| 450 L_ | 2 | 170 | 7400 | 6700 | 3500 | 3300 | 24000 | 7500 | 19000 | 7500 |
| | 4 | 210 | 17000 | 15200 | 13000 | 11600 | 62000 | 25000 | 50000 | 25000 |
| | 6 | 210 | 19000 | 17000 | 14000 | 13000 | 70000 | 24000 | 56000 | 24000 |
| | 8 | 210 | 21300 | 19000 | 16500 | 14600 | 76000 | 23000 | 62000 | 23000 |

# Mechanical design

## Axial forces

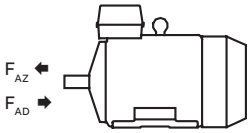
—
01 Mounting arrangement IM B3

02 Mounting arrangement IM V1

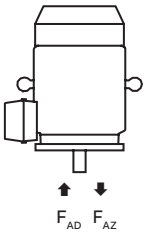
The following tables present permissible axial forces on the shaft in Newtons, assuming zero radial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20,000 and 40,000 hours per motor size.

At 60 Hz, the values must be reduced by 10 percent, and for two-speed motors, the higher speed determines permissible axial force. Permissible loads of simultaneous radial and axial forces can be supplied on request.

For axial force $F_{AD}$, it is assumed that the D-bearing is locked with a locking ring.




01




02

## Permissible axial forces

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | | | Mounting arrangement IM V1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 71 | 2 | 30 | 615 | 285 | 505 | 175 | 630 | 275 | 520 | 165 |
| | 4 | 30 | 760 | 430 | 615 | 285 | 790 | 410 | 645 | 265 |
| | 6 | 30 | 870 | 540 | 695 | 365 | 890 | 525 | 720 | 355 |
| | 8 | 30 | 960 | 630 | 765 | 435 | 985 | 615 | 785 | 415 |
| 80 | 2 | 40 | 880 | 300 | 735 | 155 | 915 | 280 | 770 | 135 |
| | 4 | 40 | 1075 | 495 | 880 | 300 | 1130 | 455 | 935 | 260 |
| | 6 | 40 | 1215 | 635 | 985 | 405 | 1270 | 600 | 1040 | 370 |
| | 8 | 40 | 1330 | 750 | 1070 | 490 | 1400 | 705 | 1140 | 450 |
| 90 | 2 | 50 | 780 | 500 | 620 | 340 | 840 | 455 | 680 | 300 |
| | 4 | 50 | 985 | 705 | 775 | 495 | 1070 | 650 | 860 | 440 |
| | 6 | 50 | 1140 | 860 | 890 | 610 | 1225 | 800 | 975 | 555 |
| | 8 | 50 | 1265 | 985 | 985 | 705 | 1355 | 925 | 1075 | 645 |
| 100 | 2 | 60 | 925 | 570 | 735 | 350 | 1285 | 510 | 1060 | 290 |
| | 4 | 60 | 1480 | 860 | 1190 | 570 | 1600 | 780 | 1305 | 490 |
| | 6 | 60 | 1690 | 1070 | 1350 | 730 | 1815 | 995 | 1470 | 650 |
| | 8 | 60 | 1865 | 1245 | 1480 | 860 | 1995 | 1160 | 1610 | 775 |
| 112 | 2 | 60 | 1155 | 595 | 935 | 375 | 1290 | 505 | 1070 | 280 |
| | 4 | 60 | 1445 | 885 | 1155 | 595 | 1595 | 785 | 1300 | 495 |
| | 6 | 60 | 1655 | 1095 | 1315 | 755 | 1810 | 995 | 1465 | 650 |
| | 8 | 60 | 1830 | 1270 | 1445 | 885 | 1985 | 1170 | 1600 | 780 |
| 132 | 2 | 80 | 1765 | 965 | 1420 | 620 | 1925 | 855 | 1580 | 510 |
| | 4 | 80 | 2210 | 1410 | 1755 | 955 | 2420 | 1270 | 1965 | 815 |
| | 6 | 80 | 2535 | 1735 | 2000 | 1200 | 2770 | 1580 | 2235 | 1045 |
| | 8 | 80 | 2800 | 2000 | 2205 | 1405 | 3055 | 1835 | 2455 | 1235 |
| 160 MLA | 2 | 110 | 2850 | 2850 | 2325 | 2325 | 3100 | 2578 | 2570 | 2048 |
| | 4 | 110 | 3450 | 3450 | 2775 | 2775 | 3820 | 3150 | 3120 | 2450 |
| | 6 | 110 | 3690 | 3690 | 2970 | 2970 | 4100 | 3410 | 3325 | 2635 |
| | 8 | 110 | 4155 | 4155 | 3315 | 3315 | 4440 | 3845 | 3640 | 3045 |
| 160 MLB | 2 | 110 | 2850 | 2850 | 2325 | 2325 | 3120 | 2570 | 2580 | 2030 |
| | 4 | 110 | 3435 | 3435 | 2760 | 2760 | 3880 | 3085 | 3180 | 2385 |
| | 6 | 110 | 3600 | 3600 | 2880 | 2880 | 4120 | 3240 | 3360 | 2480 |
| | 8 | 110 | 3750 | 3750 | 2970 | 2970 | 4140 | 3450 | 3340 | 2650 |
| 160 MLC | 2 | 110 | 2775 | 2775 | 2280 | 2280 | 3080 | 2500 | 2560 | 1980 |
| | 4 | 110 | 3150 | 3150 | 2535 | 2535 | 3620 | 2770 | 2985 | 2135 |
| | 6 | 110 | 3135 | 3135 | 2490 | 2490 | 3680 | 2700 | 3005 | 2025 |
| | 8 | 110 | 3675 | 3675 | 2910 | 2910 | 4240 | 3260 | 3445 | 2465 |
| 160 MLD | 2 | 110 | 2865 | 2865 | 2330 | 2330 | 3220 | 2540 | 2665 | 1985 |
| | 4 | 110 | 2900 | 2900 | 2320 | 2320 | 3420 | 2470 | 2820 | 1870 |
| 160 MLE | 2 | 110 | 2500 | 2500 | 2025 | 2025 | 2900 | 2150 | 2420 | 1670 |
| 180 MLA | 2 | 110 | 3300 | 3300 | 2700 | 2700 | 3660 | 2940 | 3060 | 2340 |
| | 4 | 110 | 3600 | 3600 | 2920 | 2920 | 4160 | 3150 | 3460 | 2450 |
| | 6 | 110 | 4140 | 4140 | 3320 | 3320 | 4800 | 3675 | 3940 | 2815 |
| | 8 | 110 | 4220 | 4220 | 3360 | 3360 | 4960 | 3740 | 4040 | 2820 |
| 180 MLB | 2 | 110 | 3340 | 3340 | 2725 | 2725 | 3760 | 2960 | 3125 | 2320 |
| | 4 | 110 | 3580 | 3580 | 2900 | 2900 | 4220 | 3095 | 3500 | 2375 |
| | 6 | 110 | 3800 | 3800 | 3040 | 3040 | 4500 | 3285 | 3700 | 2485 |
| 180 MLC | 4 | 110 | 3220 | 3220 | 2560 | 2560 | 3880 | 2660 | 3220 | 2000 |
| 200 MLA | 2 | 110 | 4460 | 4460 | 3640 | 3640 | 5000 | 3965 | 4200 | 3125 |
| | 4 | 110 | 5000 | 5260 | 4260 | 4260 | 5000 | 4680 | 5000 | 3640 |
| | 6 | 110 | 5000 | 5480 | 4720 | 4720 | 5000 | 5265 | 5000 | 4065 |
| | 8 | 110 | 5000 | 5880 | 4700 | 4700 | 5000 | 5195 | 5000 | 3955 |
| 200 MLB | 2 | 110 | 4440 | 4440 | 3620 | 3620 | 5000 | 3905 | 4220 | 3085 |
| | 4 | 110 | 4720 | 4720 | 3840 | 3840 | 5000 | 4060 | 4700 | 3120 |
| | 6 | 110 | 5000 | 5480 | 4420 | 4420 | 5000 | 4800 | 5000 | 3660 |
| 200 MLC | 2 | 110 | 3940 | 3940 | 3180 | 3180 | 4600 | 3385 | 3880 | 2665 |
| | 4 | 110 | 4480 | 4480 | 3620 | 3620 | 5000 | 3775 | 4520 | 2875 |
| | 6 | 110 | 4980 | 4980 | 3980 | 3980 | 5000 | 4165 | 5000 | 3105 |
| 200 MLD | 2 | 110 | 3940 | 3940 | 3200 | 3200 | 4660 | 3370 | 3925 | 2635 |
| 225 SMA | 2 | 110 | 4980 | 4980 | 4060 | 4060 | 5000 | 4375 | 4780 | 3455 |
| | 4 | 140 | 5000 | 6080 | 4920 | 4920 | 5000 | 5445 | 5000 | 4225 |
| | 6 | 140 | 5000 | 6520 | 5000 | 5260 | 5000 | 5735 | 5000 | 4395 |
| | 8 | 140 | 5000 | 7420 | 5000 | 5960 | 5000 | 6535 | 5000 | 5095 |

| Motor size | Poles | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | | | Mounting arrangement IM V1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 225 SMB | 2 | 110 | 4860 | 4860 | 3960 | 3960 | 5000 | 4245 | 4780 | 3345 |
| | 4 | 140 | 5000 | 5880 | 4780 | 4780 | 5000 | 5175 | 5000 | 3995 |
| | 6 | 140 | 5000 | 6020 | 4840 | 4840 | 5000 | 5155 | 5000 | 3915 |
| | 8 | 140 | 5000 | 6940 | 5000 | 5560 | 5000 | 6055 | 5000 | 4635 |
| 225 SMC | 2 | 110 | 4380 | 4380 | 3540 | 3540 | 5000 | 3670 | 4440 | 2900 |
| | 4 | 140 | 5000 | 5240 | 4260 | 4260 | 5000 | 4445 | 5000 | 3425 |
| 225 SMD | 2 | 110 | 4320 | 4320 | 3480 | 3480 | 5000 | 3590 | 4400 | 2790 |
| | 4 | 140 | 4800 | 4800 | 3820 | 3820 | 5000 | 3895 | 5000 | 2935 |
| 250 SMA | 2 | 140 | 6000 | 6080 | 4920 | 4920 | 6000 | 5345 | 5840 | 4225 |
| | 4 | 140 | 6000 | 7140 | 5820 | 5820 | 6000 | 6300 | 6000 | 4920 |
| | 6 | 140 | 6000 | 7880 | 6000 | 6380 | 6000 | 6950 | 6000 | 5350 |
| | 8 | 140 | 6000 | 8200 | 6000 | 6600 | 6000 | 7125 | 6000 | 5385 |
| 250 SMB | 2 | 140 | 5620 | 5620 | 4540 | 4540 | 6000 | 4830 | 5640 | 3810 |
| | 4 | 140 | 6000 | 6320 | 5100 | 5100 | 6000 | 5325 | 6000 | 4085 |
| | 6 | 140 | 6000 | 7480 | 6000 | 6040 | 6000 | 6370 | 6000 | 4830 |
| 250 SMC | 2 | 140 | 5260 | 5260 | 4220 | 4220 | 6000 | 4395 | 5400 | 3415 |
| | 4 | 140 | 5960 | 5960 | 4760 | 4760 | 6000 | 4900 | 6000 | 3700 |
| | 6 | 140 | 6000 | 6860 | 5520 | 5520 | 6000 | 5575 | 6000 | 4135 |
| 280 SM_ | 2 | 140 | 6200 | 4250 | 4900 | 2900 | 7550 | 3150 | 6200 | 1800 |
| | 4 | 140 | 8000 | 6000 | 6250 | 4250 | 9600 | 4550 | 7800 | 2750 |
| | 6 | 140 | 7250 | 9250 | 7150 | 5150 | 11150 | 5500 | 9000 | 3350 |
| | 8 | 140 | 10300 | 8300 | 7950 | 5950 | 12200 | 7000 | 9850 | 4700 |
| 280 ML_ | 2 | 140 | 6100 | 4100 | 4800 | 2800 | 8150 | 2750 | 6800 | 1400 |
| | 4 | 140 | 7800 | 5800 | 6000 | 4000 | 10450 | 4050 | 8650 | 2250 |
| | 6 | 140 | 8950 | 6950 | 6900 | 4900 | 12350 | 4750 | 10250 | 2600 |
| | 8 | 140 | 10000 | 8000 | 7700 | 5700 | 13450 | 5800 | 11050 | 3450 |
| 315 SM_ | 2 | 140 | 6180 | 4200 | 4850 | 2850 | 7950 | 2600 | 6600 | 1300 |
| | 4 | 170 | 9400 | 7400 | 7250 | 5250 | 11750 | 5500 | 9550 | 3300 |
| | 6 | 170 | 10900 | 8900 | 8350 | 6350 | 13600 | 6300 | 11050 | 3750 |
| | 8 | 170 | 12000 | 10000 | 9200 | 7000 | 15350 | 7900 | 12450 | 5000 |
| 315 ML_ | 2 | 140 | 6050 | 4050 | 4750 | 2750 | 8650 | 2300 | 7300 | [1] |
| | 4 | 170 | 9250 | 7250 | 7100 | 5100 | 12500 | 5050 | 10300 | 2900 |
| | 6 | 170 | 10650 | 8650 | 8100 | 6100 | 14900 | 5800 | 12350 | 3250 |
| | 8 | 170 | 11500 | 9900 | 8900 | 6800 | 15400 | 6300 | 13600 | 3400 |
| 315 LK_ | 2 | 140 | 6000 | 3950 | 4650 | 2650 | 9100 | 1350 | 7750 | [1] |
| | 4 | 170 | 9100 | 7150 | 7000 | 5000 | 13100 | 3850 | 10900 | 1700 |
| | 6 | 170 | 10500 | 8500 | 7950 | 5950 | 15700 | 4100 | 13100 | 1550 |
| | 8 | 170 | 11750 | 9750 | 8900 | 6900 | 16900 | 6300 | 14100 | 3450 |
| 355 SM_ | 2 | 140 | 3050 | 6850 | 1750 | 5550 | 6350 | 4250 | 4950 | 2900 |
| | 4 | 210 | 8600 | 12400 | 5900 | 9700 | 13250 | 8600 | 10450 | 5850 |
| | 6 | 210 | 10550 | 14350 | 7300 | 11100 | 15650 | 9580 | 12350 | 6270 |
| | 8 | 210 | 12200 | 16000 | 8550 | 12350 | 17350 | 12500 | 13600 | 8900 |
| 355 ML_ | 2 | 140 | 2900 | 6700 | 1600 | 5400 | 7100 | 3700 | 5750 | 2350 |
| | 4 | 210 | 8360 | 12150 | 5650 | 9450 | 14600 | 7950 | 11850 | 5150 |
| | 6 | 210 | 10100 | 13900 | 6900 | 10700 | 18050 | 8600 | 14700 | 5300 |
| | 8 | 210 | 12000 | 15800 | 7300 | 11000 | 21100 | 11650 | 17000 | 7600 |
| 355 LK_ | 2 | 140 | 2650 | 6450 | 1350 | 5150 | 8250 | 2650 | 6900 | 1300 |
| | 4 | 210 | 8200 | 12000 | 5450 | 9250 | 15650 | 6600 | 12850 | 3800 |
| | 6 | 210 | 9900 | 13700 | 6700 | 10500 | 19100 | 7050 | 15800 | 3750 |
| | 8 | 210 | 11450 | 15250 | 7800 | 11600 | 21200 | 8700 | 17500 | 5000 |
| 400 L, LK_ | 2 | 170 | 2150 | 7150 | [1] | 5800 | 8650 | 2150 | 7220 | [1] |
| | 4 | 210 | 7100 | 13100 | 4300 | 10300 | 16050 | 6400 | 13150 | 3400 |
| | 6 | 210 | 8850 | 14850 | 5500 | 11500 | 18450 | 6750 | 15100 | 3400 |
| | 8 | 210 | 10450 | 16450 | 6750 | 12750 | 20100 | 8350 | 16450 | 4700 |
| 450 L_ | 2 | 170 | 1800 | 6800 | [1] | 5500 | 11500 | [1] | 10000 | [1] |
| | 4 | 210 | 7600 | 13500 | 4500 | 10500 | 20000 | 4400 | 17700 | 1200 |
| | 6 | 210 | 9000 | 15000 | 5600 | 11500 | 26000 | 3700 | 22200 | [1] |
| | 8 | 210 | 10800 | 16800 | 7000 | 12900 | 27800 | 5500 | 23700 | 1350 |

[1]On request.

# Terminal box

## Standard terminal box

### Protection and mounting options

The degree of protection for the standard terminal box is IP 55 or IP65 depending on the equipment protection level and dust category. It complies with the requirements of the protection method 't' dust ignition protection and prevents all ignition sources such as sparks, excessive over heating etc. All terminal box seals are of uninterrupted type fulfilling the requirements for Ex t motors. By default, terminal boxes are mounted on top of the motor at D-end. Side mounted terminal box is possible in frame sizes 160-400. Mounting at N-end is possible for the larger frame sizes. Please refer to the variant code section for more details.

### Turnability

The standard terminal boxes for motor sizes 160–315 can be turned 4*90°, and in sizes 355–500, 2*180° after delivery. For sizes 355–500, it is also possible to mount a terminal box with an opening towards the D or N-end, using the relevant variant codes when ordering, this is needed to get the terminal block turned in the right position. For motors in size 71–132, a 4*90° turnable terminal box is optional- this can be ordered with variant code 400.

### Cable entries

Terminal box is provided as standard with tapped holes for cable glands, no cable glands are included as standard. The entry holes are closed with Ex eb approved blanking plugs made of nickel-plated brass, one of the main entries is closed with a plastic plug as transport and storage protection

Very large motors have an angle adapter between the terminal box and gland plate. Please refer to the table on next page for further information about amount and size of threaded holes, plugs provided as standard.

Different types of cable glands are available as option, suitable for either armoured and nonarmoured cables, please refer to the Terminal box alternatives section for more details.

### Cable type and terminations

Terminations are suitable for copper and aluminum cables (Al- cables on request for motor sizes 160 to 250). Cables are connected to terminals by cable lugs, which are not included in the delivery.

### Earthing bolts

The motors are as standard provided with at least one earthing bolt inside the terminal box and another on the frame. The earthing bolt on the frame is located on top close to the terminal box, motors in size 160-250 is the earthing bolt located on RHS foot (seen from D-end).

### Ordering

To ensure the delivery of desired terminations and cable entries for the motor, state the cable type, quantity, size, outer diameter and possibly type of cable glands needed when ordering.

See section Variant codes for all options available.

### Standard delivery

Standard delivery if no other information is provided.

| Motor size | Design letter | Voltage code | Pole number | Terminal box type | Size of gland plate opening on terminal box | 45° angle adapter | Amount and size of threaded plugged holes, or cable sealing end unit | Max. connectable core cross section mm² / phase | Number and size of terminal bolts |
|---|---|---|---|---|---|---|---|---|---|
| **IE2 and IE3 motors** | | | | | | | | | |
| 71 | | | 2-8 | integr. | - | - | 2xM16x1.5 | 1x2.5 | 6 x M4 |
| 80 | | | 2-8 | integr. | - | - | 2xM25x1.5 | 1x4 | 6 x M4 |
| 90 | | | 2-8 | integr. | - | - | 2xM25x1.5 | 1x6 | 6 x M5 |
| 100-132 | | | 2-8 | integr. | - | - | 2x M32x1.5 | 1x10 | 6 x M5 |
| 160-180 | | | 2-8 | 63 | B | - | 2xM40x1.5 | 1x35 | 6 x M6 |
| 200-250 | | | 2-8 | 160 | C | - | 2xM63x1.5 | 1x70 | 6 x M10 |
| 280 SM | | | | 210 | C | - | 2xM63x1.5 | 2x150 | 6 x M12 |
| 280 ML | | | 2-4 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 280 ML | | | 6-8 | 210 | C | - | 2xM63x1.5 | 2x150 | 6 x M12 |
| 315SM_, ML_ | | | 2-8 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 315LKB | | | 2 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 315LKC | | | 2 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 315LK_ | | | 4-8 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMA - SMB | | D,S | 2-4 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMA | | E,F | 2-4 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMB | K | E,F | 2-4 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMB | G,L,M | E,F | 2-4 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMA-SMB | | | 6-12 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMC | | | 2-4 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMC | K,M | D,S | 6 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMC | G,L | D,S | 6 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355SMC | | E,F | 6 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355SMC | | | 8-12 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355ML_, LK_ | | | 2-4 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_, LK_ | G,L | E,F | 6 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_, LK_ | K,M | E,F | 6 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355ML_, LK_ | | D,S | 6-8 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_ | | E,F | 8 | 370 | D | - | 2xM63x1.5 | 2x240 | 6 x M12 |
| 355LK_ | | E,F | 8 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 355ML_, LK_ | | | 10-12 | 750 | E | - | 2x M75x1.5 | 4x240 | 6 x M12 |
| 400 | | | 2-8 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 450 LA, LKA | | | 2 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 LA, LKA | M | | 4 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 LA, LKA | G,K | D,S | 4 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 LA, LKA | G,K | E,F | 4 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 450 LA, LKA | | | 6 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |
| 450 LB, LC, LKB, LKC | | | 2-6 | 1200 | E | E-2D | 4x M75x1.5 | 6x240 | 6 x M12 |
| 450 | | | 8 | 750 | E | E-2D | 4x M75x1.5 | 4x240 | 6 x M12 |

| Auxiliary cable entries | Pole numbers | Amount and size of threaded plugged holes | Max. connectable corecross section mm2 /phase |
|---|---|---|---|
| 160 - 450 | 2-8 | 2x M20x1.5 | 1x 2.5 |

# Terminal box

## Terminal box dimensions

—
01 Terminal box type 63 and 160

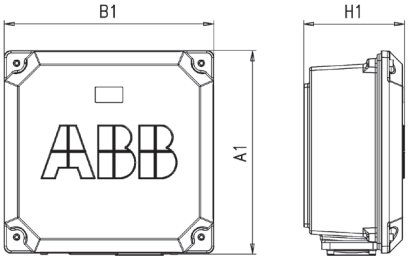
02 Terminal box types 210 and 370

03 Terminal box type 750 + adapter

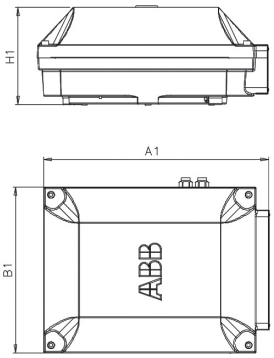
04 Terminal box type 1200 + adapter

For motor sizes 71 to 132 the terminal box is integrated in motor frame and the dimensions for terminal boxes can be found in the motor dimension drawings in ABB Library.

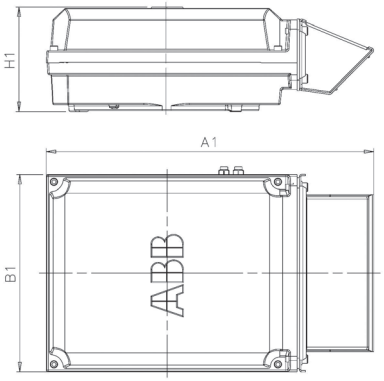
To match the correct terminal box with motor sizes 160-450, find the motor type and correspondent terminal box type on the previous page. The box types and heir dimensions are presented on this page.



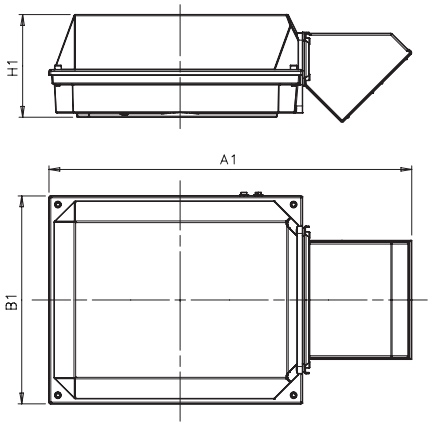

01




02



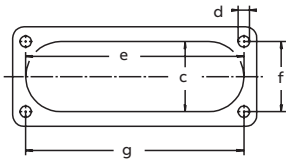

03




04

**Dimensions for terminal box inlets**

Corresponds to motor sizes 160 and above




| Terminal box types acc. to current capacity | A1 | B1 | H1 | Gland plate opening |
|---|---|---|---|---|
| 63 | 247 | 247 | 109 | B |
| 160 | 300 | 310 | 154 | C |
| 370/1 | 467 | 348 | 207 | D |
| 750 /1 | 549 | 433 | 231 | E |
| 1200/1 | 740 | 591 | 290 | E |

| Flange opening | c mm | e mm | f mm | g mm | d thread type |
|---|---|---|---|---|---|
| B | 31 | 120 | 30 | 120 | M6 |
| C *) | 71 | 194 | 62 | 193 | M6 |
| C **) | 67 | 193 | 62 | 193 | M8 |
| D | 100 | 300 | 80 | 292 | M10 |
| E | 115 | 370 | 100 | 360 | M12 |

**Note:** The C flange is different depending on frame size.

*) for frame sizes 200-225

**) for frame size 280

# Terminal box

## Terminal boxes and boards

—
01 Integrated terminal box for motor sizes 71-112. Tapped holes for cable entries

02 Terminal board for motor sizes 90-112, IE2, and 90-100, IE3

03 Terminal board for motor sizes 71-80

04 Terminal board for motor sizes 112, IE3

05 Integrated terminal box for motor sizes 132. Tapped holes for cable entries

06 Terminal board for motor size 132

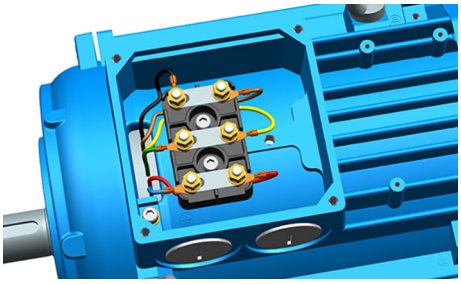
07 Terminal box for motor sizes 160-250. Connection flanges with tapped cable entries

08 Terminal board for motor sizes 160-250

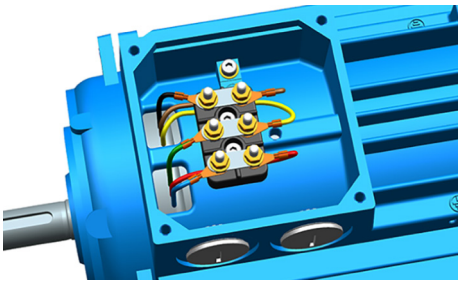
The pictures below show standard terminal boxes and the corresponding terminal boards for various motor sizes.

### Motor sizes 71-112

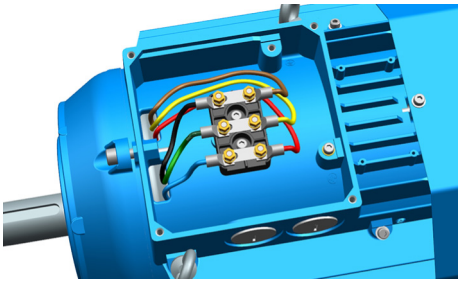
01



02

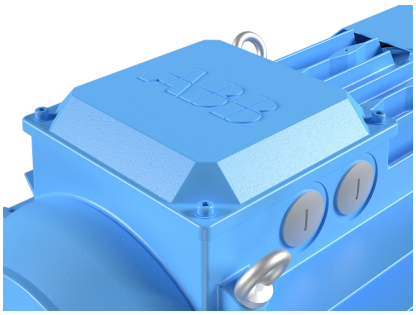


03

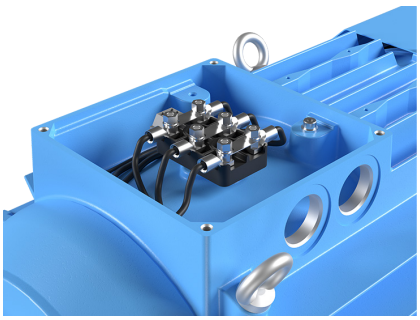


04

### Motor size 132

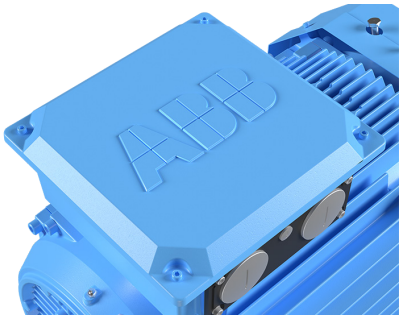


05

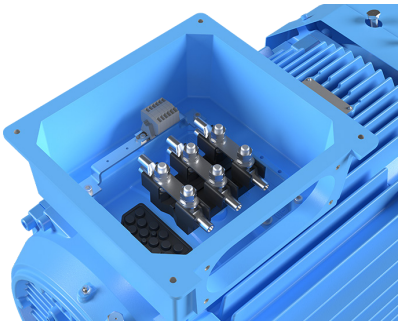


06

### Motor sizes 160-250



07



08

—
09 Terminal box for motor sizes 280 - 315, except LKC. Connection flange with tapped cable entries

10 Terminal board for motor sizes 280 - 315, except LKC.

11 Terminal box for motor sizes 315LKC

12 Terminal board for motor sizes 315 LKC

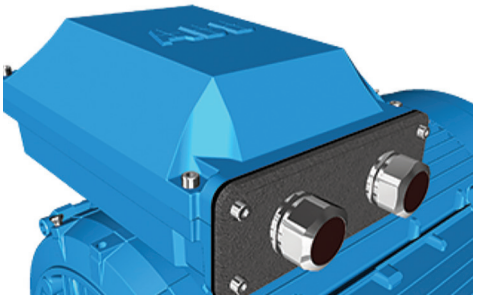
13 Terminal box for motor sizes 355SM

14 Terminal box with angle adapter for motor sizes 355ML - 450

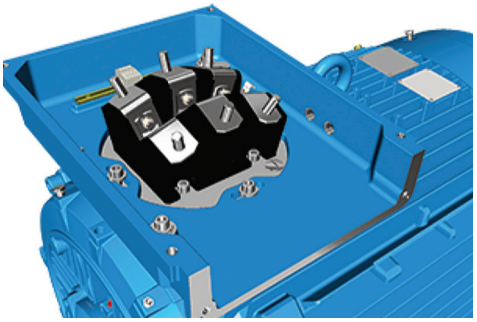
15 Terminal board for motor sizes 355 to 400

16 Terminal board for motor size 450

## Motor sizes 280 - 315

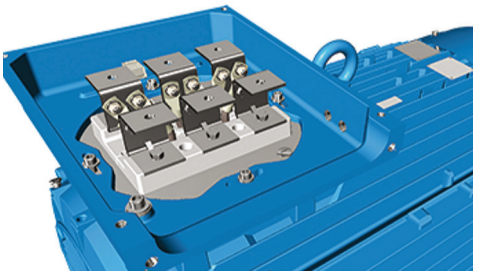


09



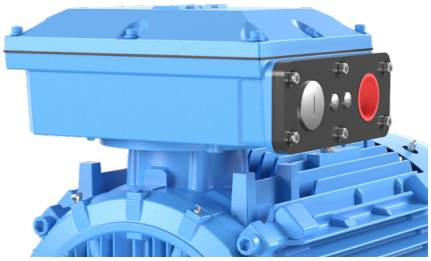
10

11

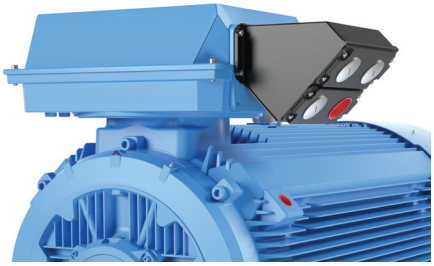


12

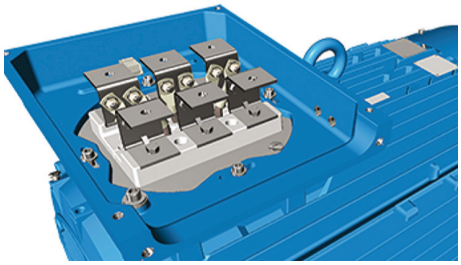
## Motor sizes 355-450



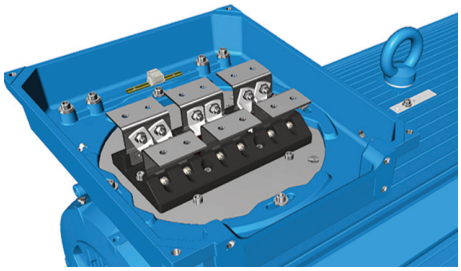
13



14



15



16

# Terminal box

## Terminal box alternatives

### Optional cable termination parts

There is a broad selection of cable termination accessories available to allow a safe and reliable termination of one or several supply cables. The most common options are explained in this chapter.

### How to order

- Check first that the terminal box itself allows mounting of the desired cable and cores (refer to table showing standard delivery for each motor size). If very large cable are used might it be necessary to use a larger terminal box and larger terminal board than standard.
- Select the right cable gland(s) or cable sealing end unit based on the diameter of the cables(s) and suitability for cable type.
- Select appropriate adapter or flange to allow mounting on opening in terminal box.
- Note that turning the terminal box might be prevented by use of some adapters

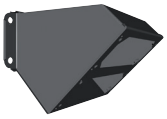
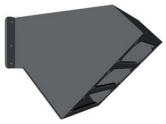
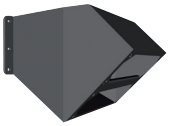
### Ordering example

**Ordering example for M3GP motors**

| | |
|---|---|
| Motor and supply cables | 110kW, 4-pole, 400V 50Hz, IE3. Cables needed: 1 pcs outer diameter 42mm steel wire armoured cable, single cross section 120 mm2. Cables coming from below. |
| Motor | M3GP 315SMC 4, B3 |
| Adapter (to allow entry of cables coming from below) | Not possible |
| Cable glands Ex d/ Ex e suitable for armoured cables (an M50 gland will suit this cable) | Variant code 734 (specify cable dimensions) |
| Gland plate made of steel drilled and tapped with 1 pcs M50 hole (non-std size) | Variant code 554 (1 pcs M50 x 1.5 threaded hole to be specified) |

## Optional adapters

To allow easy termination of cables entering the terminal box from above or below, an angle adapter is recommended. These can be used to allow the mounting of several cable sealing end units or gland plates. For exact suitability on a certain motor size, refer to the ‘terminal box opening’ column in section Standard terminal box.

| Adapater | | | |  |  |  |
|---|---|---|---|---|---|---|
| Variant code | 292 | 293 | 294 | 295 | 296 | 444 |
| Opening to terminal box | C | D | E | E | E | E |
| Flange or opening for end unit | C | D | D | 2 x D | 3 x D | 2 x E |
| Material | Cast iron | Cast iron | Cast iron | Steel | Steel | Steel |
| Notes | | | | Included as standard delivery for some types. | Only possible on type 1200 terminal box. | Only possible on type 1200 terminal box. |

## Cable glands

The motors are delivered as standard with plugged cable entries as described in the previous section. There is a broad selection of different type of cable glands available which are suitable for different types of cable and outer diameter ranges.

| Size of threaded opening for cable gland | Cable gland(s) nickel plated brass, Ex t, for non armoured cable, variant code 230 or 731 | EMC Cable gland(s) nickel plated brass, Ex t, for non armoured cable, variant code 704 | Cable gland Ex d / Ex t for armoured cable with double sealing, variant code 734 | |
|---|---|---|---|---|
| **Metric (std)** | **Cable outer diameter, mm** | **Cable outer diameter, mm** | **Cable outer diameter, mm** | **Inner sheath diameter, mm** |
| M16 x 1.5 | 4-8 | 4-8 | 7-12 | 4.5-8 |
| M20 x 1.5 | 4-12 | 4-12 | 10-16 | 6-10 |
| M25 x 1.5 | - | - | 13.5-19 | 10-14 |
| M25 x 1.5 *) | 10-18 | 10-18 | 19-25 | 14-18 |
| M32 x 1.5 | 14-24 | 14-24 | 25-30 | 18-23 |
| M40 x 1.5 | 22-32 | 22-32 | 30-36 | 23-28 |
| M50 x 1.5 | - | - | 36-40 | 28-32 |
| M50 x 1.5 *) | 26-35 | 26-35 | 40-46 | 32-37 |
| M63 x 1.5 | - | - | 46-53 | 37-43 |
| M63 x 1.5 *) | 35-45 | 35-45 | 53-60 | 43-50 |
| M75 x 1.5 | 46-62 | 46-62 | 58-70 | 48-60 |
| M90 x 1.5 | - | - | 78-90 | 68-80 |
| M100 x 1.5 | - | - | 88-100 | 78-90 |

*) = High capacity version, delivered as standard with the variant code

## Threaded openings for cable glands with NPT thread (variant code 730)

The motors are delivered as standard with openings for cable glands with metric threads as listed in the section describing the standard terminal box. If glands with NPT threads will be used must variant code 730 be ordered. If nothing else is stated on the orderer will the sizes in tables below be delivered.

| Motor frame size | Main cable entries | NPT plug |
|---|---|---|
| 160-180 | 2 x 1 ¼” | 1 x 1 ¼” |
| 200-250 | 2 x 1 ½” | 1 x 1 ½” |
| 280 | 2 x 2” | 1 x 2” |
| 315 | 2 x 21/2” | 1 x 21/2” |
| 355-450 | 2 x 3” | 1 x 3” |

| Motor frame size | Cable entries for auxiliaries | NPT plug |
|---|---|---|
| 160-450 | 2 x ¾” | 2 x ¾” |

### Threaded openings for cable glands of nonstandard size

If the standard size of threaded openings for cable glands does not suit the gland size and cable that will be used can openings of nonstandard size also be delivered, either by fitting a reducers to make the openings smaller or by increasing the amount or size of holes. The maximum possible size and amount for each gland plate size is listed below. Threaded openings of non-standard size can be ordered using variant codes 554 and 555.

| Gland plate size | Maximum amount and size of threaded holes |
|---|---|
| B | 2 x M40 |
| C | 2 x M63 |
| D | 2 x M90 or 3 x M75 |
| E | 2 x M90 or 4 x M75 |

### Gland plates of non-standard material

The standard material used in gland plates is steel. Gland plates made of stainless steel are optional, either with cable glands or blind without threaded holes. Please refer to the variant code section for more information.

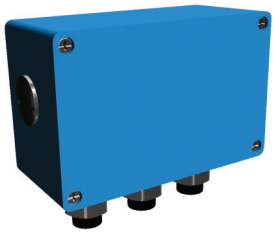
### Auxiliary terminal box

It is possible to equip motors from frame size 132 upwards with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box is made of aluminum, except frame sizes 160-250 where cast iron boxes are used.

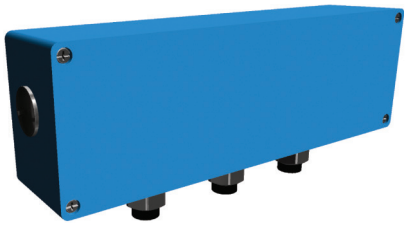
Connection terminals are of spring-loaded type for quick and easy connection. These are suitable for up to 2.5 $mm^2$ wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard.

The standard cable entry is 2 x M20 with plugged entries. If cable glands are needed must these be ordered using the variant codes described earlier in this section.

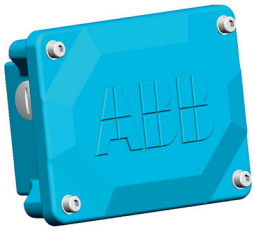
| Related variant codes | |
|---|---|
| 380 | Separate terminal box for temperature detectors |
| 418 | Separate terminal box for auxiliaries |
| 567 | Separate terminal box material: cast Iron |
| 568 | Separate terminal box for heating elements |



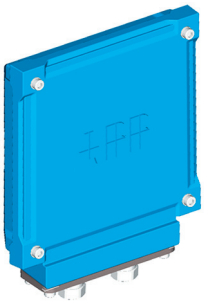
Small auxiliary aluminum terminal box for motor sizes 280- 450 (variant codes 418, 568, 380, 569). The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 125 mm, max 12 strips. Earthing size M4.



Large auxiliary aluminum terminal box for motor sizes 280-450. The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 250 mm, max 30 strips. Earthing size M4.



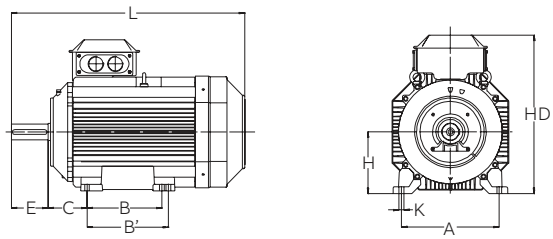
Auxiliary cast iron terminal box for motor size 160-250 (variant code 418). 111 x 162 mm.



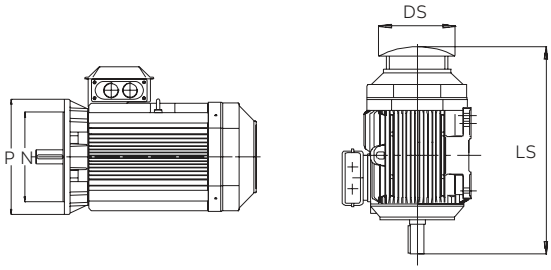
Auxiliary cast iron terminal box for motor sizes 280-450 (variant code 567). 208 x 180 mm.

# Dimension drawings

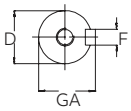
## Dust ignition protection Ex t cast iron motors, 2D and 3D

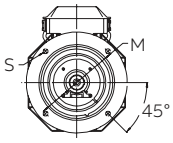



Foot-mounted motor IM 1001, IM B3

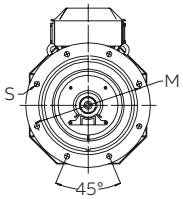



Flange-mounted motor IM 3001, IM B5

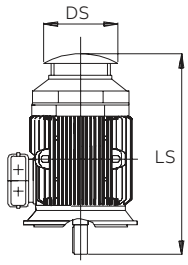



Sizes 80 to 200




Sizes 225 to 450




Protective roof, variant code 005

| Motor size | IM 1001, IM B3 AND IM 3001, IM B5 | | | | | | | | | | IM 1001, IM B3 | | | | | | | IM 3001, IM B5 | | | | | Protective roof | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D poles | | GA poles | | F poles | | E poles | | L max poles | | A | B | B' | C | HD | K | H | M | N | P | S | DS | LS | | |
| | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-8 | 2 | 4-6 | | | | | | | | | | | | | 2 | 4-8 |
| 71M_ | 14 | 14 | 16 | 16 | 5 | 5 | 30 | 30 | 264 | 264 | 112 | 90 | - | 45 | 178 | 7 | 71 | 130 | 110 | 160 | 10 | 139 | 272 | 272 |
| 71ML_ | 14 | 14 | 16 | 16 | 5 | 5 | 30 | 30 | 294 | 294 | 112 | 90 | - | 45 | 178 | 7 | 71 | 130 | 110 | 160 | 10 | 139 | 302 | 302 |
| 80M_ | 19 | 19 | 21.5 | 21.5 | 6 | 6 | 40 | 40 | 331 | 331 | 125 | 100 | - | 50 | 194 | 10 | 80 | 165 | 130 | 200 | 12 | 157 | 331 | 331 |
| 80ML_ | 19 | 19 | 21.5 | 21.5 | 6 | 6 | 40 | 40 | 363 | 363 | 125 | 100 | 112 | 50 | 194 | 10 | 80 | 165 | 130 | 200 | 12 | 157 | 363 | 363 |
| 90SL_ | 24 | 24 | 27 | 27 | 8 | 8 | 50 | 50 | 356 | 356 | 140 | 100 | 125 | 56 | 218 | 10 | 90 | 165 | 130 | 200 | 12 | 177 | 368 | 368 |
| 90L_ | 24 | 24 | 27 | 27 | 8 | 8 | 50 | 50 | 390 | 390 | 140 | 100 | 125 | 56 | 218 | 10 | 90 | 165 | 130 | 200 | 12 | 177 | 402 | 402 |
| 100L_ | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 381 | 381 | 160 | 140 | - | 63 | 247 | 12 | 100 | 215 | 180 | 250 | 15 | 197 | 395 | 395 |
| 100ML_ | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 403 | 403 | 160 | 140 | - | 63 | 247 | 12 | 100 | 215 | 180 | 250 | 15 | 197 | 417 | 417 |
| 100LK_ | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 435 | 435 | 160 | 140 | 160 | 63 | 247 | 12 | 100 | 215 | 180 | 250 | 15 | 197 | 449 | 449 |
| 112 (IE2) | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 403 | 403 | 190 | 140 | - | 70 | 259 | 12 | 112 | 215 | 180 | 250 | 15 | 197 | 417 | 417 |
| 112 (IE3) | 28 | 28 | 31 | 31 | 8 | 8 | 60 | 60 | 442 | 403 | 190 | 140 | - | 70 | 258 | 12 | 112 | 215 | 180 | 250 | 15 | 222 | 483 | 483 |
| 132 | 38 | 38 | 41 | 41 | 10 | 10 | 80 | 80 | 532 | 532 | 216 | 140 | 178 | 89 | 300 | 12 | 132 | 265 | 230 | 300 | 15 | 261 | 552 | 552 |
| 160 | 42 | 42 | 45 | 45 | 12 | 12 | 110 | 110 | 681 | 681 | 254 | 210 | 254 | 108 | 421 | 14.5 | 160 | 300 | 250 | 350 | 19 | 305 | 733 | 733 |
| 180 | 48 | 48 | 51.5 | 51.5 | 14 | 14 | 110 | 110 | 726 | 726 | 279 | 241 | 279 | 121 | 461 | 14.6 | 180 | 300 | 250 | 350 | 19 | 346 | 779 | 779 |
| 200 | 55 | 55 | 59 | 59 | 16 | 16 | 110 | 110 | 821 | 821 | 318 | 267 | 305 | 133 | 528 | 18.5 | 200 | 350 | 300 | 400 | 19 | 386 | 875 | 875 |
| 225 | 55 | 60 | 59 | 64 | 16 | 18 | 110 | 140 | 849 | 849 | 356 | 286 | 311 | 149 | 573 | 18.5 | 225 | 400 | 350 | 450 | 19 | 425 | 902 | 932 |
| 250 | 60 | 65 | 64 | 69 | 18 | 18 | 140 | 140 | 884 | 884 | 406 | 311 | 349 | 168 | 626 | 24 | 250 | 500 | 450 | 550 | 19 | 471 | 937 | 937 |
| 280 | 65 | 75 | 69 | 79.5 | 18 | 20 | 140 | 140 | 1088 | 1088 | 457 | 368 | 419 | 190 | 784 | 24 | 280 | 500 | 450 | 550 | 18 | 555 | 1180 | 1190 |
| 315SM_ | 65 | 80 | 69 | 85 | 18 | 22 | 140 | 170 | 1174 | 1204 | 508 | 406 | 457 | 216 | 852 | 30 | 315 | 600 | 550 | 660 | 23 | 624 | 1290 | 1320 |
| 315ML_ | 65 | 90 | 69 | 95 | 18 | 25 | 140 | 170 | 1285 | 1315 | 508 | 457 | 508 | 216 | 852 | 30 | 315 | 600 | 550 | 660 | 23 | 624 | 1401 | 1431 |
| 315LK_ | 65 | 90 | 69 | 95 | 18 | 25 | 140 | 170 | 1491 | 1521 | 508 | 508 | 560 | 216 | 852 | 28 | 315 | 600 | 550 | 660 | 23 | 624 | 1607 | 1637 |
| 355SM_ | 70 | 100 | 74.5 | 106 | 20 | 28 | 140 | 210 | 1409 | 1479 | 610 | 500 | 560 | 254 | 978/968 [1] | 35 | 355 | 740 | 680 | 800 | 23 | 720 | 1476 | 1546 |
| 355ML_ | 70 | 100 | 74.5 | 106 | 20 | 28 | 140 | 210 | 1514 | 1584 | 610 | 560 | 630 | 254 | 978 | 35 | 355 | 740 | 680 | 800 | 23 | 720 | 1528 | 1703 |
| 355LK_ | 70 | 100 | 74.5 | 106 | 20 | 28 | 140 | 210 | 1764 | 1834 | 610 | 630 | 710/900 | 254 | 978 | 35 | 355 | 740 | 680 | 800 | 23 | 720 | 1633 | 1703 |
| 400L_ | 80 | 110 | 85 | 116 | 22 | 28 | 170 | 210 | 1851 | 1891 | 710 | 900 | 1000 | 224 | 1065 | 35 | 400 | 940 | 880 | 1000 | 28 | 810 | 1860 | 1900 |
| 400LK_ | 80 | 100 | 85 | 106 | 22 | 28 | 170 | 210 | 1851 | 1891 | 686 | 710 | 800 | 280 | 1065 | 35 | 400 | 740 | 680 | 800 | 24 | 810 | 1860 | 1900 |
| 450 | - | 120 | - | 127 | - | 32 | - | 210 | - | 2187 | 800 | 1000 | 1120 | 250 | 1183/1256 [2] | 42 | 450 | 1080 | 1000 | 1150 | 28 | 966 | - | 2342 |

[1] With 750/370 terminal box

[2] With 1200/750 terminal box

**IM B14 (IM3601), IM 3602**

| Motor size | LA | M | N | P | S | T | S | T |
|---|---|---|---|---|---|---|---|---|
| 71 | 8 | 85 | 70 | 105 | M6 | 2.5 | M6 | 2.5 |
| 80 | 8 | 100 | 80 | 120 | M6 | 3 | M6 | 3 |
| 90 | 10 | 115 | 95 | 140 | M8 | 3 | M8 | 3 |
| 100 | 10 | 130 | 110 | 160 | M8 | 3.5 | M8 | 3.5 |
| 112 | 10 | 130 | 110 | 160 | M8 | 3.5 | M8 | 3.5 |
| 132 | 12 | 165 | 130 | 200 | M10 | 3.5 | M10 | 3.5 |

| Tolerances | |
|---|---|
| A, B | ± 0.8 |
| D, DA | ISO k6 < Ø 48mm |
| | ISO m6 > Ø 48mm |
| F, FA | ISO h9 |
| H | -0.5 |
| N | ISO j6 |
| C, CA | ± 0.8 |

In all dimension drawings: The tables give the main dimensions in mm.

For detailed drawings please see our web-pages ‘www.abb.com/motors&generators’ or contact ABB.

# Certificate examples

—
01 EU Declaration of Conformity

02 EU Type Examination certificate

03 IECEx Certificate of Conformity

ABB

## EU Declaration of Conformity

**The products:** 3-phase induction motors for potentially explosive atmospheres as listed in this document on the pages 2...3 having correspondent name plate markings covered by those as listed.

**The Manufacturer:**

ABB Oy
Motors and Generators
P.O. Box 633
Strömbergin Puistotie 5A
FIN - 65101 Vaasa, Finland

ABB Sp.z.o.o
27 Placydowska Str.
PL-95-070 Aleksandrow Lodzki
Poland

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration described above are in conformity with the relevant Union harmonization legislation:

**Directive 2014/34/EU**
The following harmonized standards are applied in relation to which conformity is declared: EN 60079-0/A11:2013[D], EN 60079-1:2014[E], EN 60079-7:2015, EN 60079-31:2014[D] and relevant parts of the EN 60034 –series of standards.

**Directive 2009/125/EC**
The motors that are marked as IE2, IE3 or IE4 are in conformity with the requirements set in the Commission Regulation (EC) No. 640/2009 and the amending Regulation (EU) No. 4/2014.

**Directive 2011/65/EU**
Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

**Notes:**

Motors shall be installed and maintained according to the relevant standards and instructions of ABB Oy, Motors and Generators. When installed in converter supplied applications, additional requirements must be respected regarding the motor as well as the installation as described in the appropriate dedicated addendum

The conformity of the incorporation into a finished product according to the Directive 2006/42/EC shall be established by the commissioning party when a motor is fitted to the machinery.

**Notified Bodies** (ExNB): LCIE (0081), Av. Du Général Leclerc. 33, 92266 Fontenay-aux-Roses, France,
VTT Expert Services Ltd (0537), Otakaari 7B, 02044 Espoo, Finland
UL International Demko A/S (0539), Borupvang 5A, 2750 Ballerup, Denmark

Signed for and on behalf of: ABB Oy, Motors and Generators
Place and date of issue: Vaasa, Finland, 2019-09-04
Harri Mykkänen
Vice President

3GZF500930-309L

01

IECEx

## IECEx Certificate of Conformity

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**
**IEC Certification System for Explosive Atmospheres**
for rules and details of the IECEx Scheme visit www.iecex.com

| | | | |
|---|---|---|---|
| Certificate No.: | **IECEx UL 18.0081X** | Page 1 of 4 | Certificate history: |
| Status: | **Current** | Issue No: 3 | Issue 2 (2021-09-24)<br>Issue 1 (2019-08-07)<br>Issue 0 (2018-08-02) |
| Date of Issue: | 2024-06-25 | | |
| Applicant: | **ABB Oy, IEC LV Motors**<br>Strömbergin Puistotie 5A<br>Vaasa FI 65320<br>**Finland** | | |
| Equipment: | **Asynchronous Motors - M3GP*****, M3BP*****, M3BN*****, M3LP***** Frame Sizes 71 to 450** | | |
| Optional accessory: | | | |
| Type of Protection: | **Increased Safety "ec", Dust Ignition Protection by Enclosure "tc, tb"** | | |
| Marking: | Ex ec IIC T3...T1 Gc<br>Ex tc IIIC T100°C...T150°C Dc<br>Ex tb IIIC T100°C...T150°C Db<br>-40°C to +60°C (71-132 Frame Sizes)<br>-55°C to +80°C (160-450 Frame Sizes) | | |

Approved for issue on behalf of the IECEx Certification Body: **Katy A. Holdredge**
Position: **Senior Staff Engineer**
Signature: (for printed version)
Date: (for printed version) 2024-06-25

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:
**UL Solutions (US)**
**333 Pfingsten Road**
**Northbrook IL 60062-2096**
**United States of America**

UL Solutions

03

[1] **TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**

[3] Type Examination Certificate Number: **DEMKO 18 ATEX 2076X Rev. 3**

[4] Product: **M3GP, M3BP, M3LP, M3BN Motors Frame Sizes 71 to 450**

[5] Manufacturer: **ABB Oy, IEC LV Motors**

[6] Address: **Strömbergin Puistotie 5A Vaasa, Finland FI 65320**

[7] This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014.

The examination and test results are recorded in confidential report no. **US/UL/ExTR18.0093/03.**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN IEC 60079-0:2018 EN IEC 60079-7:2015/A1:2018 EN 60079-31:2014**

Where additional criteria beyond those given here have been used, they are listed at item 18 in the Schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the "Specific Conditions of Use" listed under item 17 of this certificate.

[11] This Type examination certificate relates only to the design of the specified product, and not to specific items of product subsequently manufactured.

[12] The marking of the product shall include the following (marking is provided in the Schedule as a part of item 15, if applicable):

**Ex II 3 G Ex ec IIC T3...T1 Gc**

**Ex II 3 D Ex tc IIIC T100°C... T150°C Dc**

**Certification Manager**
Thomas Wilson

This is to certify that the sample(s) of the Product described herein ("Certified Product") has been investigated and found in compliance with the Standard(s) indicated on this Certificate, in accordance with the ATEX Product Certification Program Requirements. This certificate and test results obtained apply only to the product sample(s) submitted by the Manufacturer. UL did not select the sample(s) or determine whether the sample(s) provided were representative of other manufactured product. UL has not established Follow Up Service or other surveillance of the product. The Manufacturer is solely and fully responsible for conformity of all product to all applicable Standards, specifications, requirements or Directives. The test results may not be used, in whole or in part, in any other document without UL's prior written approval.

**Date of issue:** 2018-08-02
**Re-issued:** 2024-06-25

**Certification Body** UL International Demko A/S, Borupvang 5A, 2750 Ballerup, Denmark
Tel. +45 44 85 65 65, info.dk@ul.com, www.ul.com

UL Solutions

This certificate may only be reproduced in its entirety and without any change.

Form-ULID-000218 (DCS:00-IC-F0060-1) – Issue 21 0

Page 1 of 3

02

# Motors in brief

## Cast iron Ex ec and Ex t motors, sizes 71 to 180

| Motor size | | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|---|
| Stator and end shields | Material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better, integrated with stator | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Feet | | Cast iron, EN-GLJ-150 or better, integrated with stator | | | | | | Forged steel, detachable feet | |
| Bearing end shields | Material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Bearings | D-end 2-8 poles | 6203-2Z/C3 | 6204-2Z/C3 | 6205-2Z/C3 | 6206-2Z/C3 | 6206-2Z/C3 | 6208-2Z/C3 | 6309/C3 | 6310/C3 |
| | N-end 2-8 poles | 6202-2Z/C3 | 6203-2Z/C3 | 6204-2Z/C3 | 6205-2Z/C3 | 6205-2Z/C3 | 6208-2Z/C3 | 6209/C3 | 6209/C3 |
| Axially locked bearings | Inner bearing cover | As standard, locked at D-end | | | | | | | |
| Bearing seal | | Gamma ring | | | | | | | |
| Lubrication | | Permanent grease lubrication. | | | | | | Regreasable bearings | |
| SPM nipples | | Optional | | | | | | As standard | |
| Rating plate | Material | Stainless steel | | | | | | | |
| Terminal box | Frame material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better | |
| | Cover material | Cast iron, EN-GLJ-150 or better | | | | | | Cast iron, EN-GJL-200 or better | |
| | Cover screws material | Stainless A4-80 | | | | | | Steel 8.8, zinc electroplated and chromated | |
| Connections | Cable entries | 2xM16 plugged | 2 x M25 plugged | | 2 x M32 plugged | | | 2 x M40 + 2 x M20 plugged | |
| | Terminals | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | Polypropylene. Reinforced with glass fibre. | | | | | | | |
| Fan cover | Material | Steel | | | | | | | |
| | Paint color shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Stator winding | Material | Copper | | | | | | | |
| | Insulation | Insulation class F | | | | | | | |
| | Winding protection | 3 pcs thermistors | | | | | | | |
| Rotor winding | Material | Pressure die-cast aluminum | | | | | | | |
| Balancing | | Half key balancing | | | | | | | |
| Key ways | | Closed | | | | | | | |
| Heating elements | On request | 25 W | | | | | | | |
| Drain holes | | Closed | | | | | | | |
| External earthing bolt | | As standard | | | | | | | |
| Enclosure | | IP 55 | | | | | | | |
| Cooling method | | IC 411 | | | | | | | |

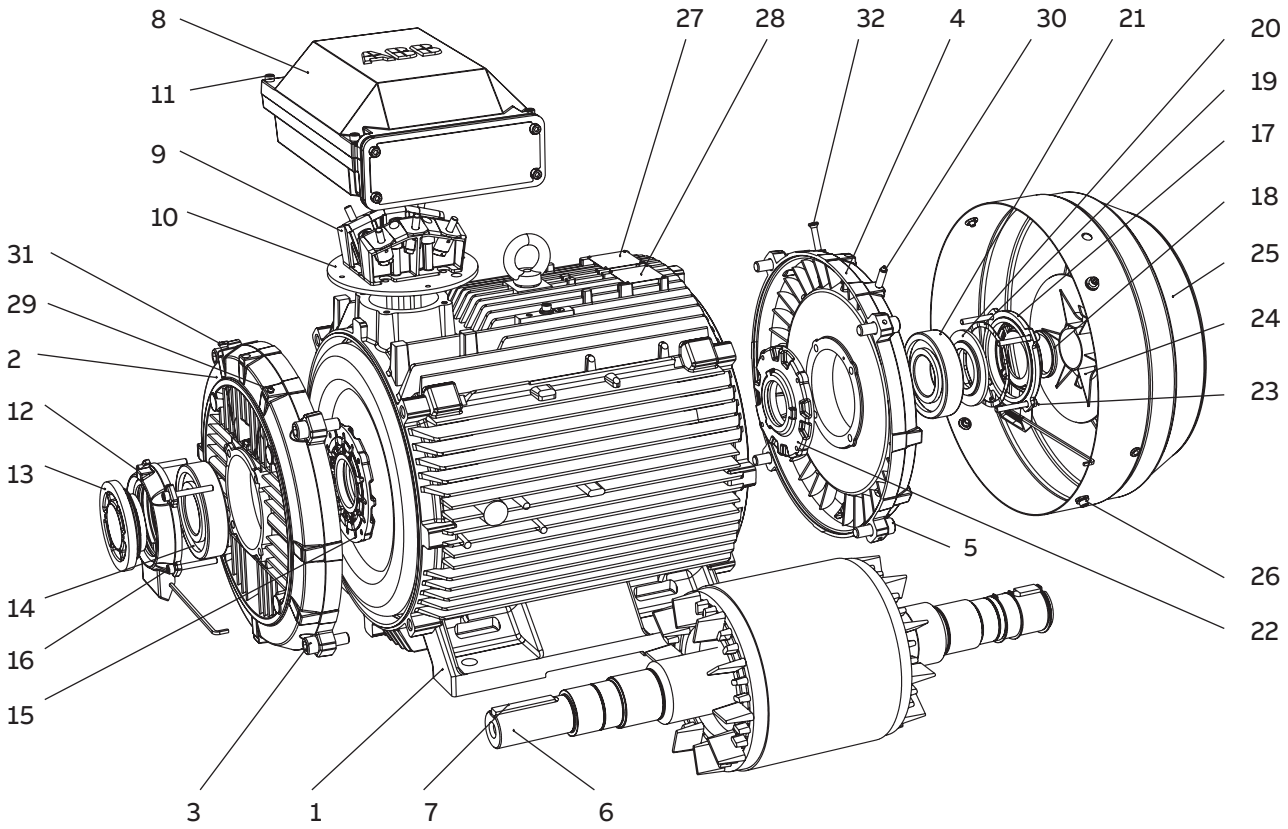
# Motors in brief

## Cast iron Ex ec and Ex t motors, sizes 200 to 450

| Motor size | | 200 | 225 | 250 | 280 | 315 | 355 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|---|
| Stator | Material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Feet | Material | Cast iron, EN-GJL-200 or better, integrated with stator | | | | | | | |
| Bearing end shields | Material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Paint colour shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Bearings | D-end 2-pole | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317/C3 | 6316M/C3 |
| | D-end 4-12-pole | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6319/C3 | 6322/C3 | 6324/C3 | 6326M/C3 |
| | N-end 2-pole | 6210/C3 | 6212/C3 | 6213/C3 | 6316/C3 | 6316/C3 | 6316M/C3 | 6317/C3 | 6317M/C3 |
| | N-end 4-12-pole | 6210/C3 | 6212/C3 | 6213/C3 | 6316/C3 | 6316/C3 | 6313/C3 | 6319/C3 | 6322/C3 |
| Axially locked bearings | Inner bearing cover | As standard, locked at D-end | | | | | | | |
| Bearing seals | | Gamma ring | | | V-ring or labyrinth seal | | | | |
| Lubrication | | Regreasable bearings | | | | | | | |
| SPM nipples | | As standard | | | | | | | |
| Rating plate | Material | Stainless steel | | | | | | | |
| Terminal box | Frame material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover material | Cast iron, EN-GJL-200 or better | | | | | | | |
| | Cover screws material | Steel 8.8, zinc electroplated and chromated | | | | | | | |
| Connections | Cable-entries | 2 x M63 + 2 x M20 plugged | | | | | xx | | |
| | Terminals | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | Polypropylene. Reinforced with glass fibre. | | | | | Polypropylene reinforced with glass fibre or aluminum. | | |
| Fan cover | Material | Hot dip galvanized steel | | | | | | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 medium according to ISO/EN 12944-5 | | | | | | | |
| Stator winding | Material | Copper | | | | | | | |
| | Insulation | Insulation class F. | | | | | | | |
| | Winding protection | 3 pcs thermistors as standard | | | | | | | |
| Rotor winding | Material | Pressure die-cast aluminum | | | | | | | |
| Balancing | | Half key balancing | | | | | | | |
| Keyway | | Closed | | | Open | | | | |
| Heating elements | On request | 25 W | 60 W | | | 120 W | | | 200 W |
| Drain holes | | As standard. open on delivery | | | | | | | |
| External earthing bolt | | As standard | | | | | | | |
| Enclosure | | IP 55 | | | | | | | |
| Cooling method | | IC 411 | | | | | | | |

# Motor construction

## Dust ignition protection cast iron motors, Ex t




**Typical exploded view of cast iron motors, frame size 315**

1 Stator frame
2 End shield, D-end
3 Screws for end shield, D-end
4 End shield, N-end
5 Screws for end shield, N-end
6 Rotor with shaft
7 Key, D-end
8 Terminal box
9 Terminal board
10 Intermediate flange
11 Screws for terminal box cover
12 Outer bearing cover, D-end
13 Valve disc with labyrinth seal, D-end; standard in 2-pole motors, V-ring in 4-8 pole motors
14 Bearing, D-end
15 Inner bearing cover, D-end
16 Screws for bearing cover
17 Outer bearing cover, N-end
18 Seal, N-end
19 Wave spring
20 Valve disc, N-end
21 Bearing, N-end
22 Inner bearing cover, N-end
23 Screws for bearing cover
24 Fan
25 Fan cover
26 Screws for fan cover
27 Rating plate
28 Lubrication plate
29 Grease nipple, D-end
30 Grease nipple, N-end
31 SPM nipple, D-end
32 SPM nipple, N-end

# IE5 SynRM Increased safety motors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211 Technology
213 SynRM motors and frequency converters for explosive atmospheres

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**215** **Rating plates**

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218 IE5 Increased safety Ex eb SynRM motors, network 500 V
219 IE5 Increased safety Ex eb SynRM motors, network 690 V
220 IE5 Increased safety Ex ec SynRM motors, network 400 V
221 IE5 Increased safety Ex ec SynRM motors, network 500 V
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**223** **Variant codes**
223 IE5 Increased safety Synchronous reluctance motors

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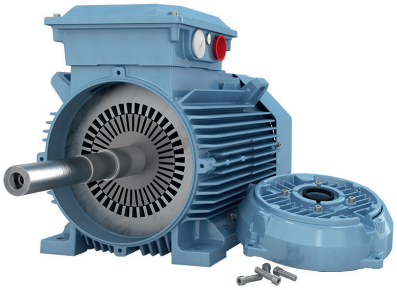
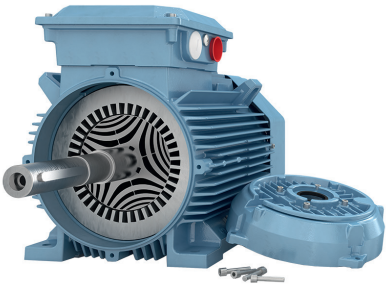
# Introduction to Synchronous Reluctance technology

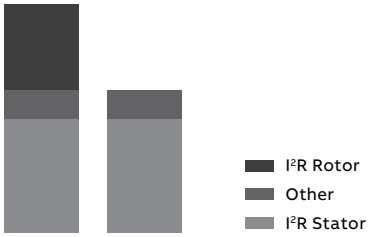
## Synchronous reluctance motors - Ultimate efficiency and reliability to optimize your cost of ownership



Traditional induction motor



IE5 SynRM motor




Losses

### Innovation inside

The idea is simple. Take a conventional, proven stator technology and a innovative rotor design. Then combine them with a best-in-class ABB drive loaded with new, purpose-designed software.

### Magnet-free design

Synchronous reluctance technology combines the performance of the permanent magnet motor with the simplicity and service-friendliness of an induction motor. The rotor has neither magnets nor windings and suffers virtually no power losses. And because there are no magnetic forces in the rotor, maintenance is as straightforward as with induction motors.

| SynRM technology | Benefit |
|---|---|
| Higher efficiency IE5 | Lowest energy consumption |
| No rare earth metals | Environmental sustainability |
| Magnet-free rotor | Easy service |
| Lower winding and bearing temperatures | Longer life time, extended service intervals |
| Better controllability | Accurate speed and torque control |
| Lower noise level | Better working environment |
| Same size with IE2 | Drop-in replacement |

### Highest reliability to minimize the cost of not running

IE5 synchronous reluctance motors have very low winding temperatures, which increases the reliability and lifetime of the winding. More importantly, the cool synchronous reluctance rotor means significantly lower bearing temperatures – an important factor because bearing failures cause about 70 percent of unplanned motor outages.

### Full motor control, down to zero speed

Many processes require accurate speed control. As the name says, SynRM is a synchronous motor that always runs at reference speed with practically no error, without an encoder. Even the best slip compensation systems in an induction motor inverter will never match the precision of SynRM. Sometimes your application may require you to run your motor at slow speeds, for example at less than 40 rpm. If you are using SynRM and your drive cannot provide the necessaire torque, it may trip. This means you may have downtime while the problem is being debugged. ABB drives provide full control and torque down to zero speed, even without speed sensors.

### For all applications

The SynRM motor can be used in any application where an induction motor is used, like pumps, fans, compressors, extruders, conveyors and wire drawing machines to name some.

### Drop-in replacement

The IE5 SynRM motor is an ideal solution for motor retrofits. It is the same size as an IE2 induction motor, eliminating the need for mechanical modifications. The increased efficiency will, on the other hand, reduce the payback time of the investment.

### IE5 according to IEC TS 60034-30-2

New technical specification IEC TS 60034-30-2 (2016) specify the efficiency classes for variable speed drive (VSD) motors (i.e. motors which cannot be operated direct on line (DOL)). Typical standard low voltage induction motor efficiency is determined according to IEC 60034-30-1 in sinusoidal (DOL) supply.

### IEC TS 60034-30-2 highlights

- The IE class limit values in new IEC TS 60034-30-2 are reduced by adding the additional harmonic losses caused by the drive:
  - 15% additional losses for motors up to 90kW
  - 25% additional losses for motors above 90kW
- Limit values available also for IE5 level
- Limit values to be achieved with 90% speed, 100% torque

### DOL or VSD motor – Same IE class, same efficiency performance in VSD duty

This allows direct comparison in IE class level of traditional induction motors in variable speed usage and advanced technology motors designed only for variable speed drive (like Synchronous reluctance motors). It does not matter if the IE classification is done with DOL supply according to IEC 60034-30-1 or with VSD supply according to IEC TS 60034-30-2. The given IE class still illustrates efficiency performance of both solutions in VSD operation very well. Same IE class, same efficiency performance.

**Example:**

| 110 kW 4-pole motor efficiency | |
|---|---|
| IEC 60034-30-1 (DOL) | IEC TS 60034-30-2 (VSD) |
| Losses 4,2 kW | Losses 4,2 kW x 1,25 = 5,25 kW |
| Eff. (110kw/114,2 kw)<br>= 96,3% | Eff. (110 kW/ (110 + 5,25 kw)<br>= 95,4% |
| IE4 limit 96,3% | IE4 limit 95,4% % |
| Same motor is IE4 according to both standards | |

IE5 SynRM efficiency with VSD duty for same rating is 96,8 %.

In practice, IE5 motor has 20% less losses compared to an IE4 motor. In the technical tables you can see the measured SynRM motor efficiency with VSD supply. Typical values of IE3 induction motor efficiency with VSD supply are listed for comparison.

# Introduction to Synchronous Reluctance technology

## Technology

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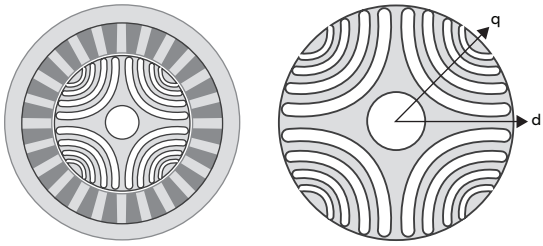
01 Cross-sectional illustration of a four-pole synchronous reluctance motor (left), and the definition of the magnetic d- and q-axes of its rotor (right).

### Introduction

The synchronous reluctance motor is a three-phase electric motor with a magnetically anisotropic rotor structure. In the four-pole version, the rotor has four high- and four low-permeance axes. High permeance means high magnetic conductivity and higher inductance, while low permeance means lower inductance.

Reluctance is the inverse of permeance and is, in practical terms, magnetic resistance; high reluctance results in low inductance. The axes with high permeance can be referred to as the direct or d-axis, while the axes with high reluctance can be referred to as the quadrature or q-axis.

The figures below show cross-sectionals of a synchronous reluctance motor. The different axes in the rotor are identified in the figure on the right.

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### Functional principle

When a magnetic field is produced in the air gap by applying exciting currents to the stator windings, the rotor will strive to align its most magnetically conductive axis, the d-axis, with the applied field, in order to minimize the reluctance in the magnetic circuit. In other words, torque is produced in the air gap between the stator and rotor whenever the applied field vector and the d-axis of the rotor are not aligned.

The magnitude of the vector field and the speed of its rotation can be controlled by a frequency converter. The high saliency of the rotor means that its angular position can easily be detected by a sensorless control. Expensive absolute encoders, resolvers, and other rotational sensors are therefore not required.

The sensorless control system keeps track of the rotor's angular position in relation to the stator and creates a vector field with accurate magnitude and rotational speed in accordance with the control reference signals dictated by the load. Since performance is dependent on the information about the rotor's position, the motor needs a frequency converter; it cannot be started with a direct-on-line supply. The rotor runs in synchronism with the applied vector field, striving to minimize reluctance in the magnetic circuit that is present. This functional principle has given its name to the technology – synchronous reluctance.

Synchronous reluctance motors run smoothly due to the sinusoidal air gap field distribution and operation with sinusoidal current.

### Rotor design

The rotor design of a synchronous reluctance motor comprises electric steel plates stacked together to form a rotor package. The electric steel plates have punched holes as flux barriers, as illustrated in the figure 01.

The torque produced by the motor is proportional to the difference between the inductances on the d- and q-axes: the greater this difference, the greater the torque production. The synchronous reluctance motor is therefore designed with magnetically conductive material, iron, in the d-axis and magnetically insulating material, air, in the q-axis.

As the rotor has no windings and consequently no joule losses, it runs considerably cooler and with better efficiency than the rotor in an induction motor. The cool running of the rotor also means lower bearing temperatures, which in turn increase the reliability of the bearing system.

### Further considerations

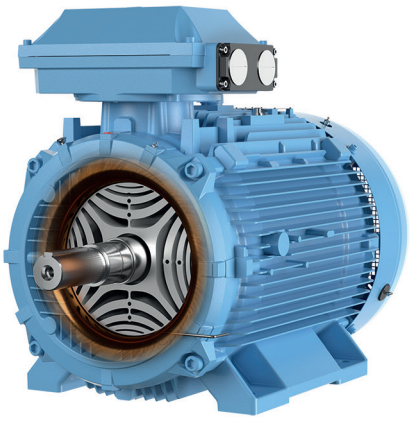
Eliminating rotor joule losses in the synchronous reluctance motor has led to compact construction, good efficiency levels and cooler bearing temperatures. The main disadvantage of this technology is that the motor's power factor is generally not as good as with induction motors.

Since there is always a frequency converter between the motor and the grid, the lower power factor is not apparent on the grid side and consequently does not have an impact on the grid supply dimensioning. However, the lower power factor may sometimes mean that a frequency converter with a higher current rating is needed.

The stator and frame design are based on proven induction motor technology, and the rotor consists of only iron and air. The lack of windings and permanent magnets in the rotor eliminates potential faults associated with these components, resulting in robust motor technology optimized for industrial variable speed applications.

# Introduction to Synchronous Reluctance technology

## SynRM motors and frequency converters for explosive atmospheres



**ACS580 general purpose drive highlights**

- A scalable offering from 0.75 kW to 500 kW.
- All compatible drive for typical light indus-try applications such as compressors, con-veyors, mixers, pumps and fans, as well as many other linear, variable and constant torque applica-tions.
- The assistant control panel with multiple lan-guage choices as standard.
- An optional Bluetooth control panel for wire-less commissioning and monitoring. Primary settings and application control macros en-sure quick product setup.
- Enclosure IP55 for harsh conditions.
- Integrated safety, including the safe-torque off (STO) feature as standard.
- Supports various motor types: induction, per-manent magnet, and synchronous re-luctance motors.

Industry specific ACH580 drives for HVAC and ACQ580 drives for water and wastewater are also available for SynRM control. Consult ABB to find the drive that matches your business needs the best or visit our web page .

**ACS880 industrial drive highlights**

- All compatible drives range for numerous de-manding industries and applications such as cranes, extruders, winches, winders, conveyors and compressors, among others.
- Compact design for easy installation, commis-sioning, and maintenance.
- Enclosure classes IP21, IP22, IP42, IP54 and IP55 for various ambient conditions.
- Integrated safety, including the safe-torque-off (STO) feature as standard.
- A memory module stores drive settings and can be installed in a new drive by anyone on the site.
- Supports various motor types: induction, per-manent magnet, and synchronous reluctance motors.
- Direct torque control (DTC) – ABB's signature motor control technology provides precise speed and torque control also without any feedback devices like encoders or position sensors.

Consult ABB to find the drive that matches your business needs the best or visit our web page .

# Ordering information

## Explanation of the product code

| Motor type | Motor size | Product code | Mounting arrangement code, Voltage and frequency code, Generation code | Variant codes |
|---|---|---|---|---|
| M3GL | 160 MLA | 3GGL 162 413 | - ASC | 445 |
| | | 1 2 3 4 5 6 7 8 9 10 | 11 12 13 14 | |

| Positions 1 to 4 | |
|---|---|
| 3GHL | Totally enclosed fan-cooled synchronous reluctance Increased safety Ex eb motor with cast iron frame, sizes 132-315 |
| 3GGL | Totally enclosed fan-cooled synchronous reluctance Increased safety Ex ec motor with cast iron frame, sizes 132-315 |

| Positions 5 to 6 | |
|---|---|
| IEC size | |
| 13: | 132 |
| 16: | 160 |
| 18: | 180 |
| 20: | 200 |
| 22: | 225 |
| 25: | 250 |
| 28: | 280 |
| 31: | 315 |

| Position 7 | |
|---|---|
| Pole pairs | |
| 2: | 4 poles |

| Positions 8 to 10 | |
|---|---|
| 8: | Frame lenght |
| 9: | Stator package length |
| 10: | Speed for two-speed induction, Permanent Magnet, SynRM and High Speed motors |

| Position 11 |
|---|
| -(dash) |

| Position 12 (marked with black dot in data tables) | |
|---|---|
| Mounting arrangement | |
| A: | Foot-mounted |
| B: | Flange-mounted, large flange |
| C: | Flange-mounted,small flange (sizes 90-112) |
| Use a variant code for ordering any other mounting arrange- ment | |

| Position 13 (marked with black dot in data tables) | |
|---|---|
| Voltage and frequency | |
| D: | 400 VΔ, 415 VΔ, 690 VY 50 Hz, 460VΔ 60 Hz |
| E: | 500 VΔ 50 Hz |
| F: | 500 VY 50 Hz |
| S: | 230 VΔ, 400 VY, 415 VY 50 Hz |
| U: | 690 VΔ 50 Hz |

| Position 14 | |
|---|---|
| Generation code | |
| C | IE5 synchronous reluctance motors |

| Variant codes |
|---|
| The product code must be, if needed, followed by variant codes. |

# Rating plates

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01 Sample rating plate for IE5 Increased safety SynRM motors

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1 ABB logo

2 Manufacturing place

3 CE mark on Ecodesign approved motors UKCA mark on UK approved motors

4 Manufacturing standard

5 Product description

6 Manufacturing year

7 Factory order reference number

8 Serial number

9 Insulation class, IP protection class

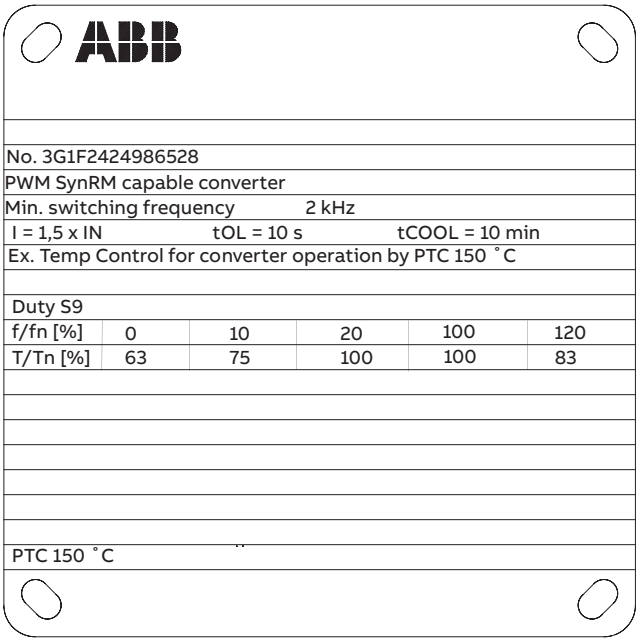
10 Voltage, Frequency, output, speed, current, power factory, duty

11 Product code

12 Bearing type

13 Weight

—
02 Converter supply plate
as standard

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# Technical data

## IE5 Increased safety Ex eb SynRM motors, network 400 V

**IP 55 - IC 411 - Temperature rise class B**
**IE5 efficiency class according to IEC TS 60034-30-2;2016**

| Output kW | Motor type | Product code | Efficiency at 100% % | Current in A | Torque $T_N$ Nm | Overload-ability $TOL/T_N$ | Rotor inertia J=1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure level $L_{PA}$ dB | Voltage V | Max. speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 4 poles** | | | | **100 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3HL 132SMA 4 | 3GHL132217-**C | 92,8 | 12,1 | 17,5 | 2.1 | 0,0145 | 63 | 64 | 380 | 3600 |
| 7.5 | M3HL 132SMB 4 | 3GHL132227-**C | 93,1 | 16,5 | 23,9 | 2 | 0,0145 | 63 | 64 | 380 | 3600 |
| 11 | M3HL 132SMC 4 | 3GHL132237-**C | 94 | 24,5 | 35 | 2.5 | 0,0184 | 69 | 64 | 380 | 3600 |
| 11 | M3HL 160MLA 4 | 3GHL162417-**C | 93,6 | 25,5 | 35 | 1.8 | 0,0579 | 133 | 70 | 370 | 3600 |
| 15 | M3HL 132SMD 4 | 3GHL132247-**C | 94,1 | 32,9 | 47,8 | 2.1 | 0,0184 | 69 | 64 | 380 | 3600 |
| 15 | M3HL 160MLB 4 | 3GHL162427-**C | 95,1 | 34,6 | 48 | 1.6 | 0,0579 | 133 | 71 | 370 | 3600 |
| 18.5 | M3HL 160MLC 4 | 3GHL162437-**C | 94,6 | 43 | 59 | 1.7 | 0,0579 | 133 | 67 | 370 | 3600 |
| 22 | M3HL 180MLB 4 | 3GHL182427-**C | 95,5 | 50 | 70 | 1.5 | 0,116 | 190 | 66 | 370 | 3600 |
| 30 | M3HL 200MLC 4 | 3GHL202437-**C | 95,9 | 68,9 | 95,6 | 1.5 | 0,207 | 277 | 72 | 370 | 3600 |
| 37 | M3HL 200MLD 4 | 3GHL202447-**C | 96,1 | 84,5 | 117,77 | 1.5 | 0,207 | 277 | 72 | 370 | 3600 |
| 45 | M3HL 225SMB 4 | 3GHL222227-**C | 96,1 | 99,8 | 143,24 | 1.5 | 0,302 | 330 | 73 | 370 | 3600 |
| 55 | M3HL 250SMA 4 | 3GHL252217-**C | 96,4 | 123 | 175 | 1.5 | 0,499 | 396 | 74 | 370 | 3600 |
| **1500 r/min = 4 poles** | | | | **50 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3HL 132SMA 4 | 3GHL132213-**C | 93,7 | 11,7 | 35 | 2.1 | 0,0277 | 85 | 60 | 380 | 1800 |
| 7.5 | M3HL 132SMB 4 | 3GHL132223-**C | 93,7 | 15,7 | 47,8 | 2 | 0,0277 | 85 | 60 | 380 | 1800 |
| 11 | M3HL 160MLA 4 | 3GHL162413-**C | 94 | 24,2 | 70 | 1.8 | 0,0702 | 160 | 62 | 370 | 1800 |
| 15 | M3HL 160MLB 4 | 3GHL162423-**C | 94,8 | 32,1 | 95,5 | 1.8 | 0,0864 | 177 | 62 | 370 | 1800 |
| 18.5 | M3HL 180MLB 4 | 3GHL182423-**C | 95 | 42,8 | 118 | 1.5 | 0,156 | 222 | 60 | 370 | 1800 |
| 22 | M3HL 180MLC 4 | 3GHL182433-**C | 95,4 | 49,4 | 140 | 1.5 | 0,156 | 222 | 60 | 370 | 1800 |
| 30 | M3HL 200MLB 4 | 3GHL202423-**C | 95,9 | 65 | 191 | 1.5 | 0,287 | 304 | 61 | 370 | 1800 |
| 37 | M3HL 225SMB 4 | 3GHL222223-**C | 96,3 | 79,3 | 236 | 1.5 | 0,38 | 385 | 64 | 370 | 1800 |
| 45 | M3HL 225SMC 4 | 3GHL222233-**C | 96,3 | 98,5 | 286 | 1.5 | 0,38 | 350 | 64 | 370 | 1800 |
| 55 | M3HL 250SMB 4 | 3GHL252223-**C | 96,5 | 117 | 350 | 1.5 | 0,632 | 454 | 65 | 370 | 1800 |
| 75 | M3HL 280SMA 4 | 3GHL282213-**C | 96,2 | 166 | 478 | 2.2 | 1 | 639 | 72 | 370 | 1800 |
| 90 | M3HL 280SMB 4 | 3GHL282223-**C | 96,5 | 199 | 573 | 2 | 1 | 639 | 72 | 370 | 1800 |
| 110 | M3HL 280SMC 4 | 3GHL282233-**C | 96,7 | 241 | 699 | 2.1 | 1,21 | 697 | 68 | 370 | 1800 |
| 110 | M3HL 315SMA 4 | 3GHL312213-**C | 96,8 | 243 | 702 | 2.2 | 1,64 | 873 | 68 | 370 | 1800 |
| 132 | M3HL 315SMB 4 | 3GHL312223-**C | 96,8 | 290 | 842 | 2.2 | 1,87 | 925 | 68 | 370 | 1800 |
| 160 | M3HL 315SMC 4 | 3GHL312233-**C | 97,1 | 343 | 1018 | 2 | 2,04 | 965 | 68 | 370 | 1800 |
| 200 | M3HL 315MLA 4 | 3GHL312413-**C | 97,2 | 427 | 1272 | 2 | 2,45 | 1116 | 74 | 370 | 1800 |
| 250 | M3HL 315LKA 4 | 3GHL312813-**C | 97,1 | 552 | 1591 | 2.2 | 3,04 | 1357 | 74 | 370 | 1800 |
| 315 | M3HL 315LKC 4 | 3GHL312833-**C | 97,2 | 662 | 2006 | 1.9 | 3,77 | 1533 | 74 | 370 | 1800 |
| **1000 r/min = 4 poles** | | | | **33,3 Hz** | | **BASIC-design** | | | | | |
| 7.5 | M3HL 160MLA 4 | 3GHL162412-**C | 93,1 | 16,5 | 72 | 1.9 | 0,0702 | 160 | 59 | 370 | 1200 |
| 11 | M3HL 160MLB 4 | 3GHL162422-**C | 93,7 | 24,1 | 105 | 1.9 | 0,0864 | 177 | 59 | 370 | 1200 |
| 15 | M3HL 180MLC 4 | 3GHL182432-**C | 94,2 | 34,1 | 143 | 1.5 | 0,156 | 216 | 57 | 370 | 1200 |
| 18.5 | M3HL 200MLA 4 | 3GHL202412-**C | 95,2 | 39,9 | 177 | 2.3 | 0,287 | 304 | 63 | 370 | 1200 |
| 22 | M3HL 200MLB 4 | 3GHL202422-**C | 95 | 47 | 210 | 2.1 | 0,287 | 304 | 63 | 370 | 1200 |
| 30 | M3HL 225SMB 4 | 3GHL222222-**C | 95,5 | 64,7 | 287 | 1.5 | 0,38 | 348 | 61 | 370 | 1200 |
| 37 | M3HL 250SMA 4 | 3GHL252212-**C | 95,6 | 80,5 | 353 | 1.7 | 0,575 | 428 | 63 | 370 | 1200 |
| 45 | M3HL 280SMA 4 | 3GHL282212-**C | 96,2 | 98,6 | 430 | 2.3 | 1 | 639 | 65 | 370 | 1200 |
| 55 | M3HL 280SMB 4 | 3GHL282222-**C | 96 | 119 | 526 | 2 | 1 | 639 | 65 | 370 | 1200 |
| 75 | M3HL 280SMC 4 | 3GHL282232-**C | 96,2 | 160 | 715 | 1.9 | 1,21 | 697 | 67 | 370 | 1200 |
| 75 | M3HL 315SMA 4 | 3GHL312212-**C | 96,5 | 164 | 717 | 2.1 | 1,64 | 873 | 67 | 370 | 1200 |
| 90 | M3HL 315SMB 4 | 3GHL312222-**C | 96,8 | 199 | 859 | 2.1 | 1,87 | 925 | 67 | 370 | 1200 |
| 110 | M3HL 315SMC 4 | 3GHL312232-**C | 96,8 | 241 | 1051 | 2 | 2,04 | 965 | 68 | 370 | 1200 |
| 132 | M3HL 315MLA 4 | 3GHL312412-**C | 97,1 | 278 | 1261 | 1.8 | 2,45 | 1116 | 68 | 370 | 1200 |
| 160 | M3HL 315LKA 4 | 3GHL312812-**C | 97,1 | 341 | 1527 | 2 | 3,04 | 1357 | 73 | 370 | 1200 |
| 200 | M3HL 315LKC 4 | 3GHL312832-**C | 97,3 | 416 | 1910 | 2 | 3,77 | 1533 | 73 | 370 | 1200 |

# Technical data

## IE5 Increased safety Ex eb SynRM motors, network 500 V

**IP 55 - IC 411 - Temperature rise class B**
**IE5 efficiency class according to IEC TS 60034-30-2;2016**

| Output kW | Motor type | Product code | Efficiency at 100% % | Current in A | Torque $T_N$ Nm | Overload-ability TOL/$T_N$ | Rotor inertia J=1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure level $L_{PA}$ dB | Voltage V | Max. speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 4 poles** | | | | **100 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3HL 132SMA 4 | 3GHL132217-**C | 92,8 | 9,6 | 17,5 | 2.2 | 0,0145 | 63 | 64 | 470 | 3600 |
| 7.5 | M3HL 132SMB 4 | 3GHL132227-**C | 93,1 | 13,3 | 23,9 | 2.1 | 0,0145 | 63 | 64 | 470 | 3600 |
| 11 | M3HL 132SMC 4 | 3GHL132237-**C | 93,1 | 19,8 | 35 | 2.3 | 0,0184 | 69 | 64 | 470 | 3600 |
| 11 | M3HL 160MLA 4 | 3GHL162417-**C | 93,6 | 20,8 | 35 | 1.8 | 0,0579 | 133 | 70 | 470 | 3600 |
| 15 | M3HL 132SMD 4 | 3GHL132247-**C | 94,1 | 26,6 | 47,8 | 2.3 | 0,0184 | 69 | 64 | 470 | 3600 |
| 15 | M3HL 160MLB 4 | 3GHL162427-**C | 95,1 | 27,2 | 47,8 | 1.7 | 0,0579 | 133 | 71 | 470 | 3600 |
| 18.5 | M3HL 160MLC 4 | 3GHL162437-**C | 94,5 | 34,1 | 58,89 | 1.7 | 0,0579 | 133 | 70 | 470 | 3600 |
| 22 | M3HL 180MLB 4 | 3GHL182427-**C | 95,5 | 39,7 | 70 | 1.5 | 0,116 | 190 | 66 | 470 | 3600 |
| 30 | M3HL 200MLC 4 | 3GHL202437-**C | 95,9 | 50,9 | 95,5 | 1.5 | 0,207 | 277 | 72 | 470 | 3600 |
| 37 | M3HL 200MLD 4 | 3GHL202447-**C | 96,1 | 66,4 | 117,77 | 1.5 | 0,207 | 277 | 72 | 470 | 3600 |
| 45 | M3HL 225SMB 4 | 3GHL222227-**C | 96,1 | 78,4 | 143,24 | 1.5 | 0,302 | 330 | 73 | 470 | 3600 |
| 55 | M3HL 250SMA 4 | 3GHL252217-**C | 96,9 | 97 | 175 | 1.5 | 0,499 | 396 | 74 | 470 | 3600 |
| **1500 r/min = 4 poles** | | | | **50 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3HL 132SMA 4 | 3GHL132213-**C | 93,7 | 9,5 | 35 | 2.1 | 0,0277 | 85 | 60 | 470 | 1800 |
| 7.5 | M3HL 132SMB 4 | 3GHL132223-**C | 93,7 | 12,8 | 47,8 | 2 | 0,0277 | 85 | 60 | 470 | 1800 |
| 11 | M3HL 160MLA 4 | 3GHL162413-**C | 94 | 19,1 | 70,03 | 1.9 | 0,0702 | 160 | 62 | 470 | 1800 |
| 15 | M3HL 160MLB 4 | 3GHL162423-**C | 94,8 | 25,3 | 95,5 | 2 | 0,0864 | 177 | 62 | 470 | 1800 |
| 18.5 | M3HL 180MLB 4 | 3GHL182423-**C | 95 | 33,2 | 118 | 1.5 | 0,156 | 222 | 60 | 470 | 1800 |
| 22 | M3HL 180MLC 4 | 3GHL182433-**C | 95,4 | 39,5 | 140 | 1.5 | 0,156 | 222 | 60 | 470 | 1800 |
| 30 | M3HL 200MLB 4 | 3GHL202423-**C | 95,9 | 51,2 | 191 | 1.5 | 0,287 | 304 | 61 | 470 | 1800 |
| 37 | M3HL 225SMB 4 | 3GHL222223-**C | 96,3 | 61,2 | 236 | 1.5 | 0,38 | 385 | 64 | 470 | 1800 |
| 45 | M3HL 225SMC 4 | 3GHL222233-**C | 96,3 | 78,2 | 286 | 1.5 | 0,389 | 350 | 64 | 470 | 1800 |
| 55 | M3HL 250SMB 4 | 3GHL252223-**C | 96,5 | 91,6 | 350 | 1.5 | 0,632 | 454 | 65 | 470 | 1800 |
| 75 | M3HL 280SMA 4 | 3GHL282213-**C | 96,2 | 131 | 477 | 2.1 | 1 | 639 | 72 | 470 | 1800 |
| 90 | M3HL 280SMB 4 | 3GHL282223-**C | 96,5 | 157 | 573 | 1.9 | 1 | 639 | 72 | 470 | 1800 |
| 110 | M3HL 280SMC 4 | 3GHL282233-**C | 96,7 | 190 | 700 | 2 | 1,21 | 697 | 68 | 470 | 1800 |
| 110 | M3HL 315SMA 4 | 3GHL312213-**C | 96,8 | 191 | 700 | 2.2 | 1,64 | 873 | 68 | 470 | 1800 |
| 132 | M3HL 315SMB 4 | 3GHL312223-**C | 96,8 | 232 | 840 | 2.3 | 1,87 | 925 | 68 | 470 | 1800 |
| 160 | M3HL 315SMC 4 | 3GHL312233-**C | 97,1 | 271 | 1019 | 2 | 2,04 | 965 | 68 | 470 | 1800 |
| 200 | M3HL 315MLA 4 | 3GHL312413-**C | 97,2 | 326 | 1273 | 1.9 | 2,45 | 1116 | 74 | 470 | 1800 |
| 250 | M3HL 315LKA 4 | 3GHL312813-**C | 97,1 | 434 | 1592 | 2.2 | 3,04 | 1357 | 74 | 470 | 1800 |
| 315 | M3HL 315LKC 4 | 3GHL312833-**C | 97,2 | 517 | 2005,35 | 1.7 | 3,77 | 1533 | 74 | 470 | 1800 |
| **1000 r/min = 4 poles** | | | | **33,3 Hz** | | **BASIC-design** | | | | | |
| 7.5 | M3HL 160MLA 4 | 3GHL162412-**C | 93,3 | 13,1 | 71,6 | 2 | 0,0702 | 160 | 59 | 470 | 1200 |
| 11 | M3HL 160MLB 4 | 3GHL162422-**C | 93,7 | 19 | 105 | 1.9 | 0,0864 | 177 | 59 | 470 | 1200 |
| 15 | M3HL 180MLC 4 | 3GHL182432-**C | 94,2 | 25,2 | 143 | 1.5 | 0,156 | 216 | 57 | 470 | 1200 |
| 18.5 | M3HL 200MLA 4 | 3GHL202412-**C | 95,4 | 31,5 | 177 | 2.4 | 0,287 | 304 | 63 | 470 | 1200 |
| 22 | M3HL 200MLB 4 | 3GHL202422-**C | 95,2 | 37 | 210 | 2.2 | 0,287 | 304 | 63 | 470 | 1200 |
| 30 | M3HL 225SMB 4 | 3GHL222222-**C | 95,5 | 51,3 | 287 | 1.5 | 0,38 | 348 | 61 | 470 | 1200 |
| 37 | M3HL 250SMA 4 | 3GHL252212-**C | 95,8 | 63,4 | 353 | 1.9 | 0,575 | 428 | 63 | 470 | 1200 |
| 45 | M3HL 280SMA 4 | 3GHL282212-**C | 96,2 | 77,6 | 430 | 2.3 | 1 | 639 | 65 | 470 | 1200 |
| 55 | M3HL 280SMB 4 | 3GHL282222-**C | 96,1 | 93,7 | 525 | 2 | 1 | 639 | 65 | 470 | 1200 |
| 75 | M3HL 280SMC 4 | 3GHL282232-**C | 96,2 | 126 | 716 | 1.8 | 1,21 | 697 | 67 | 470 | 1200 |
| 75 | M3HL 315SMA 4 | 3GHL312212-**C | 96,5 | 129 | 716 | 2.1 | 1,64 | 873 | 67 | 470 | 1200 |
| 90 | M3HL 315SMB 4 | 3GHL312222-**C | 96,8 | 157 | 859 | 2.1 | 1,87 | 925 | 67 | 470 | 1200 |
| 110 | M3HL 315SMC 4 | 3GHL312232-**C | 96,8 | 190 | 1050 | 2.1 | 2,04 | 965 | 68 | 470 | 1200 |
| 132 | M3HL 315MLA 4 | 3GHL312412-**C | 97,1 | 219 | 1261 | 1.8 | 2,45 | 1116 | 68 | 470 | 1200 |
| 160 | M3HL 315LKA 4 | 3GHL312812-**C | 97,1 | 269 | 1527,89 | 2 | 3,04 | 1357 | 73 | 470 | 1200 |
| 200 | M3HL 315LKC 4 | 3GHL312832-**C | 97,3 | 327 | 1910 | 1.8 | 3,77 | 1533 | 73 | 470 | 1200 |

# Technical data

## IE5 Increased safety Ex eb SynRM motors, network 690 V

**IP 55 - IC 411 - Temperature rise class B**
**IE5 efficiency class according to IEC TS 60034-30-2;2016**

| Output kW | Motor type | Product code | Efficiency at 100% % | Current in A | Torque $T_N$ Nm | Overload-ability TOL/$T_N$ | Rotor inertia J=1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure level $L_{PA}$ dB | Voltage V | Max. speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 4 poles** | | | | **100 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3HL 132SMA 4 | 3GHL132217-**C | 92,5 | 7 | 17,5 | 2.4 | 0,0145 | 63 | 64 | 650 | 3600 |
| 5.5 | M3HL 132SMA 4 | 3GHL132217-**C | 92,5 | 7 | 17,5 | 2.4 | 0,0145 | 63 | 64 | 650 | 3600 |
| 7.5 | M3HL 132SMB 4 | 3GHL132227-**C | 92,8 | 9,5 | 23,9 | 2.1 | 0,0145 | 63 | 64 | 650 | 3600 |
| 11 | M3HL 132SMC 4 | 3GHL132237-**C | 92,9 | 14,1 | 35 | 2.2 | 0,0184 | 69 | 64 | 650 | 3600 |
| 11 | M3HL 160MLA 4 | 3GHL162417-**C | 93,6 | 14,8 | 35 | 1.9 | 0,0579 | 133 | 70 | 650 | 3600 |
| 15 | M3HL 132SMD 4 | 3GHL132247-**C | 93,7 | 18,9 | 47,8 | 2.1 | 0,0184 | 69 | 64 | 650 | 3600 |
| 15 | M3HL 160MLB 4 | 3GHL162427-**C | 94,9 | 20 | 47,8 | 1.6 | 0,0579 | 133 | 71 | 650 | 3600 |
| 18.5 | M3HL 160MLC 4 | 3GHL162437-**C | 94,5 | 25,1 | 58,89 | 1.8 | 0,0579 | 133 | 70 | 650 | 3600 |
| 22 | M3HL 180MLB 4 | 3GHL182427-**C | 95,4 | 28,9 | 70 | 1.5 | 0,116 | 190 | 66 | 650 | 3600 |
| 30 | M3HL 200MLC 4 | 3GHL202437-**C | 95,9 | 39,3 | 95,5 | 1.5 | 0,207 | 277 | 72 | 650 | 3600 |
| 37 | M3HL 200MLD 4 | 3GHL202447-**C | 96,1 | 47,8 | 117,77 | 1.5 | 0,207 | 277 | 72 | 650 | 3600 |
| 45 | M3HL 225SMB 4 | 3GHL222227-**C | 96,1 | 57,2 | 143,24 | 1.5 | 0,302 | 330 | 73 | 650 | 3600 |
| 55 | M3HL 250SMA 4 | 3GHL252217-**C | 94,4 | 70 | 175 | 1.5 | 0,499 | 396 | 74 | 650 | 3600 |
| **1500 r/min = 4 poles** | | | | **50 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3HL 132SMA 4 | 3GHL132213-**C | 93,3 | 6,8 | 35 | 2.1 | 0,0277 | 85 | 60 | 650 | 1800 |
| 7.5 | M3HL 132SMB 4 | 3GHL132223-**C | 93,3 | 9,2 | 47,8 | 2.1 | 0,0277 | 85 | 60 | 650 | 1800 |
| 11 | M3HL 160MLA 4 | 3GHL162413-**C | 93,6 | 14,1 | 70,03 | 1.8 | 0,0702 | 160 | 62 | 650 | 1800 |
| 15 | M3HL 160MLB 4 | 3GHL162423-**C | 94,6 | 18,4 | 95,5 | 1.9 | 0,0864 | 177 | 62 | 650 | 1800 |
| 18.5 | M3HL 180MLB 4 | 3GHL182423-**C | 95 | 24,3 | 118 | 1.5 | 0,156 | 222 | 60 | 650 | 1800 |
| 22 | M3HL 180MLC 4 | 3GHL182433-**C | 95,4 | 28 | 140 | 1.5 | 0,156 | 222 | 60 | 650 | 1800 |
| 30 | M3HL 200MLB 4 | 3GHL202423-**C | 95,5 | 37,3 | 191 | 1.5 | 0,287 | 304 | 61 | 650 | 1800 |
| 37 | M3HL 225SMB 4 | 3GHL222223-**C | 96,3 | 45,2 | 236 | 1.5 | 0,38 | 385 | 64 | 650 | 1800 |
| 45 | M3HL 225SMC 4 | 3GHL222233-**C | 96,3 | 54,8 | 286 | 1.5 | 0,38 | 350 | 64 | 650 | 1800 |
| 55 | M3HL 250SMB 4 | 3GHL252223-**C | 96,5 | 67 | 350 | 1.5 | 0,632 | 454 | 65 | 650 | 1800 |
| 75 | M3HL 280SMA 4 | 3GHL282213-**C | 96,2 | 92,6 | 477 | 2 | 1 | 639 | 72 | 650 | 1800 |
| 90 | M3HL 280SMB 4 | 3GHL282223-**C | 96,3 | 110 | 573 | 1.8 | 1 | 639 | 72 | 650 | 1800 |
| 110 | M3HL 280SMC 4 | 3GHL282233-**C | 96,6 | 133 | 700 | 1.8 | 1,21 | 697 | 68 | 650 | 1800 |
| 110 | M3HL 315SMA 4 | 3GHL312213-**C | 96,7 | 138 | 700 | 1.9 | 1,64 | 873 | 68 | 650 | 1800 |
| 132 | M3HL 315SMB 4 | 3GHL312223-**C | 96,7 | 165 | 840 | 1.9 | 1,87 | 925 | 68 | 650 | 1800 |
| 160 | M3HL 315SMC 4 | 3GHL312233-**C | 97 | 195 | 1019 | 1.7 | 2,04 | 965 | 68 | 650 | 1800 |
| 200 | M3HL 315MLA 4 | 3GHL312413-**C | 97,1 | 244 | 1273 | 2.1 | 2,45 | 1116 | 74 | 650 | 1800 |
| 250 | M3HL 315LKA 4 | 3GHL312813-**C | 97 | 314 | 1592 | 1.6 | 3,04 | 1357 | 74 | 650 | 1800 |
| 315 | M3HL 315LKC 4 | 3GHL312833-**C | 97,1 | 377 | 2005,35 | 2 | 3,77 | 1533 | 74 | 650 | 1800 |
| **1000 r/min = 4 poles** | | | | **33,3 Hz** | | **BASIC-design** | | | | | |
| 7.5 | M3HL 160MLA 4 | 3GHL162412-**C | 93 | 9,5 | 71,6 | 2.1 | 0,0702 | 160 | 59 | 650 | 1200 |
| 11 | M3HL 160MLB 4 | 3GHL162422-**C | 93,4 | 13,8 | 105 | 2 | 0,0864 | 177 | 59 | 650 | 1200 |
| 15 | M3HL 180MLC 4 | 3GHL182432-**C | 94,2 | 19,3 | 143 | 1.5 | 0,156 | 216 | 57 | 650 | 1200 |
| 18.5 | M3HL 200MLA 4 | 3GHL202412-**C | 95 | 22,6 | 177 | 2.1 | 0,287 | 304 | 63 | 650 | 1200 |
| 22 | M3HL 200MLB 4 | 3GHL202422-**C | 94,9 | 26,5 | 210 | 2 | 0,287 | 304 | 63 | 650 | 1200 |
| 30 | M3HL 225SMB 4 | 3GHL222222-**C | 95,5 | 36,7 | 287 | 1.5 | 0,38 | 348 | 61 | 650 | 1200 |
| 37 | M3HL 250SMA 4 | 3GHL252212-**C | 95,6 | 46 | 353 | 1.8 | 0,575 | 428 | 63 | 650 | 1200 |
| 45 | M3HL 280SMA 4 | 3GHL282212-**C | 96 | 54,6 | 430 | 2 | 1 | 639 | 65 | 650 | 1200 |
| 55 | M3HL 280SMB 4 | 3GHL282222-**C | 95,8 | 66,8 | 525 | 1.9 | 1 | 639 | 65 | 650 | 1200 |
| 75 | M3HL 280SMC 4 | 3GHL282232-**C | 96 | 89,8 | 716 | 1.7 | 1,21 | 697 | 67 | 650 | 1200 |
| 75 | M3HL 315SMA 4 | 3GHL312212-**C | 96,4 | 91,6 | 716 | 1.9 | 1,64 | 873 | 67 | 650 | 1200 |
| 90 | M3HL 315SMB 4 | 3GHL312222-**C | 96,6 | 111 | 860 | 1.9 | 1,87 | 925 | 67 | 650 | 1200 |
| 110 | M3HL 315SMC 4 | 3GHL312232-**C | 96,7 | 134 | 1051 | 1.8 | 2,04 | 965 | 68 | 650 | 1200 |
| 132 | M3HL 315MLA 4 | 3GHL312412-**C | 96,9 | 156 | 1261 | 1.6 | 2,45 | 1116 | 68 | 650 | 1200 |
| 160 | M3HL 315LKA 4 | 3GHL312812-**C | 96,9 | 189 | 1528,04 | 1.7 | 3,04 | 1357 | 73 | 650 | 1200 |
| 200 | M3HL 315LKC 4 | 3GHL312832-**C | 97 | 232 | 1910 | 1.6 | 3,77 | 1533 | 73 | 650 | 1200 |

# Technical data

## IE5 Increased safety Ex ec SynRM motors, network 400 V

**IP 55 - IC 411 - Temperature rise class B**
**IE5 efficiency class according to IEC TS 60034-30-2;2016**

| Output kW | Motor type | Product code | Efficiency at 100% % | Current in A | Torque $T_N$ Nm | Overload-ability TOL/$T_N$ | Rotor inertia J=1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure level $L_{PA}$ dB | Voltage V | Max. speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 4 poles** | | | | **100 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3GL 132SMA 4 | 3GGL132217-**C | 92,8 | 12,1 | 17,5 | 2.1 | 0,0145 | 63 | 64 | 380 | 3600 |
| 7.5 | M3GL 132SMB 4 | 3GGL132227-**C | 93,1 | 16,5 | 23,9 | 2 | 0,0145 | 63 | 64 | 380 | 3600 |
| 11 | M3GL 132SMC 4 | 3GGL132237-**C | 94 | 24,5 | 35 | 2.5 | 0,0184 | 69 | 64 | 380 | 3600 |
| 11 | M3GL 160MLA 4 | 3GGL162417-**C | 93,6 | 25,5 | 35 | 1.8 | 0,0579 | 133 | 70 | 370 | 3600 |
| 15 | M3GL 132SMD 4 | 3GGL132247-**C | 94,1 | 32,9 | 47,8 | 2.1 | 0,0184 | 69 | 64 | 380 | 3600 |
| 15 | M3GL 160MLB 4 | 3GGL162427-**C | 95,1 | 34,6 | 48 | 1.6 | 0,0579 | 133 | 71 | 370 | 3600 |
| 18.5 | M3GL 160MLC 4 | 3GGL162437-**C | 94,6 | 43 | 59 | 1.7 | 0,0579 | 133 | 69 | 370 | 3600 |
| 22 | M3GL 180MLB 4 | 3GGL182427-**C | 95,5 | 50 | 70 | 1.5 | 0,116 | 190 | 66 | 370 | 3600 |
| 30 | M3GL 200MLC 4 | 3GGL202437-**C | 95,9 | 68,9 | 95,6 | 1.5 | 0,207 | 277 | 72 | 370 | 3600 |
| 37 | M3GL 200MLD 4 | 3GGL202447-**C | 96,1 | 84,5 | 118 | 1.5 | 0,207 | 277 | 72 | 370 | 3600 |
| 45 | M3GL 225SMB 4 | 3GGL222227-**C | 96,1 | 99,8 | 143 | 1.5 | 0,302 | 330 | 73 | 370 | 3600 |
| 55 | M3GL 250SMA 4 | 3GGL252217-**C | 96,4 | 123 | 175 | 1.5 | 0,499 | 396 | 74 | 370 | 3600 |
| **1500 r/min = 4 poles** | | | | **50 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3GL 132SMA 4 | 3GGL132213-**C | 93,7 | 11,7 | 35 | 2.1 | 0,0277 | 85 | 60 | 380 | 1800 |
| 7.5 | M3GL 132SMB 4 | 3GGL132223-**C | 93,7 | 15,7 | 47,8 | 2 | 0,0277 | 85 | 60 | 380 | 1800 |
| 11 | M3GL 160MLA 4 | 3GGL162413-**C | 94 | 24,2 | 70 | 1.8 | 0,0702 | 160 | 62 | 370 | 1800 |
| 15 | M3GL 160MLB 4 | 3GGL162423-**C | 94,8 | 32,1 | 95,5 | 1.8 | 0,0864 | 177 | 62 | 370 | 1800 |
| 18.5 | M3GL 180MLB 4 | 3GGL182423-**C | 95 | 42,8 | 118 | 1.5 | 0,156 | 222 | 60 | 370 | 1800 |
| 22 | M3GL 180MLC 4 | 3GGL182433-**C | 95,4 | 49,4 | 140 | 1.5 | 0,156 | 222 | 60 | 370 | 1800 |
| 30 | M3GL 200MLB 4 | 3GGL202423-**C | 95,9 | 65 | 191 | 1.5 | 0,287 | 304 | 61 | 370 | 1800 |
| 37 | M3GL 225SMB 4 | 3GGL222223-**C | 96,3 | 79,3 | 236 | 1.5 | 0,38 | 385 | 64 | 370 | 1800 |
| 45 | M3GL 225SMC 4 | 3GGL222233-**C | 96,3 | 98,5 | 286 | 1.5 | 0,38 | 350 | 64 | 370 | 1800 |
| 55 | M3GL 250SMB 4 | 3GGL252223-**C | 96,5 | 117 | 350 | 1.5 | 0,632 | 454 | 65 | 370 | 1800 |
| 75 | M3GL 280SMA 4 | 3GGL282213-**C | 96,2 | 166 | 478 | 2.2 | 1 | 639 | 72 | 370 | 1800 |
| 90 | M3GL 280SMB 4 | 3GGL282223-**C | 96,5 | 199 | 573 | 2 | 1 | 639 | 72 | 370 | 1800 |
| 110 | M3GL 280SMC 4 | 3GGL282233-**C | 96,7 | 241 | 699 | 2.1 | 1,21 | 697 | 68 | 370 | 1800 |
| 110 | M3GL 315SMA 4 | 3GGL312213-**C | 96,8 | 243 | 702 | 2.2 | 1,64 | 873 | 68 | 370 | 1800 |
| 132 | M3GL 315SMB 4 | 3GGL312223-**C | 96,8 | 290 | 842 | 2.2 | 1,87 | 925 | 68 | 370 | 1800 |
| 160 | M3GL 315SMC 4 | 3GGL312233-**C | 97,1 | 343 | 1018 | 2 | 2,04 | 965 | 68 | 370 | 1800 |
| 200 | M3GL 315MLA 4 | 3GGL312413-**C | 97,2 | 427 | 1272 | 2 | 2,45 | 1116 | 74 | 370 | 1800 |
| 250 | M3GL 315LKA 4 | 3GGL312813-**C | 97,1 | 552 | 1591 | 2.2 | 3,04 | 1357 | 74 | 370 | 2000 |
| 315 | M3GL 315LKC 4 | 3GGL312833-**C | 97,2 | 662 | 2006 | 1.9 | 3,77 | 1533 | 74 | 370 | 1800 |
| **1000 r/min = 4 poles** | | | | **33,3 Hz** | | **BASIC-design** | | | | | |
| 7.5 | M3GL 160MLA 4 | 3GGL162412-**C | 93,1 | 16,5 | 72 | 1.9 | 0,0702 | 160 | 59 | 370 | 1200 |
| 11 | M3GL 160MLB 4 | 3GGL162422-**C | 93,7 | 24,1 | 105 | 1.9 | 0,0864 | 177 | 59 | 370 | 1200 |
| 15 | M3GL 180MLC 4 | 3GGL182432-**C | 94,2 | 34,1 | 143 | 1.5 | 0,156 | 216 | 57 | 370 | 1200 |
| 18.5 | M3GL 200MLA 4 | 3GGL202412-**C | 95,2 | 39,9 | 177 | 2.3 | 0,287 | 304 | 63 | 370 | 1200 |
| 22 | M3GL 200MLB 4 | 3GGL202422-**C | 95 | 47 | 210 | 2.1 | 0,287 | 304 | 63 | 370 | 1200 |
| 30 | M3GL 225SMB 4 | 3GGL222222-**C | 95,5 | 64,7 | 287 | 1.5 | 0,38 | 348 | 61 | 370 | 1200 |
| 37 | M3GL 250SMA 4 | 3GGL252212-**C | 95,6 | 80,5 | 353 | 1.7 | 0,575 | 428 | 63 | 370 | 1200 |
| 45 | M3GL 280SMA 4 | 3GGL282212-**C | 96,2 | 98,6 | 430 | 2.3 | 1 | 639 | 65 | 370 | 1200 |
| 55 | M3GL 280SMB 4 | 3GGL282222-**C | 96 | 119 | 526 | 2 | 1 | 639 | 65 | 370 | 1200 |
| 75 | M3GL 280SMC 4 | 3GGL282232-**C | 96,2 | 160 | 715 | 1.9 | 1,21 | 697 | 67 | 370 | 1200 |
| 75 | M3GL 315SMA 4 | 3GGL312212-**C | 96,5 | 164 | 717 | 2.1 | 1,64 | 873 | 67 | 370 | 1200 |
| 90 | M3GL 315SMB 4 | 3GGL312222-**C | 96,8 | 199 | 859 | 2.1 | 1,87 | 925 | 67 | 370 | 1200 |
| 110 | M3GL 315SMC 4 | 3GGL312232-**C | 96,8 | 241 | 1051 | 2 | 2,04 | 965 | 68 | 370 | 1200 |
| 132 | M3GL 315MLA 4 | 3GGL312412-**C | 97,1 | 278 | 1261 | 1.8 | 2,45 | 1116 | 68 | 370 | 1200 |
| 160 | M3GL 315LKA 4 | 3GGL312812-**C | 97,1 | 341 | 1527 | 2 | 3,04 | 1357 | 73 | 370 | 1200 |
| 200 | M3GL 315LKC 4 | 3GGL312832-**C | 97,3 | 416 | 1910 | 2 | 3,77 | 1533 | 73 | 370 | 1200 |

# Technical data

## IE5 Increased safety Ex ec SynRM motors, network 500 V

**IP 55 - IC 411 - Temperature rise class B**
**IE5 efficiency class according to IEC TS 60034-30-2;2016**

| Output kW | Motor type | Product code | Efficiency at 100% % | Current in A | Torque $T_N$ Nm | Overload-ability TOL/$T_N$ | Rotor inertia J=1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure level $L_{PA}$ dB | Voltage V | Max. speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 4 poles** | | | | **100 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3GL 132SMA 4 | 3GGL132217-**C | 92,8 | 9,6 | 17,5 | 2.2 | 0,0145 | 63 | 64 | 470 | 3600 |
| 7.5 | M3GL 132SMB 4 | 3GGL132227-**C | 93,1 | 13,3 | 23,9 | 2.1 | 0,0145 | 63 | 64 | 470 | 3600 |
| 11 | M3GL 132SMC 4 | 3GGL132237-**C | 93,1 | 19,8 | 35 | 2.3 | 0,0184 | 69 | 64 | 470 | 3600 |
| 11 | M3GL 160MLA 4 | 3GGL162417-**C | 93,6 | 20,8 | 35 | 1.8 | 0,0579 | 133 | 70 | 470 | 3600 |
| 15 | M3GL 132SMD 4 | 3GGL132247-**C | 94,1 | 26,6 | 47,8 | 2.3 | 0,0184 | 69 | 64 | 470 | 3600 |
| 15 | M3GL 160MLB 4 | 3GGL162427-**C | 95,1 | 27,2 | 47,8 | 1.7 | 0,0579 | 133 | 71 | 470 | 3600 |
| 18.5 | M3GL 160MLC 4 | 3GGL162437-**C | 94,5 | 34,1 | 58,9 | 1.7 | 0,0579 | 133 | 69 | 470 | 3600 |
| 22 | M3GL 180MLB 4 | 3GGL182427-**C | 95,5 | 39,7 | 70 | 1.5 | 0,116 | 190 | 66 | 470 | 3600 |
| 30 | M3GL 200MLC 4 | 3GGL202437-**C | 95,9 | 50,9 | 95,5 | 1.5 | 0,207 | 277 | 72 | 470 | 3600 |
| 37 | M3GL 200MLD 4 | 3GGL202447-**C | 96,1 | 66,4 | 118 | 1.5 | 0,207 | 277 | 72 | 470 | 3600 |
| 45 | M3GL 225SMB 4 | 3GGL222227-**C | 96,1 | 78,4 | 143 | 1.5 | 0,302 | 330 | 73 | 470 | 3600 |
| 55 | M3GL 250SMA 4 | 3GGL252217-**C | 96,9 | 97 | 175 | 1.5 | 0,499 | 396 | 74 | 470 | 3600 |
| **1500 r/min = 4 poles** | | | | **50 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3GL 132SMA 4 | 3GGL132213-**C | 93,7 | 9,5 | 35 | 2.1 | 0,0277 | 85 | 60 | 470 | 1800 |
| 7.5 | M3GL 132SMB 4 | 3GGL132223-**C | 93,7 | 12,8 | 47,8 | 2 | 0,0277 | 85 | 60 | 470 | 1800 |
| 11 | M3GL 160MLA 4 | 3GGL162413-**C | 94 | 19,1 | 70 | 1.9 | 0,0702 | 160 | 62 | 470 | 1800 |
| 15 | M3GL 160MLB 4 | 3GGL162423-**C | 94,8 | 25,3 | 95,5 | 2 | 0,0864 | 177 | 62 | 470 | 1800 |
| 18.5 | M3GL 180MLB 4 | 3GGL182423-**C | 95 | 33,2 | 118 | 1.5 | 0,156 | 222 | 60 | 470 | 1800 |
| 22 | M3GL 180MLC 4 | 3GGL182433-**C | 95,4 | 39,5 | 140 | 1.5 | 0,156 | 222 | 60 | 470 | 1800 |
| 30 | M3GL 200MLB 4 | 3GGL202423-**C | 95,9 | 51,2 | 190,99 | 1.5 | 0,287 | 304 | 61 | 470 | 1800 |
| 37 | M3GL 225SMB 4 | 3GGL222223-**C | 96,3 | 61,2 | 236 | 1.5 | 0,38 | 385 | 64 | 470 | 1800 |
| 45 | M3GL 225SMC 4 | 3GGL222233-**C | 96,3 | 78,2 | 286 | 1.5 | 0,389 | 350 | 64 | 470 | 1800 |
| 55 | M3GL 250SMB 4 | 3GGL252223-**C | 96,5 | 91,6 | 350 | 1.5 | 0,632 | 454 | 65 | 470 | 1800 |
| 75 | M3GL 280SMA 4 | 3GGL282213-**C | 96,2 | 131 | 477 | 2.1 | 1 | 639 | 72 | 470 | 1800 |
| 90 | M3GL 280SMB 4 | 3GGL282223-**C | 96,5 | 157 | 573 | 1.9 | 1 | 639 | 72 | 470 | 1800 |
| 110 | M3GL 280SMC 4 | 3GGL282233-**C | 96,7 | 190 | 700 | 2 | 1,21 | 697 | 68 | 470 | 1800 |
| 110 | M3GL 315SMA 4 | 3GGL312213-**C | 96,8 | 191 | 700 | 2.2 | 1,64 | 873 | 68 | 470 | 1800 |
| 132 | M3GL 315SMB 4 | 3GGL312223-**C | 96,8 | 232 | 840 | 2.3 | 1,87 | 925 | 68 | 470 | 1800 |
| 160 | M3GL 315SMC 4 | 3GGL312233-**C | 97,1 | 271 | 1019 | 2 | 2,04 | 965 | 68 | 470 | 1800 |
| 200 | M3GL 315MLA 4 | 3GGL312413-**C | 97,2 | 326 | 1273 | 1.9 | 2,45 | 1116 | 74 | 470 | 1800 |
| 250 | M3GL 315LKA 4 | 3GGL312813-**C | 97,1 | 434 | 1592 | 2.2 | 3,04 | 1357 | 74 | 470 | 2000 |
| 315 | M3GL 315LKC 4 | 3GGL312833-**C | 97,2 | 517 | 2005 | 1.7 | 3,77 | 1533 | 74 | 470 | 1800 |
| **1000 r/min = 4 poles** | | | | **33,3 Hz** | | **BASIC-design** | | | | | |
| 7.5 | M3GL 160MLA 4 | 3GGL162412-**C | 93,3 | 13,1 | 71,6 | 2 | 0,0702 | 160 | 59 | 470 | 1200 |
| 11 | M3GL 160MLB 4 | 3GGL162422-**C | 93,7 | 19 | 105 | 1.9 | 0,0864 | 177 | 59 | 470 | 1200 |
| 15 | M3GL 180MLC 4 | 3GGL182432-**C | 94,2 | 25,2 | 143 | 1.5 | 0,156 | 216 | 57 | 470 | 1200 |
| 18.5 | M3GL 200MLA 4 | 3GGL202412-**C | 95,4 | 31,5 | 177 | 2.4 | 0,287 | 304 | 63 | 470 | 1200 |
| 22 | M3GL 200MLB 4 | 3GGL202422-**C | 95,2 | 37 | 210 | 2.2 | 0,287 | 304 | 63 | 470 | 1200 |
| 30 | M3GL 225SMB 4 | 3GGL222222-**C | 95,5 | 51,3 | 287 | 1.5 | 0,38 | 348 | 61 | 470 | 1200 |
| 37 | M3GL 250SMA 4 | 3GGL252212-**C | 95,8 | 63,4 | 353 | 1.9 | 0,575 | 428 | 63 | 470 | 1200 |
| 45 | M3GL 280SMA 4 | 3GGL282212-**C | 96,2 | 77,6 | 430 | 2.3 | 1 | 639 | 65 | 470 | 1200 |
| 55 | M3GL 280SMB 4 | 3GGL282222-**C | 96,1 | 93,7 | 525 | 2 | 1 | 639 | 65 | 470 | 1200 |
| 75 | M3GL 280SMC 4 | 3GGL282232-**C | 96,2 | 126 | 716 | 1.8 | 1,21 | 697 | 67 | 470 | 1200 |
| 75 | M3GL 315SMA 4 | 3GGL312212-**C | 96,5 | 129 | 716 | 2.1 | 1,64 | 873 | 67 | 470 | 1200 |
| 90 | M3GL 315SMB 4 | 3GGL312222-**C | 96,8 | 157 | 859 | 2.1 | 1,87 | 925 | 67 | 470 | 1200 |
| 110 | M3GL 315SMC 4 | 3GGL312232-**C | 96,8 | 190 | 1050 | 2.1 | 2,04 | 965 | 68 | 470 | 1200 |
| 132 | M3GL 315MLA 4 | 3GGL312412-**C | 97,1 | 219 | 1261 | 1.8 | 2,45 | 1116 | 68 | 470 | 1200 |
| 160 | M3GL 315LKA 4 | 3GGL312812-**C | 97,1 | 269 | 1528 | 2 | 3,04 | 1357 | 73 | 470 | 1200 |
| 200 | M3GL 315LKC 4 | 3GGL312832-**C | 97,3 | 327 | 1909,86 | 1.8 | 3,77 | 1533 | 73 | 470 | 1200 |

# Technical data

## IE5 Increased safety Ex ec SynRM motors, network 690 V

**IP 55 - IC 411 - Temperature rise class B**
**IE5 efficiency class according to IEC TS 60034-30-2;2016**

| Output kW | Motor type | Product code | Efficiency at 100% % | Current in A | Torque $T_N$ Nm | Overload-ability TOL/$T_N$ | Rotor inertia J=1/4 $GD_2$ $kgm_2$ | Weight kg | Sound pressure level $L_{PA}$ dB | Voltage V | Max. speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3000 r/min = 4 poles** | | | | **100 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3GL 132SMA 4 | 3GGL132217-**C | 92,5 | 7 | 17,5 | 2.4 | 0,0145 | 63 | 64 | 650 | 3600 |
| 7.5 | M3GL 132SMB 4 | 3GGL132227-**C | 92,8 | 9,5 | 23,9 | 2.1 | 0,0145 | 63 | 64 | 650 | 3600 |
| 11 | M3GL 132SMC 4 | 3GGL132237-**C | 92,9 | 14,1 | 35 | 2.2 | 0,0184 | 69 | 64 | 650 | 3600 |
| 11 | M3GL 160MLA 4 | 3GGL162417-**C | 93,6 | 14,8 | 35 | 1.9 | 0,0579 | 133 | 70 | 650 | 3600 |
| 15 | M3GL 132SMD 4 | 3GGL132247-**C | 93,7 | 18,9 | 47,8 | 2.1 | 0,0184 | 69 | 64 | 650 | 3600 |
| 15 | M3GL 160MLB 4 | 3GGL162427-**C | 94,9 | 20 | 47,8 | 1.6 | 0,0579 | 133 | 71 | 650 | 3600 |
| 18.5 | M3GL 160MLC 4 | 3GGL162437-**C | 94,5 | 25,1 | 58,9 | 1.8 | 0,0579 | 133 | 69 | 650 | 3600 |
| 22 | M3GL 180MLB 4 | 3GGL182427-**C | 95,4 | 28,9 | 70 | 1.5 | 0,116 | 190 | 66 | 650 | 3600 |
| 30 | M3GL 200MLC 4 | 3GGL202437-**C | 95,9 | 39,3 | 95,5 | 1.5 | 0,207 | 277 | 72 | 650 | 3600 |
| 37 | M3GL 200MLD 4 | 3GGL202447-**C | 96,1 | 47,8 | 118 | 1.5 | 0,207 | 277 | 72 | 650 | 3600 |
| 45 | M3GL 225SMB 4 | 3GGL222227-**C | 96,1 | 57,2 | 143 | 1.5 | 0,302 | 330 | 73 | 650 | 3600 |
| 55 | M3GL 250SMA 4 | 3GGL252217-**C | 94,4 | 70 | 175 | 1.5 | 0,499 | 396 | 74 | 650 | 3600 |
| **1500 r/min = 4 poles** | | | | **50 Hz** | | **BASIC-design** | | | | | |
| 5.5 | M3GL 132SMA 4 | 3GGL132213-**C | 93,3 | 6,8 | 35 | 2.1 | 0,0277 | 85 | 60 | 650 | 1800 |
| 7.5 | M3GL 132SMB 4 | 3GGL132223-**C | 93,3 | 9,2 | 47,8 | 2.1 | 0,0277 | 85 | 60 | 650 | 1800 |
| 11 | M3GL 160MLA 4 | 3GGL162413-**C | 93,6 | 14,1 | 70 | 1.8 | 0,0702 | 160 | 62 | 650 | 1800 |
| 15 | M3GL 160MLB 4 | 3GGL162423-**C | 94,6 | 18,4 | 95,5 | 1.9 | 0,0864 | 177 | 62 | 650 | 1800 |
| 18.5 | M3GL 180MLB 4 | 3GGL182423-**C | 95 | 24,3 | 118 | 1.5 | 0,156 | 222 | 60 | 650 | 1800 |
| 22 | M3GL 180MLC 4 | 3GGL182433-**C | 95,4 | 28 | 140 | 1.5 | 0,156 | 222 | 60 | 650 | 1800 |
| 30 | M3GL 200MLB 4 | 3GGL202423-**C | 95,5 | 37,3 | 190,99 | 1.5 | 0,287 | 304 | 61 | 650 | 1800 |
| 37 | M3GL 225SMB 4 | 3GGL222223-**C | 96,3 | 45,2 | 236 | 1.5 | 0,38 | 385 | 64 | 650 | 1800 |
| 45 | M3GL 225SMC 4 | 3GGL222233-**C | 96,3 | 54,8 | 286 | 1.5 | 0,38 | 350 | 64 | 650 | 1800 |
| 55 | M3GL 250SMB 4 | 3GGL252223-**C | 96,5 | 67 | 350 | 1.5 | 0,632 | 454 | 65 | 650 | 1800 |
| 75 | M3GL 280SMA 4 | 3GGL282213-**C | 96,2 | 92,6 | 477 | 2 | 1 | 639 | 72 | 650 | 1800 |
| 90 | M3GL 280SMB 4 | 3GGL282223-**C | 96,3 | 110 | 573 | 1.8 | 1 | 639 | 72 | 650 | 1800 |
| 110 | M3GL 280SMC 4 | 3GGL282233-**C | 96,6 | 133 | 700 | 1.8 | 1,21 | 697 | 68 | 650 | 1800 |
| 110 | M3GL 315SMA 4 | 3GGL312213-**C | 96,7 | 138 | 700 | 1.9 | 1,64 | 873 | 68 | 650 | 1800 |
| 132 | M3GL 315SMB 4 | 3GGL312223-**C | 96,7 | 165 | 840 | 1.9 | 1,87 | 925 | 68 | 650 | 1800 |
| 160 | M3GL 315SMC 4 | 3GGL312233-**C | 97 | 195 | 1019 | 1.7 | 2,04 | 965 | 68 | 650 | 1800 |
| 200 | M3GL 315MLA 4 | 3GGL312413-**C | 97,1 | 244 | 1273 | 2.1 | 2,45 | 1116 | 74 | 650 | 1800 |
| 250 | M3GL 315LKA 4 | 3GGL312813-**C | 97 | 314 | 1592 | 1.6 | 3,04 | 1357 | 74 | 650 | 2000 |
| 315 | M3GL 315LKC 4 | 3GGL312833-**C | 97,1 | 377 | 2005 | 2 | 3,77 | 1533 | 74 | 650 | 1800 |
| **1000 r/min = 4 poles** | | | | **33,3 Hz** | | **BASIC-design** | | | | | |
| 7.5 | M3GL 160MLA 4 | 3GGL162412-**C | 93 | 9,5 | 71,6 | 2.1 | 0,0702 | 160 | 59 | 650 | 1200 |
| 11 | M3GL 160MLB 4 | 3GGL162422-**C | 93,4 | 13,8 | 105 | 2 | 0,0864 | 177 | 59 | 650 | 1200 |
| 15 | M3GL 180MLC 4 | 3GGL182432-**C | 94,2 | 19,3 | 143 | 1.5 | 0,156 | 216 | 57 | 650 | 1200 |
| 18.5 | M3GL 200MLA 4 | 3GGL202412-**C | 95 | 22,6 | 177 | 2.1 | 0,287 | 304 | 63 | 650 | 1200 |
| 22 | M3GL 200MLB 4 | 3GGL202422-**C | 94,9 | 26,5 | 210 | 2 | 0,287 | 304 | 63 | 650 | 1200 |
| 30 | M3GL 225SMB 4 | 3GGL222222-**C | 95,5 | 36,7 | 287 | 1.5 | 0,38 | 348 | 61 | 650 | 1200 |
| 37 | M3GL 250SMA 4 | 3GGL252212-**C | 95,6 | 46 | 353 | 1.8 | 0,575 | 428 | 63 | 650 | 1200 |
| 45 | M3GL 280SMA 4 | 3GGL282212-**C | 96 | 54,6 | 430 | 2 | 1 | 639 | 65 | 650 | 1200 |
| 55 | M3GL 280SMB 4 | 3GGL282222-**C | 95,8 | 66,8 | 525 | 1.9 | 1 | 639 | 65 | 650 | 1200 |
| 75 | M3GL 280SMC 4 | 3GGL282232-**C | 96 | 89,8 | 716 | 1.7 | 1,21 | 697 | 67 | 650 | 1200 |
| 75 | M3GL 315SMA 4 | 3GGL312212-**C | 96,4 | 91,6 | 716 | 1.9 | 1,64 | 873 | 67 | 650 | 1200 |
| 90 | M3GL 315SMB 4 | 3GGL312222-**C | 96,6 | 111 | 860 | 1.9 | 1,87 | 925 | 67 | 650 | 1200 |
| 110 | M3GL 315SMC 4 | 3GGL312232-**C | 96,7 | 134 | 1051 | 1.8 | 2,04 | 965 | 68 | 650 | 1200 |
| 132 | M3GL 315MLA 4 | 3GGL312412-**C | 96,9 | 156 | 1261 | 1.6 | 2,45 | 1116 | 68 | 650 | 1200 |
| 160 | M3GL 315LKA 4 | 3GGL312812-**C | 96,9 | 189 | 1528 | 1.7 | 3,04 | 1357 | 73 | 650 | 1200 |
| 200 | M3GL 315LKC 4 | 3GGL312832-**C | 97 | 232 | 1910,05 | 1.6 | 3,77 | 1533 | 73 | 650 | 1200 |

# Variant codes

## IE5 Increased safety Synchronous reluctance motors

Variant codes specify additional options and features to the standard motor. The desired features are listed as three-digit variant codes in the motor order. Note also that there are variants that cannot be used together.

| Code/Variants | | Frame size | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
| **Administration** | | | | | | | | | |
| 529 | Customer witnessed visual inspection of complete order line. | ● | ● | ● | ● | ● | ● | ● | ● |
| 530 | Two-year extension on standard warranty | ● | ● | ● | ● | ● | ● | ● | ● |
| 531 | Sea freight packing | ● | ● | ● | ● | ● | ● | ● | ● |
| 533 | Wooden sea freight packing | - | - | - | - | - | - | ● | ● |
| 590 | Mounting of customer supplied part other than coupling. | ● | ● | ● | ● | ● | ● | ● | ● |
| 648 | Rating plate in special language | ● | ● | ● | ● | ● | ● | ● | ● |
| **Balancing** | | | | | | | | | |
| 417 | Vibration acc. to Grade B (IEC 60034-14). | ● | ● | ● | ● | ● | ● | ● | ● |
| 423 | Balanced without key. | ● | ● | ● | ● | ● | ● | ● | ● |
| 424 | Full-key balancing | ● | ● | ● | ● | ● | ● | ● | ● |
| **Bearings and Lubrication** | | | | | | | | | |
| 036 | Transport lock for bearings. | ● | ● | ● | ● | ● | ● | ● | ● |
| 037 | Roller bearing at D-end. | ● | ● | ● | ● | ● | ● | ● | ● |
| 039 | Cold-resistant grease | - | ● | ● | ● | ● | ● | ● | ● |
| 040 | Heat-resistant grease | - | ● | ● | ● | ● | ● | ● | ● |
| 041 | Bearings regreasable via grease nipples. | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 043 | SPM compatible nipples for vibration measurement | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 057 | 2RS bearings at both ends. | ● | ● | ● | ● | ● | ● | - | - |
| 058 | Angular contact bearing at D-end, shaft force away from bearing. | ● | ● | ● | ● | ● | ● | ● | ● |
| 059 | Angular contact bearing at N-end, shaft force towards bearing. | - | - | - | - | - | - | - | - |
| 060 | Angular contact bearing at D-end, shaft force towards bearing. | - | - | - | - | - | - | ● | ● |
| 061 | Angular contact bearing at N-end, shaft force away from bearing. | - | - | - | - | - | - | - | - |
| 107 | Pt100 2-wire in bearings. | - | ● | ● | ● | ● | ● | ● | ● |
| 128 | Double PT100, 2-wire in bearings | - | ● | ● | ● | ● | ● | ● | ● |
| 129 | Double PT100, 3-wire in bearings | - | ● | ● | ● | ● | ● | ● | ● |
| 130 | Pt100 3-wire in bearings. | - | ● | ● | ● | ● | ● | ● | ● |
| 188 | 63-series bearing in D-end | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 194 | 2Z bearings greased for life at both ends. | ○ | ● | ● | ● | ● | ● | - | - |
| 433 | Outlet grease collector | - | - | - | - | - | - | ● | ● |
| 506 | Nipples for vibration measurement : SKF Marlin Quick Connect stud CMSS-2600-3 | - | ● | ● | ● | ● | ● | ● | ● |
| 593 | Bearings grease suitable for food and beverage industry. | ● | ● | ● | ● | ● | ● | ● | ● |
| 654 | Provision for vibration sensors (M8x1) | - | ● | ● | ● | ● | ● | ● | ● |
| 796 | Grease nipples JIS B 1575 PT 1/8 Type A | - | ● | ● | ● | ● | ● | ● | ● |
| 797 | Stainless steel SPM nipples | ● | ● | ● | ● | ● | ● | ● | ● |
| 798 | Stainless steel grease nipples | - | ● | ● | ● | ● | ● | ● | ● |
| 799 | Grease nipples flat type DIN 3404, thread M10x1 | - | ● | ● | ● | ● | ● | ● | ● |
| 800 | Grease nipples JIS B 1575 PT 1/8" pin type | - | ● | ● | ● | ● | ● | ● | ● |
| **Brakes** | | | | | | | | | |
| 412 | Assembly of built-in brake | - | - | - | - | - | - | - | - |
| **Branch standard designs** | | | | | | | | | |
| 178 | Stainless steel / acid proof bolts. | ● | ● | ● | ● | ● | ● | ● | ● |
| 396 | Motor designed for minimum ambient temperature -20 °C to -40 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● |
| 397 | Motor designed for minimum ambient temperature -40 °C to -55 °C, with space heaters (code 450/451 must be added) | ● | ● | ● | ● | ● | ● | ● | ● |
| 398 | Motor designed for minimum ambient temperature -20 °C to -40 °C | ● | ● | ● | ● | ● | ● | ● | ● |
| 399 | Motor designed for minimum ambient temperature -40 °C to -55 °C | ● | ● | ● | ● | ● | ● | ● | ● |
| 204 | Jacking bolts for foot mounted motors. | - | ● | ● | ● | ● | ● | ● | ● |
| 209 | Non-standard voltage or frequency, (special winding). | ● | ● | ● | ● | ● | ● | ● | ● |
| 425 | Corrosion protected stator and rotor core. | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
| **Cooling system** | | | | | | | | | |
| 068 | Light alloy metal fan | ● | ● | ● | ● | ● | ● | ● | ● |
| 075 | Cooling method IC418 (without fan). | ● | ● | ● | ● | ● | ● | ● | ● |
| 183 | Separate motor cooling (fan axial, N-end). | - | ● | ● | ● | ● | ● | ● | ● |
| 206 | Steel fan | ● | ● | ● | ● | ● | ● | ● | ● |
| 422 | Separate motor cooling (on top) with integrated fan motor | - | - | - | - | - | - | ● | ● |
| 514 | Separate motor cooling (fan on top) | - | - | - | - | - | - | ● | ● |
| 791 | Stainless steel fan cover | - | ● | ● | ● | ● | ● | ● | ● |
| **Documentation** | | | | | | | | | |
| 141 | Binding 2D main dimension drawing. | ● | ● | ● | ● | ● | ● | ● | ● |
| 370 | Motor model drawing in 3D | ● | ● | ● | ● | ● | ● | ● | ● |
| 374 | Binding 2D motor detailed drawing | ● | ● | ● | ● | ● | ● | ● | ● |
| 536 | Photos of manufactured motors | ● | ● | ● | ● | ● | ● | ● | ● |
| 722 | Rotor dimension drawing (incl. torsional stiffness). | ● | ● | ● | ● | ● | ● | ● | ● |
| 777 | Premium documentation package | ● | ● | ● | ● | ● | ● | ● | ● |
| **Coupling** | | | | | | | | | |
| 035 | Assembly of customer supplied coupling-half. | - | - | - | - | - | - | ● | ● |
| Drain holes | | | | | | | | | |
| 065 | Plugged existing drain holes. | ● | ● | ● | ● | ● | ● | ● | ● |
| 448 | Draining holes with metal plugs. | - | ● | ● | ● | ● | ● | ● | ● |
| **Earthing Bolt** | | | | | | | | | |
| 067 | External earthing bolt. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 525 | External earthing bolts on motor feet | ● | ● | ● | ● | ● | ● | ● | ● |
| **Hazardous environments** | | | | | | | | | |
| 334 | Ex t, Dust group III B T125C Db, IP6X (non-conductive dust) acc. IEC/EN60079-31 | 54 | ● | ● | ● | ● | ● | ● | ● |
| 335 | Ex t, Dust group III B T125C Dc, IP5X (non-conductive dust) acc. IEC/EN60079-31 1) | ● | ● | ● | ● | ● | ● | ● | ● |
| 336 | Ex t, Dust group III C T125 Db, IP6X (conductive dust) acc. IEC/EN60079-31 | 54 | ● | ● | ● | ● | ● | ● | ● |
| 337 | Ex t, Dust group III C T125 Dc, IP6X (conductive dust) acc. IEC/EN60079-31 1) | ● | ● | ● | ● | ● | ● | ● | ● |
| 338 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIB T125C Dc (non-conductive dust), IP5X 1) | ● | ● | ● | ● | ● | ● | ● | ● |
| 339 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIC T125C Dc (conductive dust), IP6X. 1) | ● | ● | ● | ● | ● | ● | ● | ● |
| 814 | Ex t (DIP) motors, temperature class T 150C | ● | ● | ● | ● | ● | ● | ● | ● |
| **Heating elements** | | | | | | | | | |
| 450 | Heating element, 100-120 V | ● | ● | ● | ● | ● | ● | ● | ● |
| 451 | Heating element, 200 - 240 V | ● | ● | ● | ● | ● | ● | ● | ● |
| **Insulation system** | | | | | | | | | |
| 014 | Winding insulation class H. | ● | ● | ● | ● | ● | ● | ● | ● |
| 405 | Special winding insulation for frequency converter supply. | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mounting arrangements** | | | | | | | | | |
| 008 | IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3). | ● | - | - | - | - | - | - | - |
| 009 | IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3). | ● | ● | ● | ● | ● | ● | ● | ● |
| 047 | IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5). | ● | - | - | - | - | - | - | - |
| 066 | Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101) | ● | ● | ● | ● | ● | ● | ● | ● |
| 305 | Additional lifting lugs. | - | ● | ● | ● | ● | ● | ● | ● |
| 786 | Special design shaft upwards (V3, V36, V6) for outdoor mounting. | - | ● | ● | ● | ● | ● | ● | ● |
| **Noise reduction** | | | | | | | | | |
| 055 | Noise reduction cover for foot mounted motor | - | - | - | - | - | - | - | - |
| **Painting** | | | | | | | | | |
| 105 | Paint thickness report. | ● | ● | ● | ● | ● | ● | ● | ● |
| 111 | Painting system C3,durability Medium | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 114 | Special paint color, standard grade | ● | ● | ● | ● | ● | ● | ● | ● |
| 115 | Painting system C4,durability Medium | ● | ● | ● | ● | ● | ● | ● | ● |
| 168 | Primer paint only. | ● | ● | ● | ● | ● | ● | ● | ● |
| 179 | Special paint specification | - | - | - | - | - | - | - | - |
| 710 | Thermally sprayed zink metallizing with acrylic top coat | ● | ● | ● | ● | ● | ● | ● | ● |
| 754 | Painting system C5, durability Medium | ● | ● | ● | ● | ● | ● | ● | ● |
| 711 | Painting system C5, durability High | ● | ● | ● | ● | ● | ● | ● | ● |
| 719 | Painting system CX | ● | ● | ● | ● | ● | ● | ● | ● |
| 755 | Norsok M-501 revision 6, Coating system no. 1 | - | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
| **Protection** | | | | | | | | | |
| 005 | Protective roof | ● | ● | ● | ● | ● | ● | ● | ● |
| 072 | Radial seal at D-end. Not possible for 2-pole , 280 and 315 frames | ● | ● | ● | ● | ● | ● | - | - |
| 073 | Sealed against oil at D-end. | - | ● | ● | ● | ● | ● | ● | ● |
| 158 | Degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● |
| 250 | Degree of protection IP66 | ● | ● | ● | ● | ● | ● | ● | ● |
| 401 | Protective roof, horizontal motor. | ● | ● | ● | ● | ● | ● | ● | ● |
| 403 | Degree of protection IP56. | ● | ● | ● | ● | ● | ● | ● | ● |
| 434 | Degree of protection IP56, open deck. | - | - | - | - | - | - | ● | ● |
| 783 | Labyrinth sealing at D-end. | - | ● | ● | ● | ● | ● | ○ | ○ |
| 784 | Gamma-seal at D-end. | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| **Rating & instruction plates** | | | | | | | | | |
| 002 | Restamping voltage, frequency and output, continuous duty. | ● | ● | ● | ● | ● | ● | ● | ● |
| 003 | Individual serial number. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 004 | Additional text on std rating plate (max 12 digits on free text line). | ● | ● | ● | ● | ● | ● | ● | ● |
| 098 | Stainless rating plate | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 126 | Tag plate | ● | ● | ● | ● | ● | ● | ● | ● |
| 135 | Mounting of additional identification plate, stainless. | ● | ● | ● | ● | ● | ● | ● | ● |
| 139 | Additional identification plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● |
| 159 | Additional plate with text "Made in ...." | ● | ● | ● | ● | ● | ● | ● | ● |
| 160 | Additional rating plate affixed. | ● | ● | ● | ● | ● | ● | ● | ● |
| 161 | Additional rating plate delivered loose. | ● | ● | ● | ● | ● | ● | ● | ● |
| 163 | Frequency converter rating plate. Rating data according to quotation. | ● | ● | ● | ● | ● | ● | ● | ● |
| 181 | Rating plate with ABB standard loadability values for VSD operation. Other auxiliaries for VSD operation to be selected as necessary. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 528 | Rating plate sticker | ● | ● | ● | ● | ● | ● | ● | ● |
| **Shaft & rotor** | | | | | | | | | |
| 069 | Two shaft extensions according to catalog drawings. | ● | ● | ● | ● | ● | ● | ● | ● |
| 070 | Special shaft extension at D-End, standard shaft material | ● | ● | ● | ● | ● | ● | ● | ● |
| 131 | Motor delivered with half key (key not exceeding shaft diameter) | ● | ● | ● | ● | ● | ● | - | - |
| 155 | Cylindrical shaft extension, D-end, without key-way. | ● | ● | ● | ● | ● | ● | ● | ● |
| 164 | Shaft extension with closed keyway | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| 165 | Shaft extension with open keyway | ● | ● | ● | ● | ● | ● | ○ | ○ |
| 410 | Shaft material stainless steel | ● | ● | ● | ● | ● | ● | ● | ● |
| 591 | Special shaft extension according to customer specification. | ● | ● | ● | ● | ● | ● | ● | ● |
| 600 | Special shaft extension at N-end, standard shaft material. | ● | ● | ● | ● | ● | ● | ● | ● |
| **Standards and Regulations** | | | | | | | | | |
| 421 | VIK design (Verband der Industriellen Energie- und Kraftwirtschaft e.V.) | ● | ● | ● | ● | ● | ● | ● | ● |
| **Stator winding temperature sensors** | | | | | | | | | |
| 435 | PTC - thermistors (3 in series), 130 ºC, in stator winding 1) | ● | ● | ● | ● | ● | ● | ● | ● |
| 436 | PTC - thermistors (3 in series), 150 ºC, in stator winding 2) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 435 | PTC - thermistors (3 in series), 130 ºC, in stator winding 3) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 436 | PTC - thermistors (3 in series), 150 ºC, in stator winding 4) | ● | ● | ● | ● | ● | ● | ● | ● |
| 439 | PTC - thermistors (2x3 in series), 150 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● |
| 441 | PTC - thermistors (3 in series, 130 ºC & 3 in series, 150 ºC), in stator winding | ● | ● | ● | ● | ● | ● | ● | ● |
| 445 | Pt100 2-wire in stator winding, 1 per phase | ● | ● | ● | ● | ● | ● | ● | ● |
| 446 | Pt100 2-wire in stator winding, 2 per phase | - | ● | ● | ● | ● | ● | ● | ● |
| 502 | Pt100 3-wire in stator winding, 1 per phase | - | ● | ● | ● | ● | ● | ● | ● |
| 503 | Pt100 3-wire in stator winding, 2 per phase | - | ● | ● | ● | ● | ● | ● | ● |
| 511 | PTC thermistors (2 x 3 in series), 130 ºC, in stator winding | ● | ● | ● | ● | ● | ● | ● | ● |
| 516 | Temperature detectors approved to be connected to an Ex i circuit | - | ● | ● | ● | ● | ● | ● | ● |
| **Terminal box** | | | | | | | | | |
| 021 | Terminal box LHS (seen from D-end). | - | ● | ● | ● | ● | ● | ● | ● |
| 022 | Cable entry LHS (seen from D-end). | - | ● | ● | ● | ● | ● | ● | ● |
| 157 | Terminal box degree of protection IP65. | ● | ● | ● | ● | ● | ● | ● | ● |
| 180 | Terminal box RHS (seen from D-end). | - | ● | ● | ● | ● | ● | ● | ● |
| 230 | Standard metal cable gland. | ● | ● | ● | ● | ● | ● | ● | ● |
| 292 | Adapter C-C | - | - | - | - | - | - | ● | - |
| 293 | Adapter D-D | - | - | - | - | - | - | - | ● |
| 294 | Adapter E-D | - | - | - | - | - | - | - | ● |
| 295 | Adapter E-2D | - | - | - | - | - | - | - | ● |
| 380 | Separate terminal box for temperature detectors, std. material | - | ● | ● | ● | ● | ● | ● | ● |
| 418 | Separate terminal box for auxiliaries, standard material. | - | ● | ● | ● | ● | ● | ● | ● |
| 447 | Top mounted separate terminal box for monitoring equipment. | - | - | - | - | - | - | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
| 466 | Terminal box at N-end. | - | - | - | - | - | - | ● | ● |
| 468 | Cable entry from D-end. | ● | ● | ● | ● | ● | ● | ● | ● |
| 469 | Cable entry from N-end. | ● | ● | ● | ● | ● | ● | ● | ● |
| 526 | Existing cable entries plugged | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 554 | Cast iron flange for cable glands drilled and tapped according to order. | - | ● | ● | ● | ● | ● | ● | ● |
| 557 | Nickel plated cable glands mounted according to order. | ● | ● | ● | ● | ● | ● | ● | ● |
| 567 | Separate terminal box material: cast Iron | - | ○ | ○ | ○ | ○ | ○ | ● | ● |
| 568 | Separate terminal box for heating elements, std. material | - | ● | ● | ● | ● | ● | ● | ● |
| 400 | 4 x 90 degr turnable terminal box | 156 | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 730 | Prepared for NPT cable glands. | ● | ● | ● | ● | ● | ● | ● | ● |
| 731 | Two standard metal cable glands. | ● | ● | ● | ● | ● | ● | ● | ● |
| 734 | Standard cable gland, Ex d IIC, armoured cable | - | ● | ● | ● | ● | ● | ● | ● |
| 735 | Standard cable gland, Ex d IIC, non-armoured cable | - | ● | ● | ● | ● | ● | ● | ● |
| 743 | Non-drilled cast iron flange for cable glands | - | ● | ● | ● | ● | ● | ● | ● |
| 744 | Stainless steel non-drilled flange for cable glands. | - | - | - | - | - | - | ● | ● |
| 745 | Painted steel flange equipped with nickel plated brass cable glands | - | ● | ● | ● | ● | ● | ● | ● |
| 746 | Stainless steel cable flange equipped with standard nickel plated brass cable glands | - | ● | ● | ● | ● | ● | ● | ● |
| **Testing** | | | | | | | | | |
| 146 | Type test with report for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● |
| 148 | Routine test report. | ● | ● | ● | ● | ● | ● | ● | ● |
| 149 | Test according to separate test specification | - | - | - | - | - | - | - | - |
| 150 | Customer witnessed testing. Specify test procedure with other codes. | ● | ● | ● | ● | ● | ● | ● | ● |
| 760 | Vibration level test | ● | ● | ● | ● | ● | ● | ● | ● |
| 761 | Vibration spectrum test for one motor from specific delivery batch. | - | - | - | - | - | - | ● | ● |
| 762 | Noise level test for one motor from specific delivery batch. | ● | ● | ● | ● | ● | ● | ● | ● |
| 763 | Noise spectrum test for one motor from specific delivery batch. | - | - | - | - | - | - | ● | ● |
| 764 | Test for one motor from specific delivery batch with ABB frequency converter available at ABB test field. ABB standard test procedure. | - | - | - | - | - | - | ● | ● |
| **Variable speed drives** | | | | | | | | | |
| 470 | Prepared for hollow shaft pulse tacho (L&L equivalent). | - | ● | ● | ● | ● | ● | ● | ● |
| 479 | Mounting of other type of pulse tacho with shaft extension, tacho not included. | - | ● | ● | ● | ● | ● | ● | ● |
| 680 | 2048 pulse tacho, Ex d, tD, L&L 841910001 | - | - | - | - | - | - | - | - |
| 701 | Insulated bearing at N-end. | - | - | - | - | - | - | ○ | ○ |
| 704 | EMC cable entry. | ● | ● | ● | ● | ● | ● | ● | ● |
| 747 | 1024 pulse tacho, Ex d, tD, L&L 841910002 | - | | | | | | | |

○ = Included as standard | ● = Available as option | - = Not applicable

1) M3GL

2) M3GL as standard

3) M3HL as standard

4) M3HL

# Mechanical design

## Motor frame and drain holes

### Motor frame

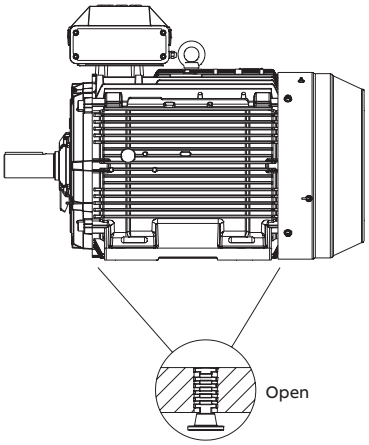
The motor frame, end shields and main terminal box are made of cast iron. Feet are integrated with the frame, except for sizes 160-250 with side mounted terminal box, which have detachable feet.

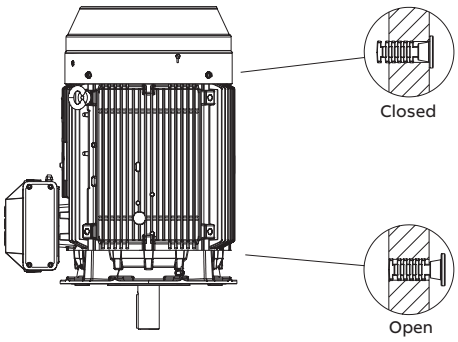
Motors can be supplied for foot mounting, flange mounting, and combinations of these.

### Drain holes

Increased safety motors are provided with drain holes fitted with closable plugs as standard. The plugs are made of plastic material and are delivered in open position.

When mounting arrangement differs from foot mounted IM B3, mention variant code 066 when ordering to ensure the drain plug is mounted in the lowest position.



# Mechanical design

## Lifting lugs

The motors are provided as standard with lifting lugs according to the table below. For improved lifting possibilities can variant code 305 be added, please refer to the variant code section for information about availability.

| Frame size | Type of lugs | Foot mounted motors | Flange mounted motors |
|---|---|---|---|
| 132 | Detachable eye bolt | 2 pcs on top of motor diagonally placed, size M8 | 2 pcs on top of motor diagonally placed, size M8 |
| 160-200 | Integrated in casting / detachable eye bolt | 2 pcs on top of motor diagonally placed, integrated in frame casting | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end. 2 pcs eye bolts size M12 delivered with each motor |
| 225-250 | Integrated in casting / detachable eye bolt | 2 pcs on top of motor diagonally placed, integrated in frame casting | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end. 2 pcs eye bolts size M16 delivered with each motor |
| 280, 315 | Detachable eye bolt | 1 pcs close to terminal box on top, size M24 | Locations for eye bolts: 4 pcs at N-end and 4 pcs at D-end, one location on top close to terminal box. 2 pcs eye bolts size M24 delivered with each motor |

# Mechanical design

## Heating elements

Heating elements are installed into windings to keep them free of corrosion in humid conditions. The required power of heating elements is shown in the table. You can order heating elements with variant code 450 or 451.

| Motor size | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
|---|---|---|---|---|---|---|---|---|
| Heating element power (W) | 25 | 25 | 50 | 50 | 50 | 50 | 60 | 2x60 |

# Mechanical design
## Bearings

ABB's increased safety motors are normally fitted with single-row deep-groove grease lubricated ball bearings, as shown in the table below.

If the bearing at the D-end is replaced with a roller bearing (NU- or NJ-), higher radial forces can be handled. Roller bearings are suitable for belt-drive applications and can be ordered with variant code 037.

### Standard and alternative designs

When high axial forces are involved, angular-contact ball bearings should be used. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force to ensure that optimal bearing system design is chosen. Thevariant codes for ordering angular-contact ball bearings at D-end are 058 and 060.

### Standard and alternative designs

| Motor size | Number of poles | Standard design | | Alternative design D-end | |
|---|---|---|---|---|---|
| | | Deep groove ball bearings | | Roller bearings (037) | Angular contact ball bear- ing (058, 060) |
| | | D-end | N-end | D-end | D-end |
| 132 | 4 | 6208-2Z/C3 | 6208-2Z/C3 | NU 308 ECP/C3 | 7208 B |
| 160 | 4 | 6309/C3 | 6209/C3 | NU 309 ECP/C3 | 7309 B |
| 180 | 4 | 6310/C3 | 6209/C3 | NU 310 ECP/C3 | 7310 B |
| 200 | 4 | 6312/C3 | 6210/C3 | NU 312 ECP/C3 | 7312 B |
| 225 | 4 | 6313/C3 | 6212/C3 | NU 313 ECP/C3 | 7313 B |
| 250 | 4 | 6315/C3 | 6213/C3 | NU 315 ECP/C3 | 7315 B |
| 280 | 4 | 6316/C3 | 6316/C3 | NU 316/C3 | 7316 B |
| 315 | 4 | 6319/C3 | 6316/C3 | NU 319/C3 | 7319 B |

### Axially-locked bearings

All motors are equipped as standard with an axially locked bearing at the D-end.

### Transport locking

Motors with roller bearings or an angular-contact ball bearing are fitted with a transport lock before dispatch to prevent damage to bearings during transport. A warning sign is attached to motors larger than 250 when transport locking is used.

Locking may also be fitted in other cases if severe transport conditions are expected.

## Bearing seals

Table below present the standard and alternative and types of bearing seals per motor size.

### Bearing seals

| Motor size | Number of poles | Standard design | | Alternative design | |
|---|---|---|---|---|---|
| | | D-end | N-end | Radial seal at D-end (variant code 072 [1]) | Labyrinth seal at D-end (variant code 783) [1] |
| 132 | 4 | Gamma seal | Gamma seal | Radial seal | NA |
| 160 | 4 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 180 | 4 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 200 | 4 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 225 | 4 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 250 | 4 | Gamma seal | Gamma seal | Radial seal | Labyrinth seal |
| 280 | 4 | Labyrinth seal | Labyrinth seal | NA | Standard |
| 315SM, ML | 4 | Labyrinth seal | Labyrinth seal | NA | Standard |
| 315LK | 4 | Labyrinth seal | Labyrinth seal | NA | Standard |

[1] N-end bearing seal of standard design, special N-end bearing seal arrangements on request

## Bearing life

The nominal life $L_{10h}$ of a bearing is defined according to ISO 281 as the number of operating hours achieved or exceeded by 90 % of identical bearings in a large test series under specified conditions. 50 % of bearings achieve at least five times this lifetime.

The calculated bearing life $L_{10h}$ for power transmission by means of coupling is for horizontally mounted motors in sizes 280 to 315 ≥ 200,000 hours.

## Lubrication

On delivery, motors in frame size 160 and above are pre-lubricated with high-quality grease. Before first start-up, see instructions for re-lubrication and recommended grease in the installation, operation, maintenance and safety manual for low voltage motors for explosive atmospheres delivered together with the motor, or see the lubrication plate on the motor.

## Motors with re-lubrication nipples

In frame sizes 160-315, the bearing system is provided with valve discs to ease lubrication. Motors are lubricated while running. The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1-2 hours after re-greasing. This ensures that the construction is tight and bearings remain dust- and dirt-free.

A grease-collection method can be used optionally.

The following tables show lubrication intervals according to the L1 principle for various nominal speeds in 25 °C ambient temperature. These values apply to horizontally mounted motors (B3) with 80 °C bearing temperature and high-quality grease containing lithium-complex soap and mineral or PAO-oil.

### Lubrication intervals

ABB follows the $L_1$principle in defining lubrication intervals. According to this principle, 99 % of motors will make the interval time. The synchronous reluctance motor sizes 160 to 315 have regreasable bearings as the standard solution. The lubrication intervals can also be calculated according to the $L_{10}$principle, which usually gives twice as long intervaltimes. $L_{10}$ values are available from ABB at request.

Motors in frame size 132 are equipped with bearings greased for life, while this is available as an option for frame sizes 160-250. Bearings are lubricated with high-quality, high-temperature grease. Bearing types are stated on the rating plate.

The approximate lifetime of bearings in four-pole motors is about 40 0000 duty hours. Lifetime is subject to the load conditions of the application run by the motor.

### Lubrication intervals in duty hours for ball bearings

| Deep Groove ball bearing | | | Interval hours at | | |
|---|---|---|---|---|---|
| **Frame size** | **Amount of grease g/DE** | **Amount of grease, g/NDE** | **3000** | **1500** | **1000** |
| 132 | Greased for life | | | | |
| 160 | 13 | 8 | 14900 | 27100 | 34200 |
| 180 | 15 | 8 | 13000 | 25100 | 32300 |
| 200 | 20 | 9 | 9900 | 21600 | 28800 |
| 225 | 23 | 9 | 8500 | 20100 | 27300 |
| 250 | 30 | 15 | 6200 | 17300 | 24400 |
| 280 | 40 | 40 | | 16000 | 23100 |
| 315 | 55 | 40 | | | 19600 |

### Lubrication intervals in duty hours for roller bearings

| Cylidrical roller bearing | | | Interval hours at | | |
|---|---|---|---|---|---|
| **Frame size** | **Amount of grease g/DE** | **Amount of grease, g/NDE** | **3000** | **1500** | **1000** |
| 132 | Greased for life | | | | |
| 160 | 13 | 8 | 7500 | 13500 | 17100 |
| 180 | 15 | 8 | 6500 | 12600 | 16100 |
| 200 | 20 | 9 | 4900 | 10800 | 14400 |
| 225 | 23 | 9 | 4300 | 10000 | 13600 |
| 250 | 30 | 15 | 3100 | 8600 | 12200 |
| 280 | 40 | 40 | | 8000 | 11600 |
| 315 | 55 | 40 | | | 9800 |

### Grease lifetime

Grease lifetime information is relevant for motors equipped with bearings greased for life. Synchronous reluctance motors in frame sizes 132 are equipped with them, while this is also available as an option for frame sizes 160 - 250.

The standard bearing grease is high-quality grease intended for normal temperatures in dry or humid environments. The normal ambient temperature is 40 °C, in some cases even higher. Refer to the table below to see how temperature affects grease lifetime.

As an optional solution, grease nipples for regreasing can also be provided. See variant code 041.

The grease lifetime $L_{10}$, applicable to permanently lubricated bearings, is defined as the number of operating hours after which 90 % of bearings are still adequately lubricated. 50 % of the bearings achieve twice the lifetime $L_{10}$.

40 000 hours should be regarded as the definitive maximum lifetime after which bearings should be replaced. Lifetime is subject to the load conditions of the application run by the motor.

**Ambient temperature and grease lifetime**

| Motor size | Speed r/min | Ambient temperature and grease lifetime | | | | | |
|---|---|---|---|---|---|---|---|
| | | 25 °C | 40 °C | 50 °C | 60 °C | 70 °C | 80 °C |
| 132 | 3000 | 40000 | 31000 | 20000 | 12000 | 6000 | 3000 |
| 132 | 1500 | 40000 | 40000 | 40000 | 24000 | 13000 | 7000 |
| 132 | 1000 | 40000 | 40000 | 40000 | 33000 | 18000 | 9000 |
| 160 | 3000 | 40000 | 40000 | 40000 | 26000 | 14000 | 8000 |
| 160 | 1500-1000 | 40000 | 40000 | 40000 | 40000 | 40000 | 37000 |
| 180 | 3000 | 38000 | 38000 | 38000 | 38000 | 23000 | 13000 |
| 180 | 1500 | 40000 | 40000 | 40000 | 32000 | 28000 | 15000 |
| 200 | 3000 | 27000 | 27000 | 27000 | 24000 | 14000 | 8000 |
| 200 | 1500-1000 | 40000 | 40000 | 40000 | 40000 | 40000 | 30000 |

# Mechanical design

## Radial forces

### Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated with FR as follows:

$$D = \frac{1.9 \cdot 10^7 \cdot K \cdot P}{n \cdot F_R}$$

| Where: | |
|---|---|
| D: | pulley diameter, mm |
| P: | power requirement, kW |
| n: | motor speed, r/min. |
| K: | belt tension factor, dependent on belt type and type of duty. A common value for V-belts is 2.5 |
| $F_R$: | permissible radial force, refer to tables below. |

### Permissible loading on the shaft

The following table shows permissible radial forces on the shaft in Newtons, assuming zero axial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20 000 and 40 000 hours per motor size. These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft affects permissible forces.

Permissible loads of simultaneous radial and axial forces can be supplied on request.

## Permissible loading on the shaft

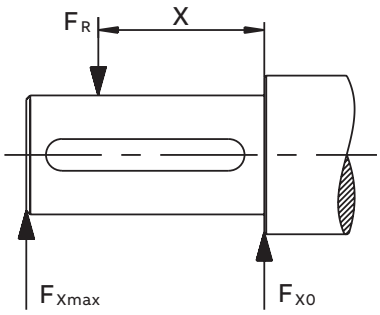
### Permissible radial forces, motor sizes 132 – 315

| Motor size | Speed r/min | Length of shaft extension E (mm) | Ball bearings | | | | Roller bearings | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20 000 hours | | 40 000 hours | | 20 000 hours | | 40 000 hours | |
| | | | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) |
| 132 | 3000 | 80 | 2120 | 1610 | 2120 | 1610 | - | - | - | - |
| 132 | 1500 | 80 | 2120 | 1610 | 2120 | 1610 | - | - | - | - |
| 160 | 3000 | 110 | 3540 | 2740 | 2955 | 2285 | 7100 | 4300 | 6140 | 4300 |
| 160 | 1500 | 110 | 4000 | 3100 | 3325 | 2570 | 8000 | 4300 | 6870 | 4300 |
| 160 | 1000 | 110 | 4170 | 3200 | 3440 | 2655 | 8600 | 4300 | 7270 | 4300 |
| 180 | 3000 | 110 | 4100 | 3385 | 3455 | 2825 | 8125 | 5500 | 7025 | 5500 |
| 180 | 1500 | 110 | 4270 | 3485 | 3525 | 2885 | 8600 | 5500 | 7300 | 5500 |
| 180 | 1000 | 110 | 4700 | 3800 | 3855 | 3155 | 9400 | 5500 | 7900 | 5500 |
| 200 | 3000 | 110 | 5600 | 4685 | 4700 | 3925 | 10900 | 9100 | 9470 | 9700 |
| 200 | 1500 | 110 | 6285 | 5200 | 5240 | 4370 | 12500 | 9550 | 10700 | 8900 |
| 200 | 1000 | 110 | 6800 | 5700 | 5700 | 4770 | 13600 | 9550 | 11670 | 9550 |
| 225 | 3000 | 110 | 6400 | 5400 | 5355 | 4500 | 13300 | 10700 | 11500 | 9700 |
| 225 | 1500 | 140 | 7300 | 5900 | 6155 | 4970 | 15400 | 10250 | 13200 | 10250 |
| 225 | 1000 | 140 | 7600 | 6200 | 6370 | 5140 | 16400 | 10250 | 14000 | 12500 |
| 250 | 3000 | 140 | 7700 | 6285 | 6500 | 5285 | 17100 | 10900 | 14900 | 10900 |
| 250 | 1500 | 140 | 8700 | 7000 | 7300 | 5900 | 19800 | 13800 | 17000 | 13800 |
| 250 | 1000 | 140 | 8900 | 7200 | 7355 | 5955 | 21200 | 13800 | 18000 | 13800 |
| 280 | 1500 | 140 | 9200 | 7800 | 7300 | 6200 | 25100 | 9200 | 20300 | 9200 |
| 280 | 1000 | 140 | 10600 | 8900 | 8400 | 7000 | 28300 | 9200 | 23000 | 9200 |
| 315 SM_ | 1500 | 170 | 11400 | 9400 | 9000 | 7450 | 32500 | 9600 | 26600 | 9600 |
| 315 SM_ | 1000 | 170 | 13000 | 9600 | 10300 | 8500 | 37000 | 9600 | 30000 | 9600 |
| 315 ML_ | 1500 | 170 | 11500 | 9700 | 9100 | 7650 | 32700 | 13600 | 26500 | 13600 |
| 315 ML_ | 1000 | 170 | 13200 | 11100 | 10400 | 8800 | 36900 | 13600 | 29900 | 13600 |
| 315 LK_ | 1500 | 170 | 11500 | 10000 | 9100 | 7850 | 33100 | 13350 | 26800 | 13350 |
| 315 LK_ | 1000 | 170 | 13200 | 11400 | 10450 | 9050 | 37300 | 13350 | 30300 | 13350 |

If the radial force is applied between points X0 and Xmax, the permissible force $F_R$ can be calculated with the following formula:

$$F_R = F_{X0} - \frac{X}{E}(F_{X0} - F_{Xmax})$$

| Where: | |
|---|---|
| E: | length of the shaft extension in the standard version |



# Mechanical design

## Axial forces

—
01 Mounting arrangement IM B3

02 Mounting arrangement IM V1

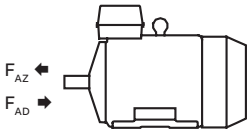
### Axial forces

The following tables present permissible axial forces on the shaft in Newton‘s, assuming zero radial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20 000 and 40 000 hours per motor size.

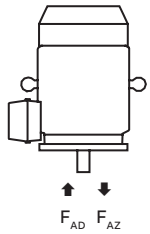
Permissible loads of simultaneous radial and axial forces can be supplied on request. For axial force FAD, it is assumed that the D-bearing is locked with a locking ring.

**Permissible axial forces, motor sizes 132 – 315**

| Motor size | Speed, r/min | Length of shaft extension E (mm) | Mounting arrangement IM B3 | | | | Mounting arrangement IM V1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Ball bearings | | | | Ball bearings | | | |
| | | | 20,000 h | | 40,000 h | | 20,000 h | | 40,000 h | |
| | | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 132 | 3000 | 80 | 2245 | 1645 | 1760 | 1160 | 2460 | 1505 | 1970 | 1015 |
| 132 | 1500 | 80 | 2595 | 1980 | 2025 | 1425 | 2815 | 1850 | 2245 | 1280 |
| 160 | 3000 | 110 | 4650 | 4650 | 3850 | 3850 | 4950 | 4350 | 4200 | 3600 |
| 160 | 1500 | 110 | 5000 | 5000 | 4200 | 4200 | 5450 | 4650 | 4600 | 3800 |
| 160 | 1000 | 110 | 4840 | 4840 | 4000 | 4000 | 5400 | 4420 | 4540 | 3560 |
| 180 | 3000 | 110 | 5480 | 5480 | 4600 | 4600 | 5920 | 5515 | 5060 | 4255 |
| 180 | 1500 | 110 | 4360 | 4360 | 3540 | 3540 | 5080 | 3860 | 4240 | 3020 |
| 180 | 1000 | 110 | 3990 | 3990 | 2820 | 2820 | 5240 | 3780 | 4060 | 2610 |
| 200 | 3000 | 110 | 5000 | 7350 | 5000 | 6150 | 5000 | 7050 | 5000 | 5800 |
| 200 | 1500 | 110 | 5000 | 8050 | 5000 | 6700 | 5000 | 7550 | 5000 | 6200 |
| 200 | 1000 | 110 | 5000 | 8300 | 5000 | 6880 | 5000 | 7505 | 5000 | 6025 |
| 225 | 3000 | 110 | 4860 | 4860 | 3960 | 3960 | 5000 | 4245 | 4780 | 3345 |
| 225 | 1500 | 140 | 4820 | 4820 | 3470 | 3470 | 6770 | 4320 | 5420 | 2960 |
| 225 | 1000 | 140 | 5960 | 5960 | 4210 | 4210 | 7910 | 5450 | 6160 | 3700 |
| 250 | 3000 | 140 | 6000 | 6050 | 4900 | 4900 | 6000 | 5300 | 5800 | 4200 |
| 250 | 1500 | 140 | 6000 | 7100 | 5800 | 5800 | 6000 | 6300 | 6000 | 4900 |
| 250 | 1000 | 140 | 6000 | 7480 | 6000 | 6040 | 6000 | 6370 | 6000 | 4830 |
| 280 | 1500 | 140 | 8000 | 6000 | 6250 | 4250 | 9600 | 4550 | 7800 | 2750 |
| 280 | 1000 | 140 | 7250 | 9250 | 7150 | 5150 | 11150 | 5500 | 9000 | 3350 |
| 315 SM_ | 1500 | 170 | 9400 | 7400 | 7250 | 5250 | 11750 | 5500 | 9500 | 3300 |
| 315 SM_ | 1000 | 170 | 10 900 | 8900 | 8350 | 6350 | 13600 | 6300 | 11 050 | 3750 |
| 315 ML_ | 1500 | 170 | 9250 | 7250 | 7100 | 5100 | 12 500 | 5500 | 10 300 | 2900 |
| 315 ML_ | 1000 | 170 | 10650 | 8650 | 8100 | 6100 | 14 900 | 5800 | 12 350 | 3250 |
| 315 LK_ | 1500 | 170 | 9100 | 7150 | 7000 | 5000 | 13 100 | 3850 | 10900 | 1700 |
| 315 LK_ | 1000 | 170 | 10 500 | 8500 | 7950 | 5950 | 15700 | 4100 | 13100 | 1550 |




01




02

# Terminal box

## Standard terminal box

### Protection and mounting options

The degree of protection for the standard terminal box is IP 55.It complies with the requirements of the protection method ‘e’ protection level ‘c’ increased safety and prevents all ignition sources such as sparks, excessive over heating etc. The features of the terminal box are: No self loosening terminals, compliance with creepage and clearance distances as defined in standard for increased safety ‘ec’ protection.

By default, terminal boxes are mounted on top of the motor at D-end. Side mounted terminal box is possible in frame sizes 160 and 400. Mounting at N-end is also possible for the larger frame sizes. Please refer to the variant code section for more details.

### Turnability

The standard terminal boxes for motor sizes 160-315 can be turned 4*90°. For motors in size 132 is 4*90° turnable terminal box optional, this can be ordered with variant code 400.

### Cable entries

Terminal box is provided as standard with tapped holes for cable glands, no cable glands are included as standard. The entry holes are closed with Ex eb approved blanking plugs made of nickel-plated brass, one of the main entries is closed with a plastic plug as transport and storage protection. Very large motors have an angle adapter between the terminal box and gland plate. Please refer to the table on next page for further information about amount and size of threaded holes, plugs provided as standard.

Different types of cable glands are available as option, suitable for either armoured and non-armoured cables, please refer to the Terminal box alternatives section for more details.

### Cable type and terminations

Terminations are suitable for copper and aluminum cables (Al- cables on request for motor sizes 160 to 250). Cables are connected to terminals by cable lugs, which are not included in the delivery.

### Earthing bolts

The motors are as standard provided with at least one earthing bolt inside the terminal box and another on the frame. The earthing bolt on the frame is located on top close to the terminal box, motors in size 160-250 is the earthing bolt located on RHS foot (seen from D-end).

### Ordering

To ensure the delivery of desired terminations and cable entries for the motor, state the cable type, quantity, size, outer diameter and possibly type of cable glands needed when ordering.

See section Variant codes for all options available.

## Standard delivery

Standard delivery if no other information is provided.

| Motor size | Speed/ min | Terminal box type | Size of gland plate opening on terminal box | 45° angle adapter | Amount and size of threaded plugged holes, or cable sealing end unit | Max. connectable core cross section mm² / phase | Number and size of terminal bolts |
|---|---|---|---|---|---|---|---|
| 132 | 3000-1500 | integr. | - | - | 2xM32x1.5 | 1x10 | 6xM5 |
| 160 | 3000-1000 | 63 | B | - | 2xM40x1.5 | 1x35 | 6xM6 |
| 180 | 3000-1500 | 63 | B | | 2xM40x1.5 | 1x35 | 6xM6 |
| 200 | 3000-1500 | 160 | C | - | 2xM63x1.5 | 1x70 | 6xM10 |
| 225 | 3000 | 160 | C | | 2xM63x1.5 | 1x70 | 6xM10 |
| 250 | 3000-1000 | 160 | C | | 2xM63x1.5 | 1x70 | 6xM10 |
| 280 | 1500-1000 | 210 | C | - | 2xM63x1.5 | 2x150 | 6xM12 |
| 315SM_, ML_ | 1500-1000 | 370 | D | - | 2xM63x1.5 | 2x240 | 6xM12 |
| 315LKA, LKC | 1500-1000 | 750 | E | E-D | 2xM75x1.5 | 4x240 | 6xM12 |

| Auxiliary cable entries | | | |
|---|---|---|---|
| 132 | 3000, 1500 | 2x M12 | |
| 160-250 | 3000-1500 | 2xM20x1.5 | 1x 2.5 |
| 280 - 315 | 1500-1000 | 2xM20x1.5 | 1x 2.5 |

| Motor size | Earthing on frame | Earthing in main terminal box |
|---|---|---|
| 132 | M5 | M5 |
| 160-250 | clamp | M6 |
| 280-315 | M10 | 2xM10 |

# Terminal box

## Terminal box dimensions

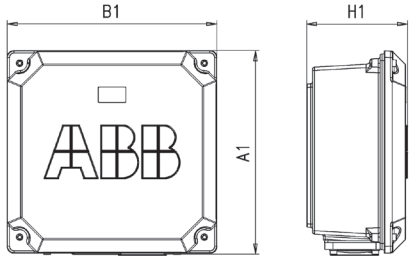
—
01 Terminal box type 63 and 160

02 Terminal box types 210 and 370

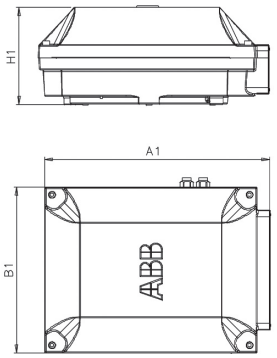
03 Terminal box type 750 + adapter

For motor size 132 the terminal box is integrated in motor frame and the dimensions for terminal boxes can be found in the motor dimension drawings in ABB Library.

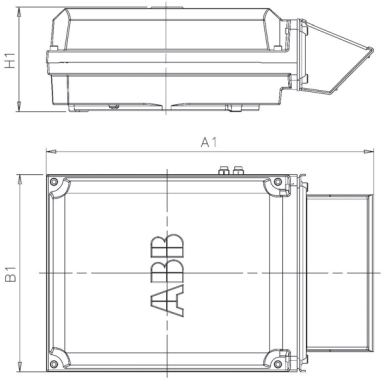
To match the correct terminal box with motor sizes 160-315, find the motor type and correspondent terminal box type on the previous page. The box types and their dimensions are presented on this page.




01




02

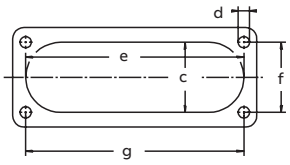



03

| Terminal box types acc. to current capacity | A1 | B1 | H1 | Gland plate opening |
|---|---|---|---|---|
| 63 | 247 | 247 | 109 | B |
| 160 | 300 | 310 | 154 | C |
| 210 | 416 | 306 | 177 | C |
| 370 | 451 | 347 | 200 | D |
| 750 with E-D adapter | 686 | 413 | 219 | D |
| 750 without E-D adapter | 523 | 413 | 219 | E |

### Dimensions for terminal box inlets

Corresponds to motor sizes 160 and above




| Flange opening | c mm | e mm | f mm | g mm | d thread type |
|---|---|---|---|---|---|
| B | 31 | 120 | 30 | 120 | M6 |
| C *) | 71 | 194 | 62 | 193 | M6 |
| C **) | 67 | 193 | 62 | 193 | M8 |
| D | 100 | 300 | 80 | 292 | M10 |
| E | 115 | 370 | 100 | 360 | M12 |

**Note:** The C flange is different depending on frame size.

*) for frame sizes 200-225

**) for frame size 280

# Terminal box

## Terminal boxes and boards

—
01 Integrated terminal box for motor sizes 132. Tapped holes for cable entries

02 Terminal board for motor size 132

03 Terminal box for motor sizes 160-250. Connection flanges with tapped cable entries

04 Terminal board for motor sizes 160-250

05 Terminal box for motor sizes 280 - 315, except LKC. Connection flange with tapped cable entries

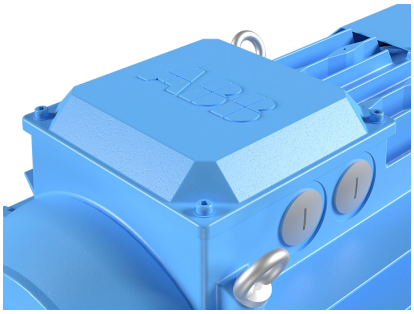
06 Terminal board for motor sizes 280 - 315, except LKC

07 Terminal box for motor sizes 315LKC

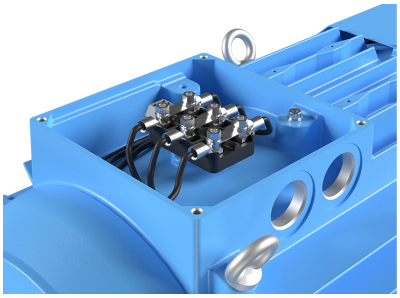
08 Terminal board for motor sizes 315 LKC

The pictures below show standard terminal boxes and the corresponding terminal boards for various motor sizes.

### Motor size 132

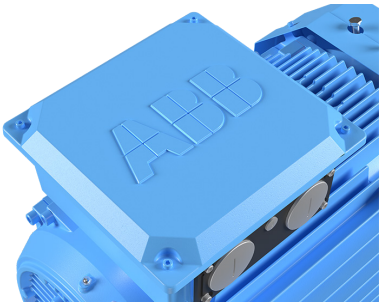


01



02

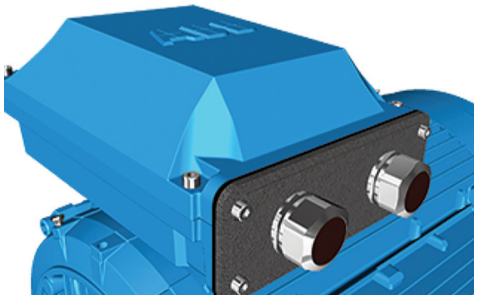
### Motor sizes 160-250



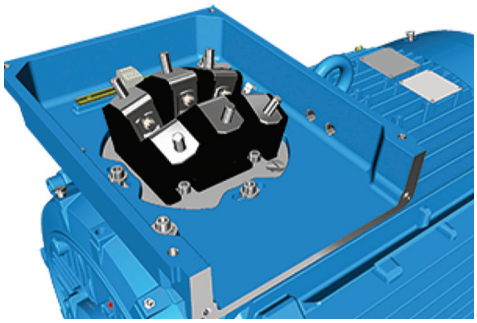
03

04

### Motor sizes 280 - 315

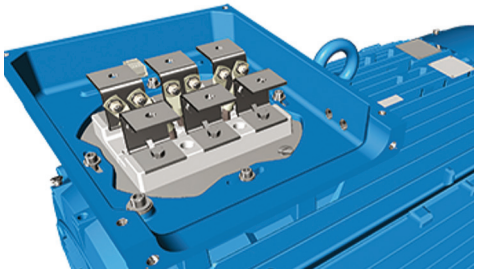


05



06

07



08

# Terminal box

## Terminal box alternatives

### Optional cable termination parts

There is a broad selection of cable termination accessories available to allow a safe and reliable termination of one or several supply cables. The most common options are explained in this chapter.

### How to order

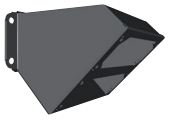
- Check first that the terminal box itself allows mounting of the desired cable and cores (refer to table showing standard delivery for each motor size). If very large cable are used might it be necessary to use a larger terminal box and larger terminal board than standard.
- Select the right cable gland(s) or cable sealing end unit based on the diameter of the cables(s) and suitability for cable type.
- Select appropriate adapter or flange to allow mounting on opening in terminal box.

### Ordering example

| | |
|---|---|
| Motor and supply cables | 110kW, 4-pole, 400V 50Hz, IE5. Cables needed: 1 pcs outer diameter 42mm steel wire armoured cable, single cross section 120 mm2. Cables coming from below. |
| Motor | M3GL 315SMA 4, B3 |
| Adapter (to allow entry of cables coming from below) | Not possible |
| Cable glands Ex t suitable for armoured cables (an M50 gland will suit this cable) | Variant code 734 (specify cable dimensions) |
| Gland plate made of steel drilled and tapped with 1 pcs M50 hole (non-std size) | Variant code 554 (1 pcs M50 x 1.5 threaded hole to be specified) |

### Optional adapters

To allow easy termination of cables entering the terminal box from above or below, an angle adapter is recommended. These are available for motor sizes 280 and above and can also be used to allow the mounting of several cable sealing end units or gland plates. For exact suitability on a certain motor size, refer to the ‘terminal box opening’ column in section Standard terminal box.

| Adapater | | | |  |
|---|---|---|---|---|
| Variant code | 292 | 293 | 294 | 295 |
| Suited for motor sizes | 280 with gland plate opening C in the terminal box | 280-315 with gland plate opening D in the terminal box | 315 with gland plate opening E in the terminal box | 315 with gland plate opening E in the terminal box |
| Opening to terminal box | C | D | E | E |
| Flange or opening for end unit | C | D | D | 2 x D |
| Material | Cast iron | Cast iron | Cast iron | Steel |
| Notes | | | | Included in type 750 terminal box when 750 is the standard size |

## Cable glands

The motors are delivered as standard with plugged cable entries as described in the previous section. There is a broad selection of different type of cable glands available which are suitable for different types of cable and outer diameter ranges.

| **Size of threaded opening for cable gland** | **Cable gland(s) nickel plated brass, Ex e, for non armoured cable** | **EMC Cable gland(s) nickel plated brass, Ex e, for non armoured cable** | **Cable gland Ex d IIC / Ex e for armoured cable with double sealing** | |
|---|---|---|---|---|
| | **Variant codes 230 or 731** | **Variant code 704** | **Variant code 734** | |
| **Metric (std)** | **Cable outer diameter, mm** | **Cable outer diameter, mm** | **Cable outer diameter, mm** | **Inner sheath diameter, mm** |
| M16 x 1.5 | 4-8 | 4-8 | 7-12 | 4.5-8 |
| M20 x 1.5 | 4-12 | 4-12 | 10-16 | 6-10 |
| M25 x 1.5 | - | - | 13.5-19 | 10-14 |
| M25 x 1.5 *) | 10-18 | 10-18 | 19-25 | 14-18 |
| M32 x 1.5 | 14-24 | 14-24 | 25-30 | 18-23 |
| M40 x 1.5 | 22-32 | 22-32 | 30-36 | 23-28 |
| M50 x 1.5 | - | - | 36-40 | 28-32 |
| M50 x 1.5 *) | 26-35 | 26-35 | 40-46 | 32-37 |
| M63 x 1.5 | - | - | 46-53 | 37-43 |
| M63 x 1.5 *) | 35-45 | 35-45 | 53-60 | 43-50 |
| M75 x 1.5 | 46-62 | 46-62 | 58-70 | 48-60 |

*) = High capacity version, delivered as standard with the variant code

## Threaded openings for cable glands with NPT thread (variant code 730)

The motors are delivered as standard with openings for cable glands with metric threads as listed in the section describing the standard terminal box. If glands with NPT threads will be used must variant code 730 be ordered. If nothing else is stated on the ordered will the sizes in tables below be delivered.

| Motor frame size | Main cable entries | NPT plug |
|---|---|---|
| 132 | 2 x ¾” | 1 x ¾” |
| 160-180 | 2 x 1 ¼” | 1 x 1 ¼” |
| 200-250 | 2 x 1 ½” | 1 x 1 ½” |
| 280 | 2 x 2” | 1 x 2” |
| 315 | 2 x 3” | 1 x 3” |

| Motor frame size | Cable entries for auxiliaries | NPT plug |
|---|---|---|
| 132 | 1 x ¾” | 1 x ¾” |
| 160-315 | 2 x ¾” | 2 x ¾” |

### Threaded openings for cable glands of nonstandard size

If the standard size of threaded openings for cable glands does not suit the gland size and cable that will be used can openings of nonstandard size also be delivered, either by fitting a reducers to make the openings smaller or by increasing the amount or size of holes. The maximum possible size and amount for each gland plate size is listed below. Threaded openings of non-standard size can be ordered using variant codes 554 and 555.

| Gland plate size | Maximum amount and size of threaded holes |
|---|---|
| B | 2 x M40 |
| C | 2 x M63 |
| D | 2 x M90 or 3 x M75 |
| E | 2 x M90 or 4 x M75 |

### Gland plates of non-standard material

The standard material used in gland plates is steel. Gland plates made of stainless steel are optional, either with cable glands or blind without threaded holes. Please refer to the variant code section for more information.

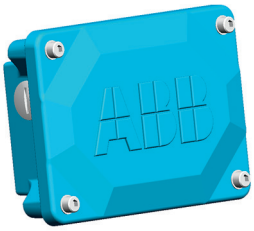
### Auxiliary terminal box

It is possible to equip motors from frame size 160 upwards with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box is made of cast iron.

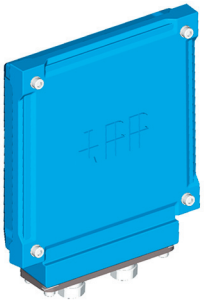
Connection terminals are of spring-loaded type for quick and easy connection. These are suitable for up to 2.5 $mm^2$ wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard.

The standard cable entry is 2 x M20 with plugged entries. If cable glands are needed must these be ordered using the variant codes described earlier in this section.

| Related variant codes | |
|---|---|
| 380 | Separate terminal box for temperature detectors |
| 418 | Separate terminal box for auxiliaries |
| 568 | Separate terminal box for heating elements |



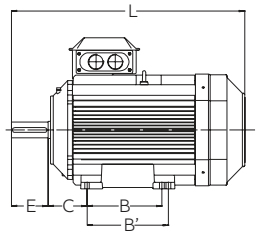
Auxiliary cast iron terminal box for motor size 160-250 (variant code 418). 111 x 162 mm.

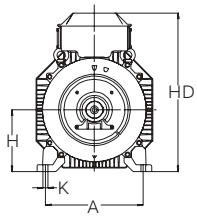


Auxiliary cast iron terminal box for motor sizes 280-450 (variant code 567). 208 x 180 mm.

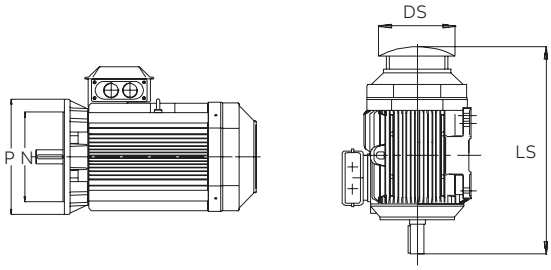
# Dimension drawings

## IE5 SynRM Increased safety cast iron motors

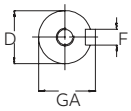


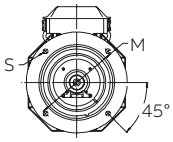




Foot-mounted motor IM 1001, IM B3

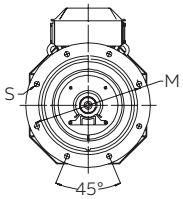



Flange-mounted motor IM 3001, IM B5

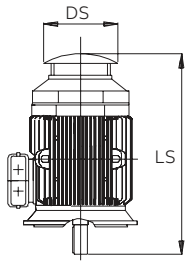



Sizes 80 to 200




Sizes 225 to 450




Protective roof, variant code 005

### Main dimensions for IE5 SynRM motors (C-generation)

| Motor size | Speed r/min | IM1001, IMB3 and IM3001, IMB5 | | | | | IM1001, IMB3 | | | | | | | IM B5 (IM3001) | | | | | IM B14 (IM 3601), IM 3602 | | | | | Protective roof | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D | GA | F | E | L max | A | B | B1 | C | H | HD max | K | M | N | P | S | T | M | N | P | S | T | DS | LS |
| 132 SM_ | 3000-1500 | 38 | 41 | 10 | 80 | 624 | 216 | 140 | 178 | 89 | 132 | 321 | 12 | 265 | 230 | 300 | 14.5 | 4 | 165 | 130 | 200 | M10 | 3.5 | - | 590 |
| 160 ML_ | 3000 | 42 | 45 | 12 | 110 | 584 | 254 | 210 | 254 | 108 | 160 | 421 | 14.5 | 300 | 250 | 350 | 19 | 5 | 300 | 250 | 350 | 19 | 5 | 328 | 756 |
| 160 ML_ | 1500-1000 | 42 | 45 | 12 | 110 | 681 | 254 | 210 | 254 | 108 | 160 | 421 | 14.5 | 300 | 250 | 350 | 19 | 5 | 300 | 250 | 350 | 19 | 5 | 328 | 756 |
| 180 ML_ | 3000 | 48 | 51.5 | 14 | 110 | 726 | 279 | 241 | 279 | 121 | 180 | 461 | 14.5 | 300 | 250 | 350 | 19 | 5 | 300 | 250 | 350 | 19 | 5 | 359 | 756 |
| 180 ML_ | 1500-1000 | 48 | 51.5 | 14 | 110 | 766 | 279 | 241 | 279 | 121 | 180 | 461 | 14.5 | 300 | 250 | 350 | 19 | 5 | 300 | 250 | 350 | 19 | 5 | 359 | 756 |
| 200 ML_ | 3000-1000 | 55 | 59 | 16 | 110 | 821 | 318 | 267 | 305 | 133 | 200 | 528 | 18.5 | 350 | 300 | 400 | 19 | 5 | 350 | 300 | 400 | 19 | 5 | 414 | 844 |
| 225 SM_ | 3000 | 55 | 59 | 16 | 110 | 849 | 356 | 286 | 311 | 149 | 225 | 573 | 18.5 | 400 | 350 | 450 | 19 | 5 | 400 | 350 | 450 | 19 | 5 | 462 | 951 |
| 225 SM_ | 1500-1000 | 60 | 64 | 16 | 110 | 879 | 356 | 286 | 311 | 149 | 225 | 573 | 18.5 | 400 | 350 | 450 | 19 | 5 | 400 | 350 | 450 | 19 | 5 | 462 | 951 |
| 250 SM_ | 3000 | 60 | 64 | 18 | 140 | 884 | 406 | 311 | 349 | 168 | 250 | 626 | 24 | 500 | 450 | 550 | 19 | 5 | 500 | 450 | 550 | 19 | 5 | 506 | 965 |
| 250 SM_ | 1500-1000 | 65 | 69 | 18 | 140 | 884 | 406 | 311 | 349 | 168 | 250 | 626 | 24 | 500 | 450 | 550 | 19 | 5 | 500 | 450 | 550 | 19 | 5 | 506 | 965 |
| 280 | 1500-1000 | 75 | 79.5 | 20 | 140 | 1088 | 457 | 368 | 419 | 190 | 280 | 762 | 24 | 500 | 450 | 550 | 23 | 5 | 500 | 450 | 550 | 23 | 5 | 555 | 1190 |
| 315 SM_ | 1500-1000 | 80 | 85 | 22 | 170 | 1204 | 508 | 406 | 457 | 216 | 315 | 852 | 28 | 600 | 550 | 660 | 23 | 6 | 600 | 550 | 660 | 23 | 6 | 624 | 1420 |
| 315 ML_ | 1500-1000 | 90 | 95 | 25 | 170 | 1315 | 508 | 457 | 508 | 216 | 315 | 852 | 28 | 600 | 550 | 660 | 23 | 6 | 600 | 550 | 660 | 23 | 6 | 624 | 1431 |
| 315 LK_ | 1500-1000 | 90 | 95 | 25 | 170 | 1521 | 508 | 508 | 560 | 216 | 315 | 880 | 28 | 600 | 550 | 660 | 23 | 6 | 600 | 550 | 660 | 23 | 6 | 624 | 1431 |

| Tolerances: | | Tolerances: | |
|---|---|---|---|
| A, B | ± 0,8 | H | -0.5 |
| D, DA | ISO k6 < Ø 48mm | N | ISO j6 |
| | ISO m6 > Ø 48mm | C, CA | ± 0.8 |
| F, FA | ISO h9 | | |

In all dimension drawings: The tables give the main dimensions in mm.

For detailed drawings please see our web-pages or contact ABB.

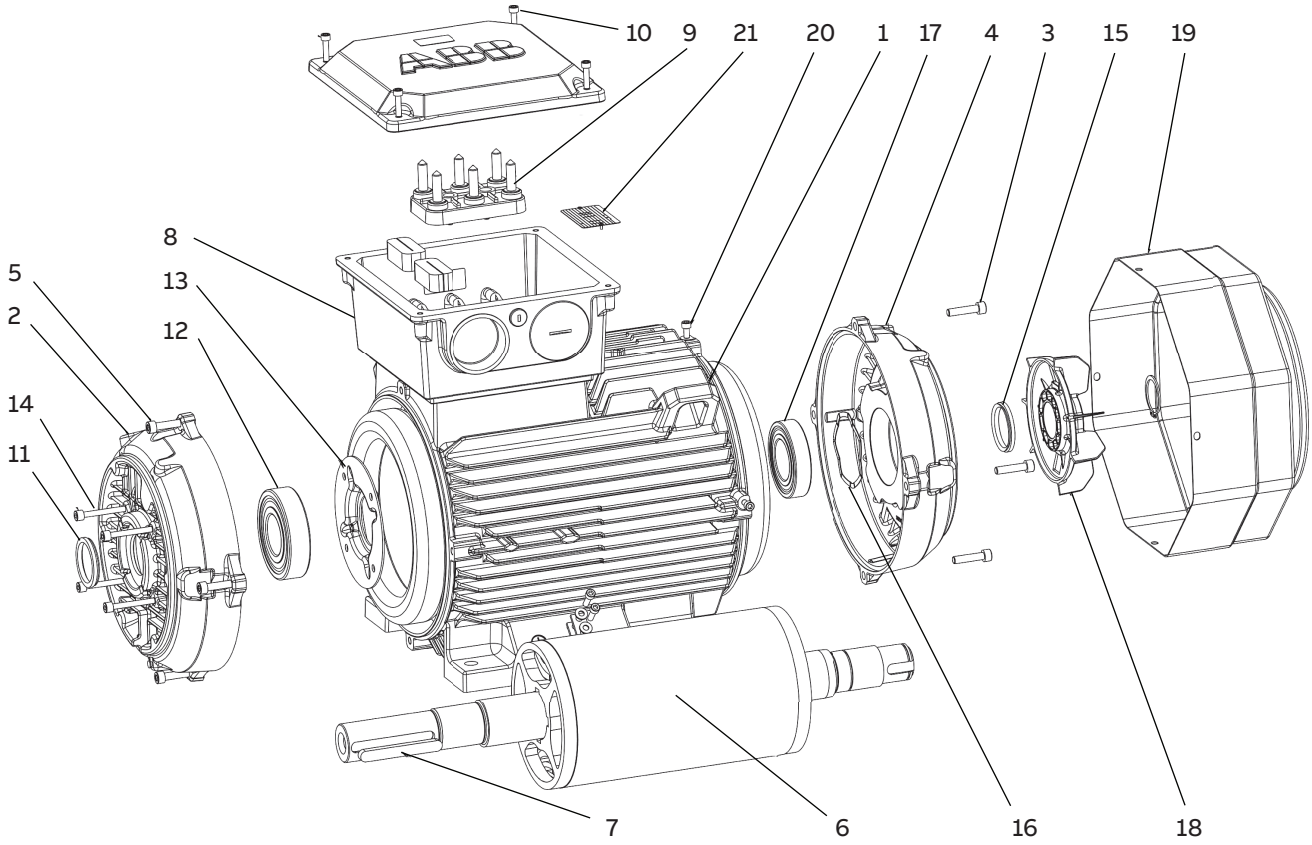
# Motors in brief

## IE5 SynRM Increased safety cast iron motors, sizes 132 - 315

| Motor size | | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
|---|---|---|---|---|---|---|---|---|---|
| Stator | Material | Cast iron, EN-GLJ-150 or better | Cast iron, EN-GJL-200 or better | | | | | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 | | | | | | | |
| Feet | Material | Cast iron, EN-GLJ-150 or better, integrated with stator | Integrated cast iron feet, bolted feet when terminal box on LHS/RHS | | | | | Cast iron, EN-GJL-200 or better, integrated with stator | |
| Bearing end shields | Material | Cast iron, EN-GLJ-150 or better | Cast iron, EN-GJL-200 or better | | | | | | |
| | Paint colour shade | Blue, Munsell 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 | | | | | | | |
| Bearings | D-end | 6308-2Z/C3 | 6309/C3 | 6310/C3 | 6312/C3 | 6313/C3 | 6315/C3 | 6316/C3 | 6319/C3 |
| | N-end | 6206-2Z/C3 | 6209/C3 | 6209/C3 | 6210/C3 | 6212/C3 | 6213/C3 | 6316/C3* | 6316/C3* |
| Axially locked bearings | Inner bearing cover | As standard, locked at D-end | | | | | | | |
| Bearing seals | | Gamma ring | | | | | | Labyrinth seal | |
| Lubrication | | Permanent grease lubrication. | Regreasable bearings | | | | | | |
| SPM nipples | | Optional | As standard | | | | | | |
| Rating plate | Material | Stainless steel | | | | | | | |
| Terminal box | Frame material | Cast iron, EN-GLJ-150 or better | Cast iron, EN-GJL-200 or better | | | | | | |
| | Cover material | Cast iron, EN-GLJ-150 or better | Cast iron, EN-GJL-200 or better | | | | | | |
| | Cover screws material | Stainless A4-80 | Steel 8.8, zinc electroplated and chromated | | | | | | |
| Connections | Cable-entries | 2 x M32 plugged | 2 x M40 + 2 x M20 plugged | | 2 x M63 + 2 x M20 plugged | | | | |
| | Terminals | 6 terminals for connection with cable lugs (not included) | | | | | | | |
| Fan | Material | Polypropylene. Reinforced with glass fibre. | | | | | | | |
| Fan cover | Material | Steel | | | Hot dip galvanized steel | | | | |
| | Paint color shade | Munsell blue 8B 4.5/3.25 | | | | | | | |
| | Corrosion class | C3 | | | | | | | |
| Stator winding | Material | Copper | | | | | | | |
| | Insulation | Insulation class F | | | | | | | |
| | Winding protection | 3 pcs PTC thermistors as standard | | | | | | | |
| Rotor winding | Material | Pressure die-cast aluminum | | | | | | | |
| Balancing | | Half key balancing | | | | | | | |
| Keyway | | Closed | | | | | | Open | |
| Heating elements | On request | 25 W | | | | 60 W | | | 120 W |
| Drain holes | | As standard, open on delivery | | | | | | | |
| External earthing bolt | | As standard | | | | | | | |
| Enclosure | | IP 55 | | | | | | | |
| Cooling method | | IC 411 | | | | | | | |

*Insulated bearing at N-end as standard

# Motor construction




**Typical exploded view of cast iron motors, frame size 160**

1 Stator frame
2 End shield, D-end
3 Screws for end shield, N-end
4 End shield, N-end
5 Screws for end shield, D-end
6 Rotor with shaft
7 Key, D-end
8 Terminal box
9 Terminal board
10Screws for terminal box cover
11 Seal, D-end
12 Bearing, D-end
13 Inner bearing cover, D-end
14 Screws for bearing cover
15 Seal, N-end
16 Wave spring
17 Bearing, N-end
18 Fan
19 Fan cover
20 Screws for fan cover
21 Rating plate

# Certicate examples

01 EU Type ATEX Examination Certificate

02 Eurofins ATEX Type Examination Certificate

03 IECEx Certificate of Conformity

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EESF 23 ATEX 005X Issue 2
Page 1 of 4

1. **EU-TYPE EXAMINATION CERTIFICATE**

2. **Equipment or Protective System Intended for use in Potentially explosive atmospheres Directive 2014/34/EU**

3. EU-Type Examination Certificate Number: **EESF 23 ATEX 005X Issue 2**

4. Product: **Synchronous reluctance motor**

   Certified types: **M3HL and M3GL**

5. Manufacturer: **ABB Oy, IEC LV Motors**

6. Address: **Strömbergin Puistotie 5, 65320 Vaasa, Finland**

7. This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8. Eurofins Electric & Electronics Finland Oy, Notified Body number 0537, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

   The examination and test results are recorded in confidential report No. EUFI29-24000662-T2.

9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

   **EN IEC 60079-0:2018** **EN IEC 60079-7:2015/A1:2018**

   **EN 60079-31:2014 / IEC 60079-31:2022-01**

10. If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

11. This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12. The marking of the product shall include the following:

| M3HL | M3GL |
|---|---|
| II 2G Ex eb IIC T3 Gb | II 2D Ex tb IIIC T100°C… T150°C Db |
| II 2D Ex tb IIIC T100°C… T150°C Db | II 2D Ex tb IIIB T100°C… T150°C Db |
| II 2D Ex tb IIIB T100°C… T150°C Db | |

Espoo, 7.1.2025
**Eurofins Electric & Electronics Finland Oy**

Kari Koskela
Senior Expert

Jenni Hirvelä
Senior Expert

This document is digitally signed.

FINAS Finnish Accreditation Service S063 (EN ISO/IEC 17065)

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01

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EESF 23 ATEX 006X Issue 2
Page 1 of 4

1. **TYPE EXAMINATION CERTIFICATE**

2. **Equipment or Protective System Intended for use in Potentially explosive atmospheres Directive 2014/34/EU**

3. Type Examination Certificate Number: **EESF 23 ATEX 006X Issue 2**

4. Product: **Synchronous reluctance motor**

   Certified types: **M3GL**

5. Manufacturer: **ABB Oy, IEC LV Motors**

6. Address: **Strömbergin Puistotie 5, 65320 Vaasa, Finland**

7. This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8. Eurofins Electric & Electronics Finland Oy, Certification Body No. S063 accredited by the Finnish Accreditation Service (FINAS), certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive 2014/34/EU of February 2014.

   The examination and test results are recorded in confidential report No. EUFI29-24000662-T2.

9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

   **EN IEC 60079-0:2018** **EN IEC 60079-7:2015/A1:2018**

   **EN 60079-31:2014 / IEC 60079-31:2022-01**

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11. This Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12. The marking of the product shall include the following:

| |
|---|
| II 3G Ex ec IIC T3/T2/T1 Gc |
| II 3D Ex tc IIIC T100°C… T150°C Dc |
| II 3D Ex tc IIIB T100°C… T150°C Dc |

Espoo, 7.1.2025
**Eurofins Electric & Electronics Finland Oy**

Kari Koskela
Senior Expert

Jenni Hirvelä
Senior Expert

This document is digitally signed.

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www.eurofins.fi/electrical-and-electronics

02

IECEx

# IECEx Certificate of Conformity

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**
**IEC Certification System for Explosive Atmospheres**
for rules and details of the IECEx Scheme visit www.iecex.com

| | | | |
|---|---|---|---|
| Certificate No.: | **IECEx EESF 23.0004X** | Page 1 of 4 | Certificate history: |
| Status: | **Current** | Issue No: 2 | Issue 1 (2023-09-04)<br>Issue 0 (2023-06-07) |
| Date of Issue: | 2025-01-07 | | |
| Applicant: | **ABB Oy, IEC LV Motors**<br>Strömbergin Puistotie 5A<br>Vaasa FI 65320<br>**Finland** | | |
| Equipment: | **Series of synchronous reluctance motors; M3HL and M3GL** | | |
| Optional accessory: | | | |
| Type of Protection: | **Increased safety and dust ignition protection by enclosure** | | |
| Marking: | **M3HL**<br>Ex eb IIC T3 Gb<br>Ex tb IIIB T100°C… T150°C Db<br>Ex tb IIIC T100°C… T150°C Db<br>**M3GL**<br>Ex ec IIC T3/T2/T1 Gc<br>Ex tb IIIB T100°C… T150°C Db<br>Ex tb IIIC T100°C… T150°C Db<br>Ex tc IIIB T100°C… T150°C Dc<br>Ex tc IIIC T100°C… T150°C Dc | | |

| | |
|---|---|
| Approved for issue on behalf of the IECEx Certification Body: | **Kari Koskela** |
| Position: | **Senior Expert** |
| Signature: (for printed version) | |
| Date: (for printed version) | 2024-01-07 |

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**Eurofins Electric & Electronics Finland Oy**
**Kivimiehentie 4**
**Espoo FI-02150**
**Finland**

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03

# Aluminum Ex ec and Ex t motors


**251** **Ordering information**

**252** **Rating plates**

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254 IE3 Aluminum Ex ec and Ex t motors, 1500 r/min
255 IE3 Aluminum Ex ec and Ex t motors, 1000 r/min

**256** **Variant codes**
256 Aluminum Ex ec and Ex t motors

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259 Bearings
262 Radial forces
264 Axial forces

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266 Standard terminal box
268 Terminal boxes and boards

**269** **Dimension drawings**
269 Aluminum Ex ec & Ex t motors

**270** **Certificate examples**

**271** **Motors in brief**
271 Aluminum Ex ec & Ex t motors

# Ordering information

## Explanation of the product code

| Motor type | Motor size | Product code | Code for mounting arrangement, Voltage and frequency code, Generation code followed by variant codes |
|---|---|---|---|
| M3AA | 132MC | 3GAA 132 330 | - BDK338, 003 etc. |
| | | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14... |

## Explanation of the product code

| Motor type | Motor size | Product code | Code for mounting arrangement, Voltage and frequency code, Generation code followed by variant codes |
|---|---|---|---|
| M3AA | 160MLB | 3GAA 163 420 | - ADK 531 etc. |
| | | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14... |

| Positions 1 to 4 | |
|---|---|
| 3GAA: | Totally enclosed motor with aluminum stator frame |

| Positions 5 and 6 | |
|---|---|
| IEC size | |
| 09: | 90 |
| 10: | 100 |
| 11: | 112 |
| 13: | 132 |
| 16: | 160 |
| 18: | 180 |
| 20: | 200 |
| 22: | 225 |
| 25: | 250 |

| Position 7 | |
|---|---|
| Speed (Pole pairs) | |
| 1: | 2 poles |
| 2: | 4 poles |
| 3: | 6 poles |

| Positions 8 to 10 | |
|---|---|
| 8: | Frame lenght |
| 9: | Stator package length |
| 10: | Speed for two-speed induction, Permanent Magnet, SynRM and High Speed motors |

| Position 11 |
|---|
| - (Dash) |

| Position 12 (marked with black dot in data tables) | |
|---|---|
| Mounting arrangement | |
| A: | Foot-mounted |
| B: | Flange-mounted motor. Large flange with clearance holes |
| C: | Flange-mounted motor. Small flange with tapped holes. |
| H: | Foot- and flange-mounted motor. Large flange with clearance holes |
| J: | Foot- and flange-mounted motor. Small flange with tapped holes. |

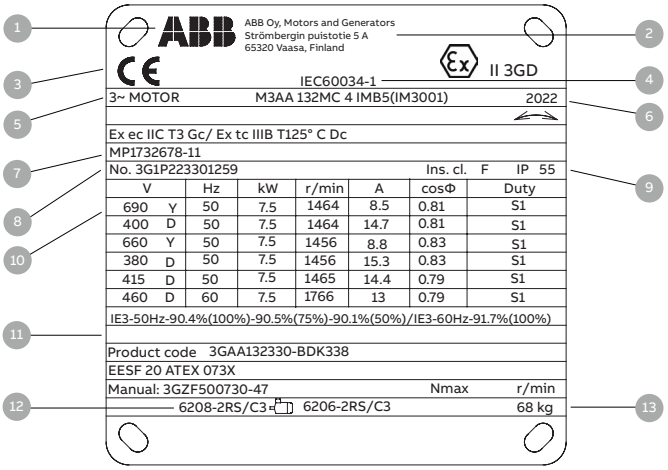
| Position 13 (marked with black dot in data tables) | |
|---|---|
| Voltage and frequency code | |
| Single-speed motors | |
| D: | 400 VΔ, 415 VΔ, 690 VY 50 Hz |
| S: | 230 VΔ, 400 VY, 415 VY 50 Hz |

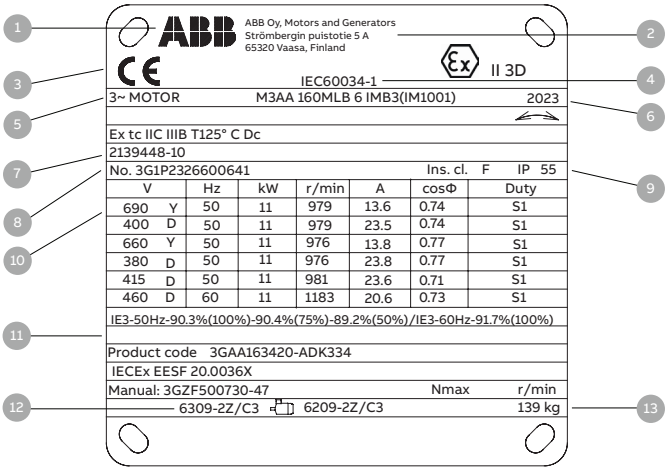
| Position 14 | |
|---|---|
| Version | |
| A, B, C... | Generation code followed by variant codes |

| Frame sizes 90-132 are available as premodified motors with following variant codes: | |
|---|---|
| 338 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIB T125C Dc (non-conductive dust), IP5X. |
| 339 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIC T125C Dc (conductive dust), IP6X. |

| When ordering frame sizes 160-250, select appropriate variant code: | |
|---|---|
| 335 | Ex t, Dust group III B T125C Dc, IP5X. |
| 336 | Ex t, Dust group III C T125 Db, IP6X. |
| 456 | Ex ec IIC T3 Gc acc. IEC/EN 60079-7 |

# Rating plates




1 ABB Logo

2 Manufacturing place

3 CE mark on Ecodesign approved motors

4 Manufacturing standard

5 Product description

6 Manufacturing year

7 Factory order reference number

8 Serial number

9 Insulation class, IP protection class

10 Voltage, Frequency, output, speed, current, power factory, duty

11 Product code

12 Bearing type

13 Weight

# Technical data

## IE3 Aluminum Ex ec and Ex t motors, 3000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_I/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 1.5 | M3AA 90LB 2 | 3GAA091520-**K | 2906 | 84,2 | 84,8 | 84,7 | 0,89 | 2,8 | 7,9 | 4,9 | 3 | 3,7 | 0,0027 | 17 | 60 |
| 2.2 | M3AA 90LC 2 | 3GAA091530-**K | 2900 | 85,9 | 87,4 | 87,5 | 0,89 | 4 | 8,3 | 7,2 | 2,9 | 3,5 | 0,0032 | 20 | 60 |
| 3 | M3AA 100LC 2 | 3GAA101530-**K | 2896 | 87,1 | 88,2 | 88 | 0,9 | 5,4 | 8,4 | 9,8 | 3,2 | 3,9 | 0,0057 | 28 | 62 |
| 4 | M3AA 112MB 2 | 3GAA111320-**K | 2888 | 88,1 | 89,4 | 89,6 | 0,91 | 7,1 | 8,4 | 13,2 | 3,2 | 4 | 0,0104 | 38 | 68 |
| 5.5 | M3AA 132SB 2 | 3GAA131120-**K | 2901 | 89,2 | 89,9 | 90,1 | 0,91 | 9,7 | 7,9 | 18,1 | 2,3 | 3,4 | 0,0154 | 58 | 68 |
| 7.5 | M3AA 132SC 2 | 3GAA131130-**K | 2909 | 90,1 | 91,2 | 91,4 | 0,9 | 13,1 | 8,3 | 24,6 | 3 | 3,9 | 0,0173 | 63 | 70 |
| 11 | M3AA 160MLA 2 | 3GAA161410-**K | 2943 | 91,2 | 91,9 | 91,6 | 0,91 | 19,1 | 7,2 | 35,57 | 2,6 | 3,3 | 0,057 | 106 | 69,4 |
| 15 | M3AA 160MLB 2 | 3GAA161420-**K | 2947 | 91,9 | 92,2 | 91,8 | 0,88 | 26,7 | 8,2 | 48,6 | 3,2 | 4,2 | 0,063 | 123 | 69,4 |
| 18.5 | M3AA 160MLC 2 | 3GAA161430-**K | 2949 | 92,4 | 93 | 92,6 | 0,9 | 32,1 | 9 | 59,9 | 3,3 | 3,9 | 0,076 | 137 | 73,3 |
| 22 | M3AA 180MLA 2 | 3GAA181410-**K | 2956 | 92,7 | 93,1 | 92,7 | 0,9 | 37,7 | 7,8 | 70,98 | 3 | 3,83 | 0,11 | 176 | 72,9 |
| 30 | M3AA 200MLA 2 | 3GAA201410-**K | 2962 | 93,3 | 93,5 | 92,8 | 0,87 | 53,2 | 7,6 | 96,76 | 3,09 | 3,76 | 0,159 | 225 | 72 |
| 37 | M3AA 200MLB 2 | 3GAA201420-**K | 2961 | 93,7 | 94,1 | 93,8 | 0,88 | 64,4 | 8,2 | 119,3 | 3 | 3,3 | 0,196 | 241 | 72 |
| 45 | M3AA 225SMA 2 | 3GAA221210-**K | 2968 | 94 | 94 | 93 | 0,87 | 79,6 | 7,3 | 144,8 | 2,7 | 3,07 | 0,296 | 326 | 75,7 |
| 55 | M3AA 250SMA 2 | 3GAA251210-**K | 2968 | 94,3 | 93,7 | 93,6 | 0,89 | 94,8 | 6,8 | 177 | 2,35 | 3 | 0,426 | 351 | 75,9 |

| Output kW | Motor type | Product code | | Efficiency IEC 60034-30-1: 2014 | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_I/T_N$ | $T_b/T_N$ | | | |
| **3000 r/min = 2 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 22 | M3AA 160MLD 2 | 3GAA161440-**K | 2944 | 92,7 | 93,5 | 93,4 | 0,9 | 38 | 8,4 | 71,36 | 3,2 | 3,7 | 0,071 | 131 | 74 |
| 30 | M3AA 180MLB 2 | 3GAA181420-**K | 2957 | 93,3 | 94 | 93,9 | 0,88 | 52,7 | 8,7 | 96,88 | 3 | 3,8 | 0,104 | 162 | 74 |
| 37 | M3AA 180MLC 2 | 3GAA181430-**K | 2950 | 93,7 | 94,2 | 94,2 | 0,86 | 66 | 8,5 | 119,5 | 3,38 | 4,35 | 0,117 | 176 | 74 |
| 45 | M3AA 200MLC 2 | 3GAA201430-**K | 2956 | 94 | 94,6 | 94,8 | 0,89 | 77,2 | 7,8 | 145,24 | 2,91 | 3,27 | 0,216 | 250 | 77 |
| 55 | M3AA 225SMB 2 | 3GAA221220-**K | 2964 | 94,3 | 94,4 | 93,9 | 0,86 | 97,4 | 7,2 | 177,3 | 3,14 | 3,22 | 0,299 | 288 | 79 |
| 75 | M3AA 225SMC 2 | 3GAA221230-**K | 2966 | 94,7 | 95 | 94,7 | 0,86 | 132 | 7,6 | 241,7 | 3,08 | 3,06 | 0,362 | 328 | 79 |
| 75 | M3AA 250SMB 2 | 3GAA251220-**K | 2971 | 94,7 | 95,1 | 94,8 | 0,9 | 127 | 7,9 | 241,06 | 2,8 | 3,3 | 0,644 | 405 | 81 |
| 90 | M3AA 250SMC 2 | 3GAA251230-**K | 2975 | 95 | 95,2 | 94,6 | 0,87 | 156 | 8,5 | 288,6 | 2,91 | 3,6 | 0,514 | 414 | 81 |

# Technical data

## IE3 Aluminum Ex ec and Ex t motors, 1500 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Efficiency IEC 60034-30-1: 2014 | | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 1.1 | M3AA 90LC 4 | 3GAA092530-**K | 1442 | 84,1 | 83,5 | 81,7 | 0,8 | 2,3 | 7,9 | 7,2 | 3,3 | 3,9 | 0,0055 | 19 | 56 |
| 1.5 | M3AA 90LD 4 | 3GAA092540-**K | 1439 | 85,3 | 84,7 | 82,8 | 0,78 | 3,2 | 8,2 | 9,9 | 3,5 | 4 | 0,0055 | 19 | 55 |
| 2.2 | M3AA 100LE 4 | 3GAA102550-**K | 1454 | 86,7 | 87,1 | 86 | 0,83 | 4,3 | 8,9 | 14,5 | 3,1 | 4,1 | 0,0144 | 36 | 54 |
| 3 | M3AA 100LF 4 | 3GAA102560-**K | 1452 | 87,7 | 88,1 | 87,1 | 0,83 | 5,9 | 9 | 19,7 | 3,5 | 4,2 | 0,0144 | 36 | 54 |
| 4 | M3AA 112MB 4 | 3GAA112320-**K | 1451 | 88,6 | 89,5 | 89 | 0,77 | 8,6 | 7,6 | 26,3 | 3,1 | 4,1 | 0,018 | 44 | 64 |
| 5.5 | M3AA 132MB 4 | 3GAA132320-**K | 1464 | 89,6 | 90,2 | 89,5 | 0,78 | 11,4 | 7 | 35,87 | 2,8 | 3,9 | 0,0295 | 68 | 70 |
| 7.5 | M3AA 132MC 4 | 3GAA132330-**K | 1464 | 90,4 | 90,8 | 90,7 | 0,81 | 14,7 | 7,7 | 48,9 | 2,5 | 3,6 | 0,0414 | 68 | 64 |
| 11 | M3AA 160MLA 4 | 3GAA162410-**K | 1477 | 91,4 | 91,8 | 91,1 | 0,82 | 21,1 | 7,6 | 71,27 | 2,62 | 3,34 | 0,11 | 126 | 61,1 |
| 15 | M3AA 160MLB 4 | 3GAA162420-**K | 1474 | 92,1 | 92,2 | 91,3 | 0,81 | 29 | 7,8 | 97,15 | 3,01 | 3,65 | 0,135 | 140 | 60,8 |
| 18.5 | M3AA 180MLA 4 | 3GAA182410-**K | 1481 | 92,6 | 93,2 | 92,9 | 0,83 | 34,9 | 7,2 | 119,3 | 2,8 | 3,03 | 0,219 | 177 | 59,8 |
| 22 | M3AA 180MLB 4 | 3GAA182420-**K | 1480 | 93 | 93,8 | 93,8 | 0,82 | 41,5 | 8,2 | 141 | 2,8 | 3,1 | 0,217 | 176 | 62 |
| 30 | M3AA 200MLA 4 | 3GAA202410-**K | 1481 | 93,6 | 93,9 | 93,4 | 0,84 | 55,1 | 7,5 | 193,42 | 2,8 | 3 | 0,385 | 246 | 62,8 |
| 37 | M3AA 225SMA 4 | 3GAA222210-**K | 1481 | 93,9 | 94,1 | 93,4 | 0,82 | 69,8 | 8 | 235,4 | 3,32 | 3,46 | 0,433 | 315 | 66 |
| 45 | M3AA 225SMB 4 | 3GAA222220-**K | 1482 | 94,2 | 94,3 | 93,9 | 0,84 | 82,3 | 8 | 290 | 3,15 | 3,45 | 0,525 | 316 | 66 |
| 55 | M3AA 250SMA 4 | 3GAA252210-**K | 1485 | 94,6 | 95,2 | 94,9 | 0,85 | 97,8 | 7,9 | 353 | 3 | 3,3 | 0,933 | 376 | 67 |

| Output kW | Motor type | Product code | Efficiency IEC 60034-30-1: 2014 | | | | | Current | | Torque | | | Moment of inertia J = 1/4 $GD_2$kgm$_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Speed r/min | Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | $I_n$A | $I_S/I_N$ | $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | | | |
| **1500 r/min = 4 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 18.5 | M3AA 160MLC 4 | 3GAA162430-**K | 1476 | 92,6 | 93,1 | 92,7 | 0,77 | 37,2 | 8,3 | 119,9 | 3,32 | 3,58 | 0,121 | 135 | 67 |
| 28 | M3AA 180MLC 4 | 3GAA182430-**K | 1482 | 93,4 | 93,3 | 92,3 | 0,77 | 56,5 | 8,2 | 180,36 | 2,98 | 3,56 | 0,191 | 176 | 62 |
| 37 | M3AA 200MLB 4 | 3GAA202420-**K | 1482 | 93,9 | 94,1 | 93,7 | 0,82 | 69,3 | 7,8 | 237,9 | 3,13 | 3,28 | 0,362 | 244 | 68 |
| 51 | M3AA 225SMC 4 | 3GAA222230-**K | 1481 | 94,4 | 94,5 | 93,9 | 0,81 | 95,9 | 9,3 | 328,35 | 3,39 | 3,67 | 0,532 | 318 | 71 |
| 75 | M3AA 250SMB 4 | 3GAA252220-**K | 1483 | 95 | 95,3 | 95 | 0,82 | 139 | 7,8 | 485,8 | 3,28 | 3,46 | 0,796 | 389 | 73 |

# Technical data

## IE3 Aluminum Ex ec and Ex t motors, 1000 r/min

**IP 55 - IC 411 - Insulation class F, temperature rise class B**
**IE3 efficiency class according to IEC 60034-30-1; 2014**

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_nA$ | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **BASIC-design** | | | | | | | |
| 0.75 | M3AA 90LD 6 | 3GAA093540-**K | 938 | 78,9 | 79,6 | 77,3 | 0,74 | 1,82 | 4,8 | 7,59 | 2,27 | 2,56 | 0,0055 | 19 | 44 |
| 1.1 | M3AA 100LE 6 | 3GAA103550-**K | 963 | 81 | 82,2 | 81 | 0,69 | 2,6 | 5,6 | 10,9 | 2,3 | 3,1 | 0,0138 | 35 | 49 |
| 1.5 | M3AA 100LF 6 | 3GAA103560-**K | 969 | 82,5 | 81,4 | 77,5 | 0,65 | 3,77 | 7 | 14,8 | 3,31 | 4,11 | 0,0138 | 35 | 49 |
| 2.2 | M3AA 112MC 6 | 3GAA113330-**K | 967 | 84,3 | 85,2 | 84,1 | 0,69 | 5,2 | 6,5 | 21,7 | 2,4 | 3,5 | 0,0187 | 43 | 68 |
| 3 | M3AA 132MC 6 | 3GAA133330-**K | 978 | 85,6 | 86 | 84,5 | 0,69 | 7 | 6,2 | 29,2 | 2 | 3 | 0,0402 | 66 | 61 |
| 4 | M3AA 132MD 6 | 3GAA133340-**K | 973 | 86,8 | 87,7 | 87,5 | 0,72 | 9,1 | 5,6 | 39,2 | 1,9 | 2,7 | 0,0402 | 67 | 61 |
| 5.5 | M3AA 132ME 6 | 3GAA133350-**K | 973 | 88 | 88,8 | 88,2 | 0,74 | 12 | 5,8 | 53,9 | 2 | 2,9 | 0,039 | 63 | 61 |
| 7.5 | M3AA 160MLA 6 | 3GAA163410-**K | 980 | 89,1 | 89,9 | 89,3 | 0,78 | 15,2 | 7,9 | 73 | 1,7 | 2,8 | 0,114 | 125 | 59 |
| 11 | M3AA 160MLB 6 | 3GAA163420-**K | 979 | 90,3 | 90,9 | 90,2 | 0,74 | 23,5 | 8,5 | 107 | 2,2 | 3,9 | 0,131 | 139 | 59 |
| 15 | M3AA 180MLA 6 | 3GAA183410-**K | 987 | 91,2 | 91,5 | 90,5 | 0,77 | 30,4 | 5,5 | 146 | 1,7 | 2,7 | 0,225 | 175 | 59 |
| 18.5 | M3AA 200MLA 6 | 3GAA203410-**K | 990 | 91,7 | 92,1 | 91,5 | 0,77 | 37,3 | 7,5 | 178 | 2,6 | 3,2 | 0,448 | 218 | 63 |
| 22 | M3AA 200MLB 6 | 3GAA203420-**K | 990 | 92,2 | 92,7 | 92 | 0,79 | 43 | 7,8 | 212 | 2,6 | 3,2 | 0,531 | 245 | 63 |
| 30 | M3AA 225SMA 6 | 3GAA223210-**K | 989 | 92,9 | 93,6 | 93,3 | 0,81 | 56,8 | 7,9 | 289 | 2,8 | 3,1 | 0,813 | 310 | 63 |
| 37 | M3AA 250SMA 6 | 3GAA253210-**K | 991 | 93,3 | 93,9 | 93,6 | 0,83 | 68 | 7,7 | 356 | 2,7 | 2,9 | 1,49 | 367 | 63 |

| Output kW | Motor type | Product code | Speed r/min | Efficiency IEC 60034-30-1: 2014 Full load 100% | 3/4 load 75% | 1/2 load 50% | Power factor Cos | Current $I_nA$ | $I_S/I_N$ | Torque $T_N$ Nm | $T_l/T_N$ | $T_b/T_N$ | Moment of inertia J = 1/4 $GD_2kgm_2$ | Weight kg | Sound pressure Level $L_{PA}$ dB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000 r/min = 6 poles** | | | | **400 V 50Hz** | | | | **COMPACT-design** | | | | | | | |
| 18.5 | M3AA 180MLB 6 | 3GAA183420-**K | 980 | 91,7 | 92,1 | 91,5 | 0,72 | 40,3 | 6,8 | 179,5 | 2,3 | 3,21 | 0,191 | 168 | 65 |
| 37 | M3AA 225SMB 6 | 3GAA223220-**K | 986 | 93,3 | 93,6 | 93 | 0,76 | 75,1 | 7,7 | 357,6 | 3,16 | 3,35 | 0,799 | 307 | 68 |
| 45 | M3AA 250SMB 6 | 3GAA253220-**K | 991 | 93,7 | 93,8 | 93,1 | 0,79 | 87,3 | 8 | 433,2 | 3,06 | 3,24 | 1,33 | 389 | 68 |

# Variant codes

## Aluminum Ex ec and Ex t motors

Variant codes specify additional options and features to the standard motor. The desired features are listed as three-digit variant codes in the motor order. Note also that there are variants that cannot be used together.

| Code/Variants | | Frame size | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 |
| **Administration** | | | | | | | | | | |
| 531 | Sea freight packing | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Balancing** | | | | | | | | | | |
| 052 | Vibration acc. to Grade A (IEC 60034-14). | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 426 | Half key balancing. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Bearings and Lubrication** | | | | | | | | | | |
| 037 | Roller bearing at D-end. | - | - | - | - | ● | ● | ● | ● | ● |
| 039 | Cold-resistant grease | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 040 | Heat-resistant grease | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 041 | Bearings regreasable via grease nipples. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 042 | Locked D-end | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 043 | SPM compatible nipples for vibration measurement | - | - | - | - | ● | ● | ● | ● | ● |
| 057 | 2RS bearings at both ends. | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 188 | 63-series bearing in D-end | ● | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ |
| 194 | 2Z bearings greased for life at both ends. | - | - | - | - | ○ | ○ | ○ | ○ | ○ |
| 195 | Bearings greased for life. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 593 | Bearings grease suitable for food and beverage industry. | - | - | - | - | ● | ● | ● | ● | ● |
| 798 | Stainless steel grease nipples | - | - | - | - | ● | ● | ● | ● | ● |
| **Branch standard designs** | | | | | | | | | | |
| 178 | Stainless steel / acid proof bolts. | - | - | - | - | ● | ● | ● | ● | ● |
| 217 | Cast iron D-end shield (on aluminum motor). | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ |
| 232 | Cast iron N-end shield (on aluminium motor). | - | - | - | - | ○ | ○ | ○ | ○ | ○ |
| 425 | Corrosion protected stator and rotor core. | - | - | - | - | ● | ● | ● | ● | ● |
| **Cooling system** | | | | | | | | | | |
| 046 | Two-directional fan. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 053 | Metal fan cover. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 068 | Light alloy metal fan | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 792 | Metal fasteners for fan cover | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Documentation** | | | | | | | | | | |
| 141 | Binding 2D main dimension drawing. | - | - | - | - | ● | ● | ● | ● | ● |
| **Drain holes** | | | | | | | | | | |
| 065 | Plugged existing drain holes. | - | - | - | - | ● | ● | ● | ● | ● |
| **Earthing Bolt** | | | | | | | | | | |
| 067 | External earthing bolt. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Hazardous Environments** | | | | | | | | | | |
| 335 | Ex t, Dust group III B T125C Dc, IP5X (non-conductive dust) acc. IEC/EN60079-31. | - | - | - | - | ● | ● | ● | ● | ● |
| 336 | Ex t, Dust group III C T125 Db, IP6X (conductive dust) acc. IEC/EN60079-31. | - | - | - | - | ● | ● | ● | ● | ● |
| 338 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIB T125C Dc (non-conductive dust), IP5X. | ○ | ○ | ○ | ○ | - | - | - | - | - |
| 339 | Rated for gas or dust, Ex ec IIC T3 Gc / Ex tc IIIC T125C Dc (conductive dust), IP6X. | ○ | ○ | ○ | ○ | - | - | - | - | - |
| 456 | Ex ec IIC T3 Gc acc. IEC/EN 60079-7 with certificates. | - | - | - | - | ● | ● | ● | ● | ● |
| **Heating elements** | | | | | | | | | | |
| 450 | Heating element, 100-120 V | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 451 | Heating element, 200 - 240 V | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mounting arrangements** | | | | | | | | | | |
| 007 | IM 3001 flange mounted, IEC flange, from IM 1001 (B5 from B3). | - | - | - | - | ● | ● | ● | ● | ● |
| 008 | IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3). | ● | ● | ● | ● | - | - | - | - | - |
| 009 | IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3). | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 047 | IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5). | ● | ● | ● | ● | - | - | - | - | - |
| 048 | IM 3001 flange mounted, IEC flange, from IM 3601 (B5 from B14). | ● | ● | ● | ● | - | - | - | - | - |
| 066 | Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101) | ● | ● | ● | ● | ● | ● | ● | ● | ● |

○ = Included as standard | ● = Available as option | - = Not applicable

| Code/Variants | | Frame size | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 |
| 200 | Flange ring holder. | ● | ● | ● | ● | - | - | - | - | - |
| 224 | Flange ring FT 115. | ● | - | - | - | - | - | - | - | - |
| 226 | Flange ring FF 130. | ● | ● | ● | - | - | - | - | - | - |
| 227 | Flange ring FT 130. | ● | ● | ● | - | - | - | - | - | - |
| 233 | Flange ring FF 165. | ● | ● | ● | - | - | - | - | - | - |
| 234 | Flange ring FT 165. | ● | ● | ● | - | - | - | - | - | - |
| 243 | Flange ring FF 215. | - | - | ● | ● | - | - | - | - | - |
| **Painting** | | | | | | | | | | |
| 114 | Special paint color, standard grade | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Protection** | | | | | | | | | | |
| 005 | Protective roof | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 072 | Radial seal at D-end. Not possible for 2-pole , 280 and 315 frames | - | - | - | - | ● | ● | ● | ● | ● |
| 074 | Degree of protection IP55. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 158 | Degree of protection IP65. | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| 250 | Degree of protection IP66 | - | - | - | - | ● | ● | ● | ● | ● |
| 403 | Degree of protection IP56. | - | - | - | - | ● | ● | ● | ● | ● |
| 784 | Gamma-seal at D-end. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Rating & instruction plates** | | | | | | | | | | |
| 002 | Restamping voltage, frequency and output, continuous duty. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 003 | Individual serial number. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 004 | Additional text on std rating plate (max 12 digits on free text line). | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 095 | Restamping output (maintained voltage, frequency), intermittent duty. | - | - | - | - | ● | ● | ● | ● | ● |
| 098 | Stainless rating plate. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 126 | Tag plate | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 135 | Mounting of additional identification plate, stainless. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 138 | Mounting of additional identification plate, aluminium. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 159 | Additional plate with text "Made in ...." | - | - | - | - | ● | ● | ● | ● | ● |
| 160 | Additional rating plate affixed. | - | - | - | - | ● | ● | ● | ● | ● |
| 161 | Additional rating plate delivered loose. | - | - | - | - | ● | ● | ● | ● | ● |
| 162 | Rating plate fixed to stator. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 163 | Frequency converter rating plate. Rating data according to quotation. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 181 | Rating plate with ABB standard loadability values for VSD operation. Other auxiliaries for VSD operation to be selected as necessary. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Shaft & rotor** | | | | | | | | | | |
| 164 | Shaft extension with closed keyway | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Standards and Regulations** | | | | | | | | | | |
| 331 | Motor not for sale for use in EU or UK. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 538 | CE mark | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Stator winding temperature sensors** | | | | | | | | | | |
| 436 | PTC - thermistors (3 in series), 150 ºC, in stator winding | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 445 | Pt100 2-wire in stator winding, 1 per phase | - | - | - | - | ● | ● | ● | ● | ● |
| **Terminal box** | | | | | | | | | | |
| 015 | Motor supplied in D connection. | - | - | - | - | ● | ● | ● | ● | ● |
| 017 | Motor supplied in Y connection. | - | - | - | - | ● | ● | ● | ● | ● |
| 230 | Standard metal cable gland. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 465 | Terminal box on top. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 731 | Two standard metal cable glands. | - | - | - | - | ● | ● | ● | ● | ● |
| 738 | Prepared for metric cable glands. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Testing** | | | | | | | | | | |
| 145 | Type test report from a catalogue motor, 400V 50Hz. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 148 | Routine test report. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Variable speed drives** | | | | | | | | | | |
| 701 | Insulated bearing at N-end. | - | - | - | - | ● | ● | ● | ● | ● |
| 704 | EMC cable entry. | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Y/D starting** | | | | | | | | | | |
| 023 | 6 terminals (for Y/D start, single speed), in terminal box. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

○ = Included as standard | ● = Available as option | - = Not applicable

# Mechanical design

## Motor frame and drain holes

### Motor frame

The motor frame is made of aluminum alloy. Frame size 90-180 have aluminum feet and sizes 200-250 have cast iron feet.

The bearing end shield of sizes 90-132 are made of aluminum, and those of 160 to 250 are made of cast iron.

Motors can be supplied for foot mounting, flange mounting, and combinations of these.

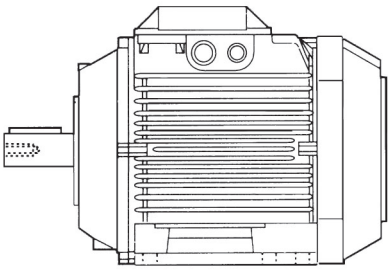
### Drain holes

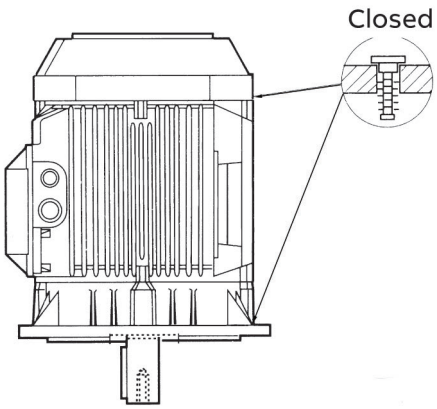
Motors that will be operated in very humid or wet environments and especially under intermittent duty should be provided with drain holes. The IM designation, such as IM 3031, determines the intended mounting arrangement for the motor.

Motors are provided with closable plastic plugs in the drain holes. In explosive environments requiring IP55 or IP65 protection, the both plugs should be hammered home. In the case of vertical mounting, the upper plug must be hammered home completely.

Motors are supplied with drain holes both at the D-end and N-end.

When mounting arrangement differs from foot mounted IM B3, please use variant code 065 when ordering.





# Mechanical design

## Bearings

—
01 Motor sizes 90–132

02 Motor sizes 160–250

ABB's alumimum motors are as standard fitted with single-row ball bearings according to the table below.

### Standard design: Deep groove ball bearings

| Motor size | Foot and flange mounted motor | |
|---|---|---|
| | D-end | N-end |
| 90 | 6205-2RSH/C3 | 6204-2RSH/C3 |
| 100 | 6306-2RS1/C3 | 6205-2RSH/C3 |
| 112 | 6306-2RS1/C3 | 6205-2RSH/C3 |
| 132 [1] | 6208-2RS1/C3 | 6206-2RS1/C3 |
| 160 | 6309-2Z/C3 | 6209-2Z/C3 |
| 180 | 6310-2Z/C3 | 6209-2Z/C3 |
| 200 | 6312-2Z/C3 | 6210-2Z/C3 |
| 225 | 6313-2Z/C3 | 6212-2Z/C3 |
| 250 | 6315-2Z/C3 | 6213-2Z/C3 |

[1] all types except

Note that in such cases the axial force must only operate in one direction. Motor versions with roller bearings tolerate greater radial forces

### Alternative design with roller bearings

It is recommended to use roller bearings in belt drives for motor sizes 160 to 250.

See variant code 037 under the heading "Bearings and lubrication".

| Motor size | Number of poles | Alternative designs | |
|---|---|---|---|
| | | Roller bearings (037) | |
| | | D-end | N-end |
| 160 | – | NU 309 ECP | 6209-2Z/C3 |
| 180 | – | NU 310 ECP | 6209-2Z/C3 |
| 200 | – | NU 312 ECP | 6210-2Z/C3 |
| 225 | – | NU 313 ECP | 6212-2Z/C3 |
| 250 | – | NU 315 ECP | 6213-2Z/C3 |

[1] all types except

### Axially-locked bearings

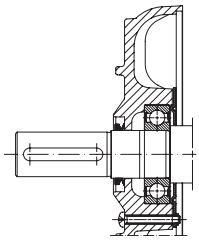
All motors with deep groove ball bearings are equipped as standard with an axially locked bearing at the D-end. For sizes 90-250 is the locking done by a spring washer at N-end pushing the rotor towards D-end.

| Motor size | Foot-mounted motors | Flange-mounted motors | |
|---|---|---|---|
| | | Large flange | Small flange |
| 90–132 | D-end [1] | D-end [1] | D-end [1] |
| 160–250 | D-end | D-end | – |

[1] A spring-washer at the N-end presses the rotor toward the D-end.

### Bearing seals

Motors in sizes 90-250 are provided with gamma seals at both D and N-end.The sizes 90-132 have in addition to the shaft seals 2RS type bearings with rubber seals for improved protection.



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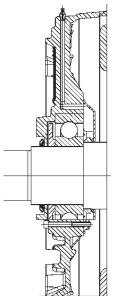


02

### Bearing life

The nominal life is defined as the number of hours that are attained or exceeded by 90 percent of identical bearings, in a large test series, under certain specified conditions. 50 percent of the bearings attain a life of as much as 5 times this figure.

The life of bearings is dependent on various factors such as bearing load, motor speed, operating temperature and the purity of the grease. The permissible radial and axial loading for different motor sizes is shown in the table on the following pages.

The table is valid for 50 Hz. For 60 Hz and/or some other bearing life than specified in the table the values are changed according to the table below.

The table values assume the occurrence of only radial or axial forces. In the case of simultaneous radial and axial forces information can be supplied on request. It is assumed that the radial force is applied at the end of the motor shaft.

Permissible force at changed bearing life or supply frequency

| Bearing life in hours at | | |
|---|---|---|
| 50 Hz | 60 Hz | |
| 25 000 | 21 000 | 100 % of value for 25.000 hours |
| 40 000 | 33 000 | 100 % of value for 40.000 hours |
| 63 000 | 52 000 | 86 % of value for 40.000 hours |
| 80 000 | 67 000 | 80 % of value for 40.000 hours |

## Lubrication

The motors are delivered with bearing grease for use at normal temperatures in dry or humid environments. The motors are lubricated for ambient temperatures 40°C and in other temperatures above 40°C, see table next page.

Motors in size 90-250 are delivered with greased for life shielded bearings as standard, as an option are also regreasable bearings with grease nipples available for sizes 160-250.

Lubrication intervals and grease quantities are specified on a plate on the motor as well as in the manual supplied with the motor.

The grease lifetime $L_{10}$, suitable for permanent lubricated bearings, is defined as the number of operating hours after which 90 percent of the bearings are adequately lubricated. 50 percent of the bearings achieve two times this figure. Maximum lifetime, however, should be regarded as 40,000 hours.

In case of high ambient temperatures the shaft loads must be reduced compared to permissible loadings in the table, please contact ABB.

## Lubrication intervals

ABB follows the $L_1$-principle in defining lubrication interval. That means that 99 percent of the motors are sure to make the interval time. The lubrication intervals can also be calculated according to the $L_{10}$-principle, which are normally doubled compared to $L_1$-values. Values available from ABB at request.

The table below gives lubrication intervals according to the $L_1$-principle for different speeds. The values are valid for horizontal mounted motors (B3), with about 80°C bearing temperature and using good quality grease with lithium complex soap and with mineral or PAO-oil.

For more information, see ABB's Low Voltage Motors Manual.

## Grease lifetime

In vertically mounted motors, the grease lifetime is half the figures as in following table. For applications corresponding to the empty cells in the table, please contact ABB. These applications can imply reduced lifetime for bearings and winding. Motors with roller bearings (optional) have considerably shorter grease life. For continuous operation regreasing nipples should be considered.

| Ambient temperature and rated output | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25 °C | | 40 °C | | 50 °C | | 60 °C | | 70 °C | | 80 °C | |
| Motor | r/min | Basic | High | Basic | High | Basic | High | Basic | High | Basic | High | Basic | High |
| 90 | 3000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 20 000 | 20 000 | 11 000 | 11 000 | 6000 | 6000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| | 750 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| 100 | 3000 | 40 000 | 40 000 | 39 000 | 39 000 | 25 000 | 25 000 | 15 000 | 15 000 | 8000 | 8000 | 4000 | 4000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 30 000 | 30 000 | 17 000 | 17 000 | 9000 | 9000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| | 750 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| 112 | 3000 | 40 000 | 40 000 | 39 000 | 39 000 | 25 000 | 25 000 | 15 000 | 15 000 | 8000 | 8000 | 4000 | 4000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 30 000 | 30 000 | 17 000 | 17 000 | 9000 | 9000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| | 750 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| 132 | 3000 | 40 000 | 40 000 | 33 000 | 33 000 | 21 000 | 21 000 | 13 000 | 13 000 | 7000 | 7000 | 4000 | 4000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 26 000 | 26 000 | 14 000 | 14 000 | 7000 | 7000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| | 750 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 33 000 | 33 000 | 18 000 | 18 000 | 9000 | 9000 |
| 160 | 3000 | 40 000 | 40 000 | 40 000 | 36 000 | 40 000 | 19 000 | 26 000 | 9000 | 14 000 | 5000 | 8000 | 2000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 38 000 | 40 000 | 20 000 | 37000 | 10 000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 24 000 | 40 000 | 12 000 |
| | 750 | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | |
| 180 | 3000 | 38 000 | 38 000 | 38 000 | 38 000 | 38 000 | 38 000 | 38 000 | 23 000 | 23 000 | 12 000 | 13 000 | 7000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 24 000 | 40 000 | 12 000 | 26 000 | 6000 | 13 000 | 3000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 24 000 | 29 000 | 12 000 |
| | 750 | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 37000 | | 21 000 | |
| 200 | 3000 | 27 000 | 27 000 | 27 000 | 27 000 | 27 000 | 18 000 | 24 000 | 10 000 | 14 000 | 5000 | 8000 | 3000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 32000 | 40 000 | 18 000 | 30 000 | 10 000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 30 000 | 38 000 | 17 000 |
| | 750 | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | |
| 225 | 3000 | 23 000 | 23 000 | 23 000 | 18 000 | 23 000 | 10 000 | 20 000 | 6000 | 12 000 | 3000 | 7000 | 1000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 23 000 | 40 000 | 12 000 | 40 000 | 6000 | 25 000 | 3000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 27 000 |
| | 750 | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | |
| 250 | 3000 | 16 000 | 16 000 | 16 000 | 13 000 | 16 000 | 7000 | 12 000 | 4000 | 7000 | 2000 | 4000 | 1000 |
| | 1500 | 40 000 | 40 000 | 40 000 | 39 000 | 40 000 | 21 000 | 40 000 | 11 000 | 33 000 | 6000 | 19 000 | 3000 |
| | 1000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 40 000 | 25 000 | 36 000 | 13 000 |
| | 750 | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | | 40 000 | |

Grease lifetime $L_{10}$ in deep groove ball bearings of type 2Z in horizontally mounted motors in continuous running duty.

# Mechanical design

## Radial forces

### Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated with FR as follows:

$$D = \frac{1.9 \cdot 10^7 \cdot K \cdot P}{n \cdot F_R}$$

| Where: | |
|---|---|
| D: | pulley diameter, mm |
| P: | power requirement, kW |
| n: | motor speed, r/min. |
| K: | belt tension factor, dependent on belt type and type of duty. A common value for V-belts is 2.5 |
| $F_R$: | permissible radial force, refer to tables below. |

### Permissible loading on the shaft

The following table shows permissible radial forces on the shaft in Newtons, assuming zero axial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life $L_{10h}$ of 40 000 hours per motor size.

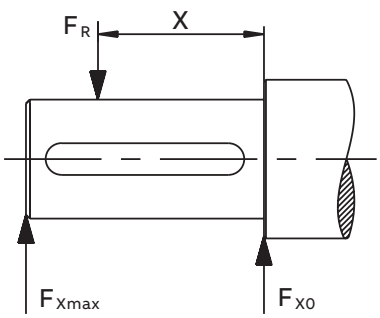
Permissible loads of simultaneous radial and axial forces can be supplied on request.

These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft together with flame path dimensions affects permissible forces.

If the radial force is applied between points X0 and Xmax, the permissible force $F_R$ can be calculated with the following formula:

$$F_R = F_{X0} - \frac{X}{E}(F_{X0} - F_{Xmax})$$

| Where: | |
|---|---|
| E: | length of the shaft extension in the standard version |



## Permissible radial forces

| Motor size | Poles | Length of shaft extension E (mm) | Ball bearings | | | |
|---|---|---|---|---|---|---|
| | | | Basic design with deep groove ball bearings | | | |
| | | | 25 000 hours | | 40 000 hours | |
| | | | $F_{X0}$(N) | $F_{Xmax}$(N) | $F_{X0}$(N) | $F_{Xmax}$(N) |
| 90 | 2-6 | 50 | 1010 | 810 | 1010 | 810 |
| 100 | 2-6 | 60 | 2280 | 1800 | 2280 | 1800 |
| 112 | 2-6 | 60 | 2280 | 1800 | 2280 | 1800 |
| 132 | 2-6 | 80 | 2120 | 1610 | 2120 | 1610 |
| 132 | 2-6 | 80 | 2600 | 2100 | 2600 | 2100 |
| 160 | 2 | 110 | 4760 | 3860 | 4100 | 3320 |
| | 4 | 110 | 5180 | 4200 | 4380 | 3545 |
| | 6 | 110 | 5160 | 4180 | 4360 | 3540 |
| 180 | 2 | 110 | 6060 | 4960 | 5280 [1] | 4305 [1] |
| | 4 | 110 | 4800 | 3940 | 4020 | 3300 |
| | 6 | 110 | 6280 | 5140 | 5280 | 4380 |
| 200 | 2 | 110 | 7800 | 6500 | 6760 [2] | 5640 [2] |
| | 4 | 110 | 8400 | 7020 | 7180 | 5980 |
| | 6 | 110 | 8960 | 7480 | 7600 | 6340 |
| 225 | 2 | 110 | 8520 | 7180 | 7360 [3] | 6200 [3] |
| | 4 | 140 | 8380 | 6780 | 7200 | 5820 |
| | 6 | 140 | 10 960 | 8860 | 9360 | 7560 |
| 250 | 2 | 140 | 10 480 [4] | 8500 [4] | 9080 [4] | 7360 [4] |
| | 4 | 140 | 10 840 | 8780 | 9380 | 7600 |
| | 6 | 140 | 12 600 | 10 220 | 10 700 | 8680 |

[1] The maximum lifetime of the grease is 38000 h

[2] The maximum lifetime of the grease is 27000 h

[3] The maximum lifetime of the grease is 23000 h

[4] The maximum lifetime of the grease is 16000 h

# Mechanical design

## Axial forces

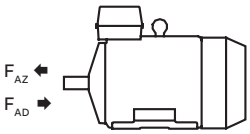
—
01 Mounting arrangement IM B3

02 Mounting arrangement IM V1

The following tables present permissible axial forces on the shaft in Newtons, assuming zero radial force, a 25 °C ambient temperature, and normal conditions. The values are given for a calculated bearing life of 20,000 and 40,000 hours per motor size.

At 60 Hz, the values must be reduced by 10 percent, and for two-speed motors, the higher speed determines permissible axial force. Permissible loads of simultaneous radial and axial forces can be supplied on request.

For axial force $F_{AD}$, it is assumed that the D-bearing is locked with a locking ring.

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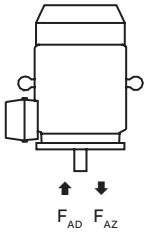



02

## Permissible axial forces

| Motor size | Poles | Mounting arrangement IM B3, deep groove ball bearings | | | | Mounting arrangement IM V1, deep groove ball bearings | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 20 000 hours | | 40 000 hours | | 20 000 hours | | 40 000 hours | |
| | | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) | $F_{AD}$(N) | $F_{AZ}$(N) |
| 90 | 2 | 885 | 485 | 720 | 320 | 945 | 450 | 775 | 280 |
| | 4 | 1170 | 650 | 945 | 425 | 1245 | 600 | 1020 | 375 |
| | 6 | 1270 | 870 | 1005 | 605 | 1360 | 815 | 1095 | 550 |
| 100 | 2 | 1620 | 1120 | 1280 | 780 | 1710 | 1060 | 1370 | 715 |
| | 4 | 2065 | 1565 | 1615 | 1115 | 2180 | 1485 | 1735 | 1035 |
| | 6 | 2390 | 1890 | 1860 | 1360 | 2510 | 1815 | 1980 | 1285 |
| 112 M, MB | 2 | 1615 | 1115 | 1275 | 775 | 1725 | 1040 | 1385 | 700 |
| | 4 | 2060 | 1560 | 1610 | 1110 | 2210 | 1460 | 1110 | 1010 |
| | 6 | 2385 | 1885 | 1860 | 1360 | 2540 | 1785 | 2010 | 1260 |
| 132 M, MA | 4 | 2245 | 1645 | 1760 | 1160 | 2460 | 1505 | 1970 | 1015 |
| | 6 | 2595 | 1980 | 2025 | 1425 | 2815 | 1850 | 2245 | 1280 |
| 132 MC | 6 | 2580 | 1980 | 2010 | 1410 | 2885 | 1780 | 2315 | 1210 |
| 132 S | 6 | 2600 | 2000 | 2030 | 1435 | 2780 | 1885 | 2210 | 1315 |
| 132 SB | 2 | 1760 | 1160 | 1400 | 800 | 1910 | 1075 | 1540 | 705 |
| 160 | 2 | 4160 | 4160 | 3425 | 3425 | 4560 | 3810 | 3860 | 3110 |
| | 4 | 4740 | 4740 | 3920 | 3920 | 5260 | 4310 | 4440 | 3490 |
| | 6 | 4840 | 4840 | 4000 | 4000 | 5400 | 4420 | 4540 | 3560 |
| 180 | 2 | 5480 | 5480 | 4600 [1] | 4600 [1] | 5920 | 5115 | 5060 [1] | 4255 [1] |
| | 4 | 4360 | 4360 | 3540 | 3540 | 5080 | 3860 | 4240 | 3020 |
| | 6 | 5980 | 5980 | 4940 | 4630 | 6000 | 5445 | 5600 | 4385 |
| 200 | 2 | 5000 | 6880 | 5000 [2] | 5700 [2] | 5000 | 6350 | 5000 [2] | 5230 [2] |
| | 4 | 5000 | 7660 | 5000 | 6340 | 5000 | 6950 | 5000 | 5650 |
| | 6 | 5000 | 8300 | 5000 | 6880 | 5000 | 7505 | 5000 | 6025 |
| 225 | 2 | 5000 | 7380 | 5000 [3] | 6120 [3] | 5000 | 6770 | 5000 [3] | 5490 [3] |
| | 4 | 5000 | 7600 | 5000 | 6220 | 5000 | 6795 | 5000 | 5475 |
| | 6 | 5000 | 10140 | 5000 | 8420 | 5000 | 9270 | 5000 | 7490 |
| 250 | 2 | 6000 [4] | 9020 [4] | 6000 [4] | 7500 [4] | 6000 [4] | 8335 [4] | 6000 [4] | 6755 [4] |
| | 4 | 6000 | 9800 | 6000 | 8040 | 6000 | 8820 | 6000 | 7120 |
| | 6 | 6000 | 11520 | 6000 | 9520 | 6000 | 10 275 | 6000 | 8235 |

[1] The maximum lifetime of the grease is 38 000 h

[2] The maximum lifetime of the grease is 27 000 h

[3] The maximum lifetime of the grease is 23 000 h

[4] The maximum lifetime of the grease is 16 000 h

# Terminal box

## Standard terminal box

### Protection and mounting

The degree of protection of the standard terminal-box is IP55 or IP65 depending on the equipment protection level and dust category. It complies with the requirements of the protection methods ‘Ex ec’ and 'Ex t' and prevents all ignition sources such as sparks, excessive over heating etc. All terminal box seals are of uninterrupted type fulfilling the requirements for Ex ec and Ex t motors. By default, terminal boxes are mounted on top of the motor at D-end.

### Turnability

The terminal box of motors in size 90-180 are integrated with the frame which means that the box itself cannot be rotated. There are however cable entries both on RHS and LHS to allow cabling from either side. Motors in size 200-250 have a terminal box made of casted aluminum mounted on top of the stator, the box itself cannot be rotated but there are two openings, one on RHS and another on LHS of the box allowing cable entry from both sides.

### Sizes 90–180

The terminal box is made of aluminum alloy and is located on top of the stator. The lower part of the box is integrated with the stator. It is provided with two knockout openings on each side. Sizes 160–180 also have a third smaller opening. Cable glands are not included.

### Sizes 200–250

The terminal box and cover are made of aluminum and mounted on top of the stator. The box is bolted to the stator and is not rotatable. The size of the box is the same for all frame sizes. Cable glands are not supplied. The opening on the other side is provided with a Ex (ATEX) certified plugs.

The motors can also be provided with an extralarge terminal box, standard for voltage code S and frame size 280. See variant code 019 under the heading “Terminal box”. This will increase the dimension HD by 32 mm. The box is supplied with two FL 21 openings. The right opening is provided with a flange with two holes for M63 cable glands. The holes are sealed by means of plastic plugs. Cable glands are not supplied. The opening onthe other side is provided with a cover flange. The box can also be provided with an FL 13 opening towards the N-end.

When new motors are manufactured the terminal box can be mounted on the left or the right side. See variant codes 021 and 180 under the heading “Terminal box”.

In the basic design the terminal box is provided with twoFL 13 flange openings, one on each side. The opening on the right side, seen from the D end, is supplied with a flange with two holes for M40 cable glands. On delivery the holes are sealed by means of plastic plugs. Cable glands are not supplied. The opening on the other side is provided with a cover flange.

### Cable entries

Terminal box is provided as standard with plugged holes for cable glands, no cable glands are included as standard, the knockout entry holes and cable flange holes are closed with Ex (ATEX) approved blanking plugs.

## Connection openings

Terminations are suitable for copper cables. Cables are connected to terminals by cable lugs, the lugs are not included in the delivery.

| Motor size | Opening | Metric cable entry | Method of connection | Terminal bolt size | Maximum connectable Cu-cable area, mm² |
|---|---|---|---|---|---|
| 90–112 | Knock-out opening | 2 x (M25 + M20) | Screw terminal | M4 | 6 |
| 132 | Knock-out opening | 2 x (M25 + M20) | Cable lug | M5 | 10 |
| 160–180 | Knock-out opening | 2 x (2 x M40) + M16 | Cable lug | M6 | 35 |
| 200–250 | Knock-out opening | 2x (2x M40 +2xM16) or 2x (2x M63 +2xM16) | Cable lug | M10 | 70 |

## Earthing bolts

The motors are as standard provided with at least one earthing bolt inside the terminal box and another on the frame. The earthing bolt on the frame is located on top close to the terminal box.

| Motor size | Earthing on frame | Earthing in terminal box |
|---|---|---|
| 90–100 | – | M4 (use self tapping screw) |
| 112 | – | M5 (use self tapping screw) |
| 132 | – | M5 (use self tapping screw) |
| 160–180 | – | M6 (use self tapping screw) |
| 200–250 | – | - |

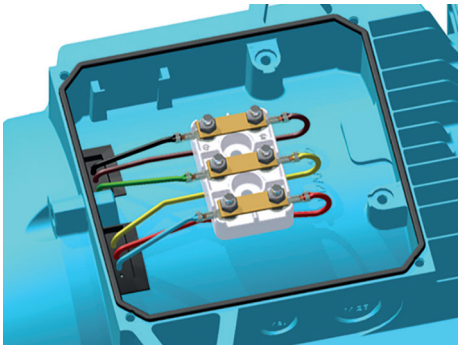
# Terminal box

## Terminal boxes and boards

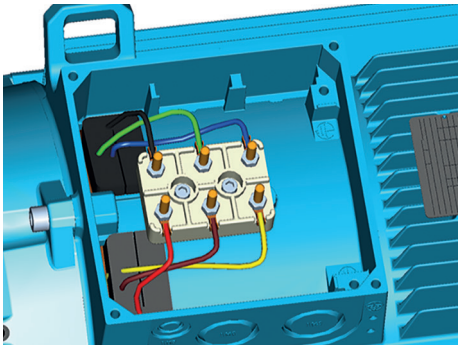
—
01 Terminal box size 90-132

02 Terminal box size 160 and 180

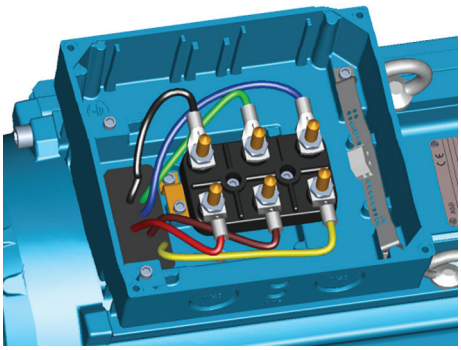
03 Terminal box size 200-250



01



02

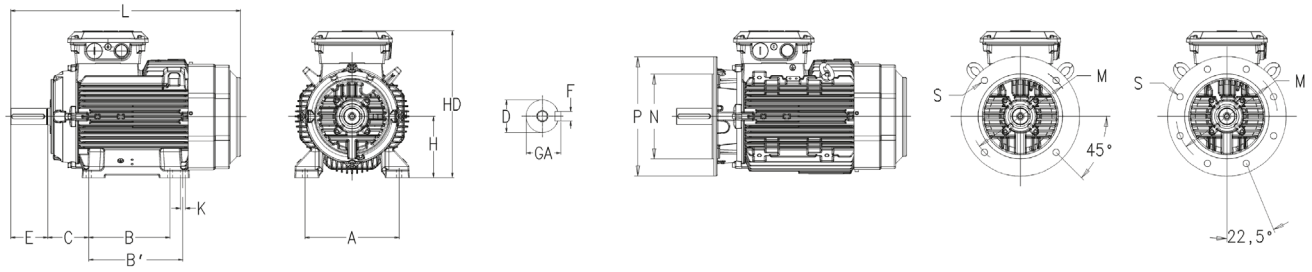


03

| Motor size | Plugged cable entry | Terminal bolt size | Maximum connectable Cu-cable area, $mm^2$ |
|---|---|---|---|
| 90-112 | 2 x (M25 + M20) | 6 x M4 (screw) | 6 |
| 132 | 2 x (M25 + M20) | 6 x M5 | 10 |
| 160, 180 | 2 x (2 x M40) + M16 | 6 x M6 | 35 |
| 200-250 | 2x (2x M40 +2xM16) or 2x (2x M63 +2xM16) | 6 x M10 | 70 |

# Dimension drawings

## Aluminum Ex ec & Ex t motors




### Foot-mounted motor IM1001, B3 and flange-mounted motor IM3001, B5

| Motor size | Poles | D | GA | F | E | L max | A | B | B' | C | HD | H | K | M | N | P | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | 2-6 | 24 | 27 | 8 | 50 | 336.5 | 140 | 125 | - | 56 | 217 | 90 | 10 | 165 | 130 | 200 | 12 |
| 100 | 2-6 | 28 | 31 | 8 | 60 | 437 | 160 | 140 | - | 63 | 237 | 100 | 12 | 215 | 180 | 250 | 15 |
| 112 | 2-6[1)] | 28 | 31 | 8 | 60 | 436 | 190 | 140 | - | 70 | 260 | 112 | 12 | 215 | 180 | 250 | 15 |
| 112 | 4[2)] | 28 | 31 | 8 | 60 | 482 | 190 | 140 | - | 70 | 260 | 112 | 12 | 215 | 180 | 250 | 15 |
| 132 | 2-6[1)] | 38 | 41 | 10 | 80 | 492 | 216 | 140 | 178 | 89 | 298 | 132 | 12 | 265 | 230 | 300 | 14.5 |
| 160 | MLA 2-6, MLB2 | 42 | 45 | 12 | 110 | 584 | 254 | 210 | 254 | 108 | 370 | 160 | 15 | 300 | 250 | 350 | 19 |
| 160 | MLB 4-6, MLC 2-6, MLD 2-4 | 42 | 45 | 12 | 110 | 681 | 254 | 210 | 254 | 108 | 370 | 160 | 15 | 300 | 250 | 350 | 19 |
| 180 | 2-6 | 48 | 51.5 | 14 | 110 | 726 | 279 | 241 | 279 | 121 | 405 | 180 | 15 | 300 | 250 | 350 | 19 |
| 200 | 2-6 | 55 | 59 | 16 | 110 | 821 | 318 | 267 | 305 | 133 | 506 | 200 | 18 | 400 | 350 | 400 | 19 |
| 225 | 2 | 55 | 59 | 16 | 110 | 850 | 356 | 286 | 311 | 149 | 533 | 225 | 18 | 400 | 350 | 450 | 19 |
| 225 | 4-6 | 60 | 64 | 18 | 140 | 880 | 356 | 286 | 311 | 149 | 533 | 250 | 18 | 400 | 350 | 450 | 19 |
| 250 | 2 | 60 | 64 | 18 | 140 | 884 | 406 | 311 | 349 | 168 | 601 | 250 | 22 | 500 | 450 | 550 | 19 |
| 250 | 4-6 | 65 | 69 | 18 | 140 | 884 | 406 | 311 | 349 | 168 | 601 | 250 | 22 | 500 | 450 | 550 | 19 |

[1)] 1) all types except, [2)]4p 5,5kW (HO), [3)]2p 11/15kW (HO)

### IMB14 (IM3601)

| Motor size | M | N | P | S | Tolerances: | | Tolerances: | |
|---|---|---|---|---|---|---|---|---|
| 90 | 115 | 95 | 140 | 8 | A, B | ISO js14 | F | ISO h9 |
| 100 | 130 | 110 | 160 | 8 | C | ± 0,8 | H | -0,5 |
| 112 | 130 | 110 | 160 | 8 | D | ISO k6 < Ø 48mm | N | ISO j6 |
| 132 | 165 | 165 | 200 | 10 | | ISO m6 > Ø 48mm | | |

| Tolerances: | | Tolerances: | |
|---|---|---|---|
| A, B | ± 0,8 | F | ISO h9 |
| D | ISO j6 < Ø 28 mm | H | -0,5 |
| | ISO k6 < Ø 38 mm | N | ISO js6 |
| | ISO m6 > Ø 55 mm | C | ± 0,8 |

The tables give the main dimensions in mm.

For detailed drawings please see our web-pages or contact ABB.

# Certificate examples

01 EU Declaration of Conformity

02 EU Type Examination certificate

03 IECEx Certificate of Conformity

04 IECEx Certificate of Conformity

ABB

## EU Declaration of Conformity

**The products:** 3-phase induction motors for potentially explosive atmospheres as listed in this document on the pages 2…3 having correspondent name plate markings covered by those as listed.

**The Manufacturer:**

ABB Oy
Motors and Generators
P.O. Box 633
Strömbergin Puistotie 5A
FIN - 65101 Vaasa, Finland

ABB Sp.z.o.o
27 Placydowska Str.
PL-95-070 Aleksandrow Lodzki
Poland

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration described above are in conformity with the relevant Union harmonization legislation:

**Directive 2014/34/EU**
The following harmonized standards are applied in relation to which conformity is declared: EN 60079-0/A11:2013[2], EN 60079-1:2014[2], EN 60079-7:2015, EN 60079-31:2014[1] and relevant parts of the EN 60034 –series of standards.

**Directive 2009/125/EC**
The motors that are marked as IE2, IE3 or IE4 are in conformity with the requirements set in the Commission Regulation (EC) No. 640/2009 and the amending Regulation (EU) No. 4/2014.

**Directive 2011/65/EU**
Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

**Notes:**

Motors shall be installed and maintained according to the relevant standards and instructions of ABB Oy, Motors and Generators. When installed in converter supplied applications, additional requirements must be respected regarding the motor as well as the installation as described in the appropriate dedicated addendum

The conformity of the incorporation into a finished product according to the Directive 2006/42/EC shall be established by the commissioning party when a motor is fitted to the machinery.

**Notified Bodies** (ExNB): LCIE (0081), Av. Du Général Leclerc. 33, 92266 Fontenay-aux-Roses, France,
VTT Expert Services Ltd (0537), Otakaari 7B, 02044 Espoo, Finland
UL International Demko A/S (0539), Borupvang 5A, 2750 Ballerup, Denmark

Signed for and on behalf of: ABB Oy, Motors and Generators
Place and date of issue: Vaasa, Finland, 2019-09-04

Harri Mykkänen
Vice President

3GZF500930-309L

01

IECEx

## IECEx Certificate of Conformity

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**
**IEC Certification System for Explosive Atmospheres**
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx EESF 20.0036X** Page 1 of 4 Certificate history:
Status: **Current** Issue No: 0
Date of Issue: 2021-04-29
Applicant: **ABB Oy, IEC LV Motors**
Strömbergin Puistotie 5A
VAASA 65100
**Finland**
Equipment: **Range of cage induction motors; types M3AA 90…, M3AA 100…, M3AA 112…, M3AA 132…, M3AA 160…, M3AA 180…, M3AA 200…, M3AA 225…, M3AA 250…, and M3AA 280…**
Optional accessory:
Type of Protection: **Ex ec, Ex tb and Ex tc**
Marking: Ex ec IIB/IIC T3 Gc
Ex tb IIIB/ IIIC T125°C Db or
Ex tc IIIB/ IIIC T125°C Dc

Approved for issue on behalf of the IECEx Certification Body: **Kari Koskela**
Position: **Senior Expert**
Signature: (for printed version)
Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:
**Eurofins Expert Services Oy**
**Kivimiehentie 4**
**FI-02150 Espoo**
**Finland**

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03

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**EESF 20 ATEX 074X**
Page 1 of 3

1. **EU-TYPE EXAMINATION CERTIFICATE**
2. **Equipment or Protective System Intended for use in Potentially explosive atmospheres Directive 2014/34/EU**
3. EU-Type Examination Certificate Number: **EESF 20 ATEX 074X**
4. Product: **Range of cage induction motors**
   Certified types: **M3AA 90…, M3AA 100…, M3AA 112…, M3AA 132…, M3AA 160…, M3AA 180…, M3AA 200…, M3AA 225…, M3AA 250…, and M3AA 280…**
5. Manufacturer: **ABB Oy, IEC LV Motors**
6. Address: **Strömbergin puistotie 5A, FI-65320 Vaasa, Finland**
   Additional manufacturing locations:
   **ABB Sp.z.o.o, ul. Placydowska, 95-070 Aleksandrow Lodzki, Poland**
   **ABB Logistics Center Europe GmbH, Bräuckerweg 132, 58708 Menden, Germany**
7. This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
8. Eurofins Expert Services Oy, Notified Body number 0537, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
   The examination and test results are recorded in confidential report No. EUFI29-20005204-T1.
9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
   **EN IEC 60079-0:2018 EN 60079-31:2014**
10. If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.
11. This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
12. The marking of the product shall include the following:
    **II 2D Ex tb IIIB or IIIC T125°C Db**

Espoo, 29.04.2021
**Eurofins Expert Services Oy**

Kari Koskela
Senior Expert

Jenni Hirvelä
Senior Expert

This document is digitally signed.

FINAS Finnish Accreditation Service S017 (EN ISO/IEC 17065)

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Eurofins Expert Services Oy, Kivimiehentie 4, FI-02150 Espoo, Finland
www.eurofins.fi/expertservices

02

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**EESF 20 ATEX 073X**
Page 1 of 3

1. **TYPE EXAMINATION CERTIFICATE**
2. **Equipment or Protective System Intended for use in Potentially explosive atmospheres Directive 2014/34/EU**
3. Type Examination Certificate Number: **EESF 20 ATEX 073X**
4. Product: **Range of cage induction motors**
   Certified types: **M3AA 90…, M3AA 100…, M3AA 112…, M3AA 132…, M3AA 160…, M3AA 180…, M3AA 200…, M3AA 225…, M3AA 250…, and M3AA 280…**
5. Manufacturer: **ABB Oy, IEC LV Motors**
6. Address: **Strömbergin puistotie 5A, FI-65320 Vaasa, Finland**
   Additional manufacturing locations:
   **ABB Sp.z.o.o, ul. Placydowska, 95-070 Aleksandrow Lodzki, Poland**
   **ABB Logistics Center Europe GmbH, Bräuckerweg 132, 58708 Menden, Germany**
7. This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
8. Eurofins Expert Services Oy, Certification Body No. S017 accredited by the Finnish Accreditation Service (FINAS), certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive 2014/34/EU of February 2014.
   The examination and test results are recorded in confidential report No. EUFI29-20005204-T1.
9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
   **EN IEC 60079-0:2018 EN IEC 60079-7:2015/A1:2018 EN 60079-31:2014**
10. If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.
11. This Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
12. The marking of the product shall include the following:
    **II 3G Ex ec IIB or IIC T3 Gc**
    **II 3D Ex tc IIIB or IIIC T125°C Dc**

Espoo, 29.04.2021
**Eurofins Expert Services Oy**

Kari Koskela
Senior Expert

Jenni Hirvelä
Senior Expert

This document is digitally signed.

FINAS Finnish Accreditation Service S017 (EN ISO/IEC 17065)

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Eurofins Expert Services Oy, Kivimiehentie 4, FI-02150 Espoo, Finland
www.eurofins.fi/expertservices

04

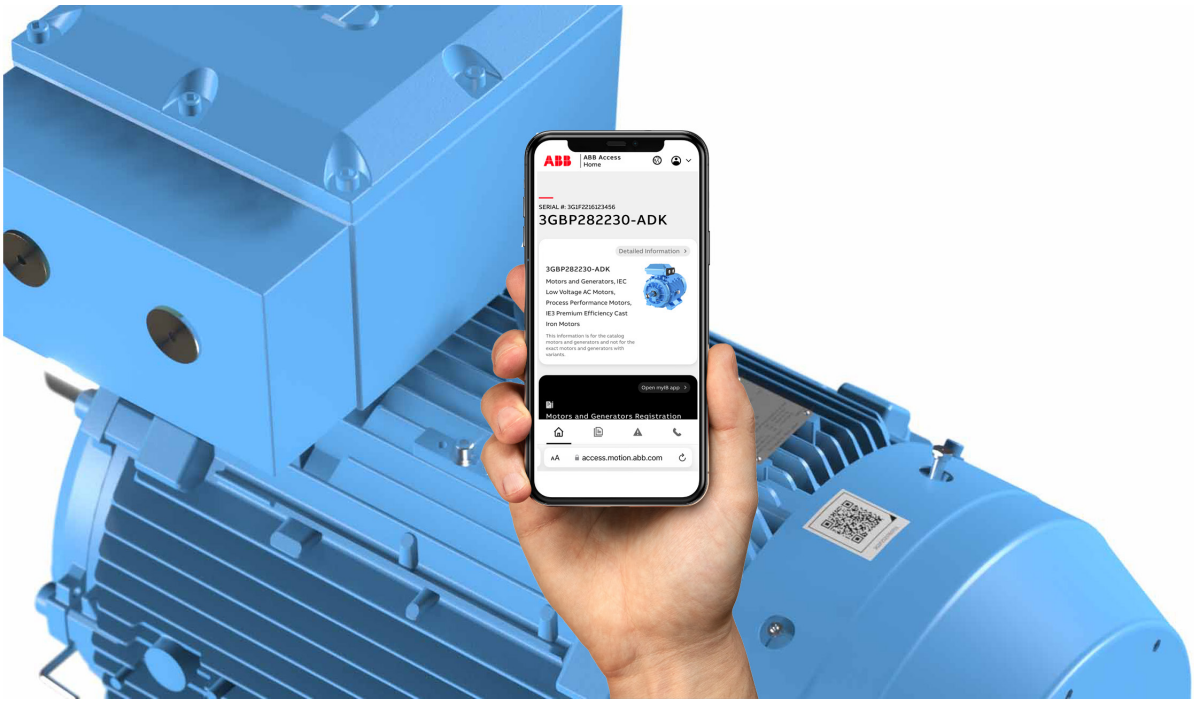
# Motors in brief

## Aluminum Ex ec & Ex t motors

| Motor size | | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stator frame | Material | Die-cast aluminum alloy | | | | | | | | |
| | Paint colour shade | Minsell blue 8B 4.5/3.25 | | | | | | | | |
| | Corrosion class | C3 | | | | | | | | |
| Feet | Material | Integrated aluminum feet | | | | Separate aluminum feet | | Separate cast iron feet | | |
| End shields | Material | Die-cast aluminum alloy | | | | Cast iron | | | | |
| Bearings | D-end | 6205-2RSH/C3 | 6306-2RS1/C3 | 6306-2RS1/C3 | 6208-2RS1/C3 | 6309-2Z/C3 | 6310-2Z/C3 | 6312-2Z/C3 | 6313-2Z/C3 | 6315-2Z/C3 |
| | N-end | 6204-2RSH/C3 | 6205-2RSH/C3 | 6205-2RSH/C3 | 6206-2RS1/C3 | 6209-2Z/C3 | 6209-2Z/C3 | 6210-2Z/C3 | 6212-2Z/C3 | 6213-2Z/C3 |
| Axially-locked bearings | | Locked at D-end | | | | | | | | |
| Bearing seal | D-end | Gamma ring | | | | | | | | |
| | N-end | Gamma ring | | | | | | | | |
| Lubrication | | Permanently lubricated shielded bearing | | | | | | | | |
| Measuring nipples for condition monitoring of the bearings | | Not included | | | | | | | | |
| Rating plate | Material | Aluminum | | | | | | | | |
| Terminal box | Frame and cover | Die-cast aluminum alloy, integrated in stator | | | | | | Die-cast alumi-num alloy | | |
| | Corrosion class | C3 | | | | | | | | |
| | Cover screws material | Zinc-electroplated steel | | | | | | | | |
| Connections | Openings | 2x(M20+M25) | | | | 2x(2xM40+M16) | | | | |
| | Blank with Ex plugs | | | | | | | 2x (2xM40+2xM16) or 2x (2xM63+2xM16) | | |
| | Terminals | 6 terminals | | | | | | | | |
| | Cable glands | Optional | | | | | | | | |
| Fan | Material | Light alloy metal fan | | | | | | | | |
| Fan cover | Material | Steel | | | | | | | | |
| | Paint colour shade | Munsell blue 8B 4.5/3.25 | | | | | | | | |
| | Corrosion class | C3 | | | | | | | | |
| Stator winding | Material | Copper | | | | | | | | |
| | Insulation | Insulation class F | | | | | | | | |
| | Winding protection | 3 PTC thermistors, 150 °C | | | | | | | | |
| Rotor winding | Material | Die cast aluminum | | | | | | | | |
| Balancing method | | Half key balancing | | | | | | | | |
| Key way | | Closed key way | | | | | | | | |
| Drain holes | | Drain holes with closable plastic plugs, closed for IP55 and IP65 | | | | | | | | |
| External earthing bolt | | As standard | | | | | | | | |
| Enclosure | | IP55 or IP65 | | | | | | | | |
| Cooling method | | IC411 | | | | | | | | |

# Total product offering

## ABB Access




With ABB Access, you can unlock all aspects of your drives, motors or PLCs, from one central location, the palm of your hand.

**Simply scan the QR code on the ABB product to get started**

ABB Access helps you easily find up-to-date product online data. It also provides easy access to documentation and manuals. If you happen to experience issues with your ABB product, this can be fastly and easily reported online to reach expert support from ABB.

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- Documentation - Quick Access to user manuals and step-by-step instructions
- Report issues - Fast Access to online issue reporting
- Contact - Access ABB contacts and search Channel partners

# Motors and generators with a complete portfolio of services

**IEC motors**

- Low voltage motors
- High voltage induction and synchronous motors
- Marine motors
- Motors for explosive atmospheres
- Motors for food and beverage
- Motors for variable speed drives
- Permanent magnet motors
- Synchronous reluctance motors
- Traction motors

**NEMA motors**

- Low voltage motors
- High voltage induction and synchronous motors
- Marine motors
- Motors for explosive atmospheres
- Motors for variable speed drives
- Permanent magnet motors
- Servomotors
- Washdown motors

**Generators**

- Generators for wind turbines
- Generators for diesel and gas engine power plants
- Generators for steam and gas turbine power plants
- Generators for marine applications
- Generators for industrial applications
- Generators for traction applications
- Synchronous condensers for reactive power compensation

**Life cycle services**

# ABB's portfolio of drives

## Optimal solution for you

Being able to rely on the continuous high performance and efficiency of your operations is something you want to take for granted. ABB variable-frequency drives are made with all this in mind, established upon more than 40 years of experience and backed by a broad range of life cycle services.

ABB drives help you to optimize your processes and systems with state-of-the-art motor control technology, resulting in increased energy efficiency, better product quality, and reduced operating costs with higher output, less downtime, and reduced need for maintenance. All ABB drives are designed for easy selection, ordering, installation and use, and they offer integrated safety features, giving you more time to focus on what matters for you and your business.

Our portfolio offers low-voltage AC and DC drives, medium-voltage AC drives, and motion control drives spanning the fractional-kilowatt to multi-megawatt power level. There is a drive available for essentially every industry and application and for all types of motors, in environments ranging from water utility facilities to clean electrical rooms, and to harsh coal mines and windy offshore platforms to food and beverage production. This wide product range allows you to select the best-fitting drive solution, providing maximum reliability and efficiency for every need.

For more information and contact details:

**www.abb.com/motors&generators**

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