

CATALOG | JUNE 2023

Low voltage

IE5 Synchronous reluctance
Increased Safety motors



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

Low voltage IE5 Synchronous reluctance Increased Safety motors

Sizes 132 to 315, 5.5 to 315 kW

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IE5 SynRM Increased safety motors

Introduction to explosive atmospheres

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 fulfil 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.

According to the regulations, low voltage motors for explosive atmospheres are exempted from the Low Voltage Directive, the EMC Directive and the Machinery Directive.

IECEx System

The IECEx System is a certification system which verifies compliance with IEC (International Electrotechnical Commission) standards 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. The voluntary and international aspects of the IECEx System differentiate it from certification under ATEX, for example, which is mandatory but applies only within the European Economic Area.

The IECEx System comprises global certification programs for both equipment and service facilities.

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.

In addition, IECEx has established a comprehensive set of operational documents and procedures to develop a single internationally standardized approach to Ex testing and certification.



The approach includes:

- A standardized “IECEx way of Ex Testing and Certification”. There is a single set of operational procedures, and Ex test procedures are always applied in the same way.
- A dedicated Technical and Operational Secretariat to maintain operations. Ex test procedures are evaluated and monitored on a centralized basis.

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).

Type testing of product samples is performed on behalf of the ExCB by an IECEx Assessment and Testing Laboratory (ExTL). On completion of its work the ExTL’s assessment engineer prepares an IECEx Test Report (ExTR).

The ExTR is then submitted to the ExCB for endorsement. Based on the QAR and ExTR, the ExCB then issues the Certificate of Conformity (CoC). The CoC provides internationally accepted verification that the equipment in question is in compliance with the relevant IEC standards. Once formally issued by the ExCB, both the ExTR and QAR are registered on the IECEx Internet site. This provides verification that an ExTR and QAR exist for the product and manufacturer.

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.

IECEx certification is particularly useful in certain markets. In Australia, New Zealand, and Singapore, for example, IECEx certificates are accepted, but not all IEC certificates are accepted. Certain other countries, including Russia, China and Korea, are prepared to accept ExTRs as a basis for their own national certificates. There are also many countries that are willing to accept products covered by current IECEx certificates, even though the countries in question are not members of the IECEx Management Framework.

Benefits of IECEx System for end users

A significant advantage of IECEx is that vendor certificates are available for inspection on the IECEx website. End users can therefore confirm the validity of IECEx certificates at any time - which is not possible with ATEX, for example. This increases end user confidence that the motor vendor will be committed to maintaining the necessary quality systems.

Under the quality based IECEx certification approach the interpretation of the standard is shared throughout the 30 participating countries and individual interpretations by Notified Bodies are not allowed. Another advantage of IECEx is that the Certificate of Conformity also covers EPL (equipment protection level) “c”, see table on next page.

Compliance on basis of recently updated standards

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

* Moved to IEC/EN 60079-7 in 2015 revision.

Equipment Protection Level (EPL)

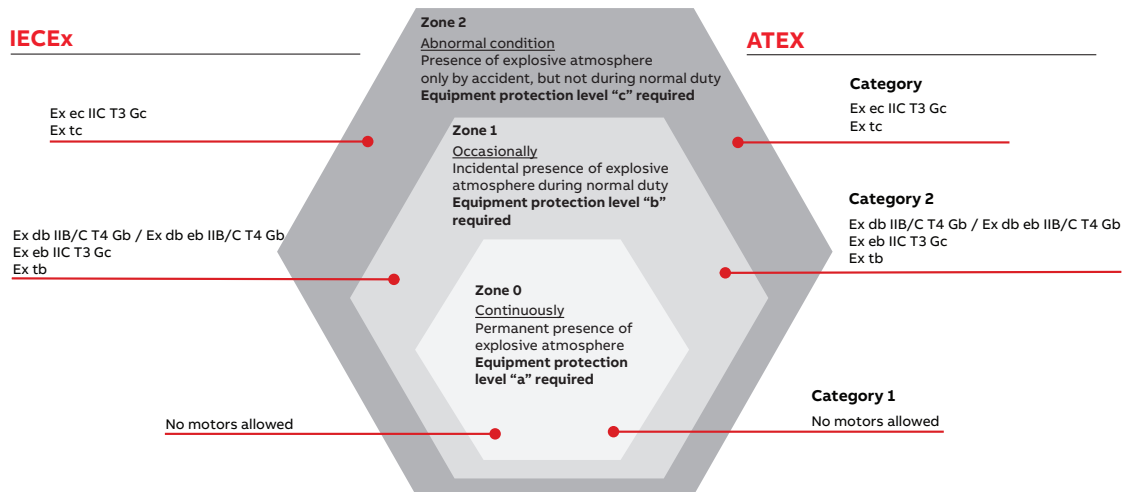
The latest revisions of the IEC and EN standards introduce the concept of “equipment protection levels”, which identify products according to the ignition risk they might cause. A motor’s EPL therefore indicates its inherent ignition risk, regardless of its protection type. This makes the selection of 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.

New markings introduced

Further have also several levels of protection been introduced in edition 7 of IEC/EN 60079-1 for flame proof protection. These two changes does affect the markings used both flameproof, increased safety and non-sparking equipment for group II as shown in table below.

Old way of marking	Old protection method	New way of marking	New protection method	Zone	ATEX category
Ex nA IIC T3 Gc	Non-sparking	Ex ec IIC T3 Gc	Increased safety	2	3G
Ex d IIB/C T4 Gb	Flameproof	Ex db IIB/C T4 Gb	Unchanged	1 (or 2)	2G
Ex de IIB/C T4 Gb	Flameproof and increased safety	Ex db eb IIB/C T4 Gb	Unchanged	1 (or 2)	2G

Zones - 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”) or dust (“D”).

Classification of explosive atmospheres according to CENELEC and IEC

The following standards define areas according to the presence of gas or dust in the atmosphere:

- IEC/EN 60079-10-1 Gas
- IEC/EN 60079-10-2 Dust

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 (Mines)	Ma Mb	very high high	NA	I (Mines)	M1 M2	NA
II (Gas)	Ga Gb Gc	very high high enhanced	0 1 2	II (Surface)	1G 2G 3G	NA Ex db, Ex db eb, Ex eb Ex ec
III Dust	Da Db Dc	very high high enhanced	20 21 22		1D 2D 3D	NA Ex tb IP 65 Ex tc IP 65/IP 55

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).

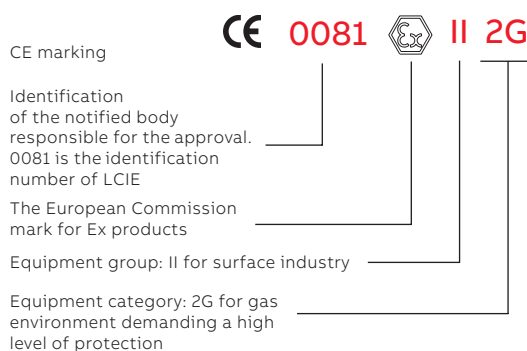
Classification

Gas classification

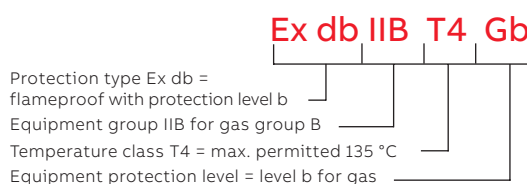
Temperature class	Ignition temp. of gas/ vapor °C	Max. permutet temp. of equipment °C	Gas examples
T1	> 450	450	Hydrogen
T2	> 300 < 450	300	Ethanol
T3	> 200 < 300	200	Hydrogen sulfide
T4	> 135 < 200	135	Diethyl ether
T5	> 100 < 135	100	-
T6	> 85 < 100	85	Carbon disul- fide

Marking of equipment protection for gas according to ATEX

CE Conformity marking



Equipment protection marking for gas:



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 H ₂ / acetylene C ₂ H ₂ carbon disulfide CS ₂

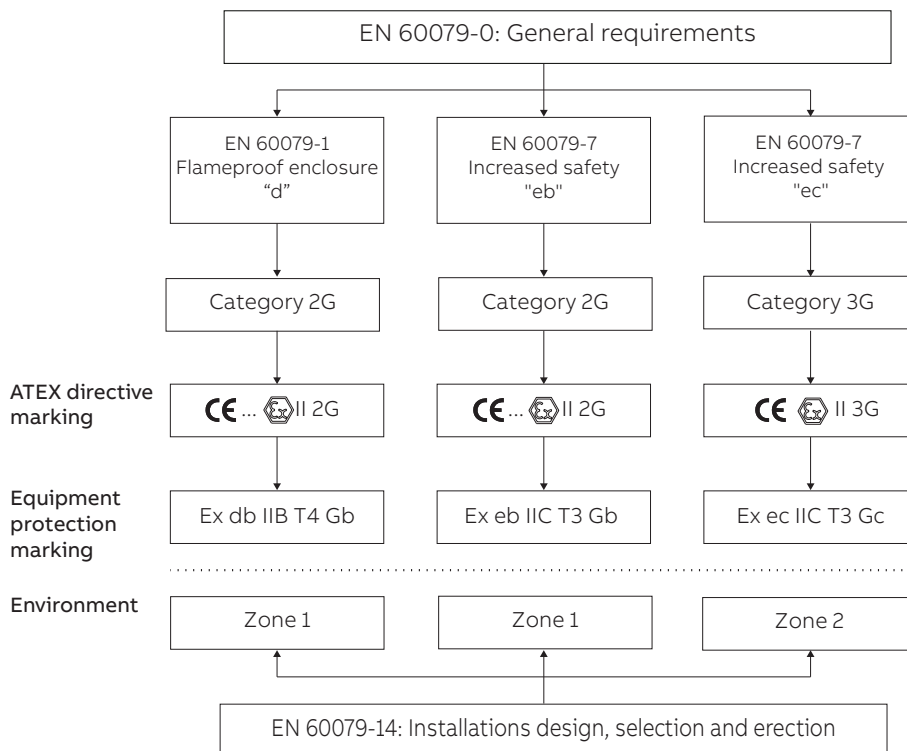
Marking of equipment protection for gas according to IEC

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

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

Increased safety design, Ex eb for Zone 1

The design of this motor type prevents the occurrence in operation (including starting and locked rotor situations), in all inner and outer parts of the machine, 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 nowadays 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 certification 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 flame-proof, 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 $-20\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$ according to standards. For ambient temperatures below $-20\text{ }^{\circ}\text{C}$ and above $+40\text{ }^{\circ}\text{C}$ 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.

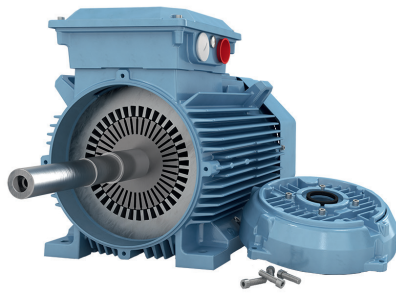
There is number of countries which according to their local regulations require a specific certificate for equipment installed in explosive atmospheres, examples of such certificates are:

- China Compulsory Certificate mark, also known as CCC mark
- cULus for Canada and the United States by Underwriters Laboratories

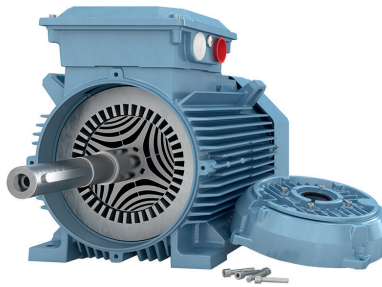
ABB is maintaining a wide selection of local certificates for the different products, please refer to the variant code section for each product for information about availability. The marking of the products certified according a specific local certification system is usually differing from the ATEX 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.

Introduction to Synchronous Reluctance technology

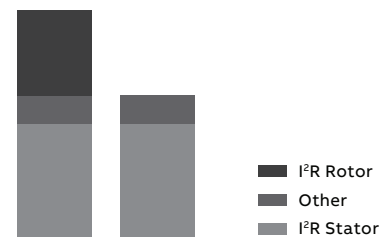
Synchronous reluctance motors - Ultimate efficiency and reliability to optimize your cost of ownership



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 necessary 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

This is important if you are planning on using the motor with applications other than quadratic torque applications like pumps and fans. Our drives provide full SynRM motor control for constant torque applications such as extruders, conveyors and wire drawing machines.

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.

Introduction to Synchronous Reluctance technology

Product features

Efficiency & MEPS

International minimum efficiency performance standards (MEPS) for measuring the efficiency of VSD-only types of motors - such as synchronous reluctance motors - are under development. No local MEPS efficiency requirements for VSD-only motors have been issued by September 2022.

Service

Servicing synchronous reluctance motors is as straightforward as with induction motors. The winding technology is identical to induction motors. The rotor does not include any magnetic materials, which means that the motor can be disassembled and serviced using the same procedure as for conventional induction motors. For test runs, SynRM capable frequency converter is needed.

Insulation protection

Synchronous reluctance motors have the same stator winding insulation as other ABB low voltage motors. The insulation is approved for 500 V VSD supply. For voltages above 500 V, follow ABB's instructions regarding the correct insulation system and the output filters of the drive.

Bearing currents

Synchronous reluctance motors rated above 100 kW are equipped with one insulated bearing as standard, which together with the correct cabling is sufficient to secure trouble-free operation up to 350 kW. Above 350 kW the drive should be equipped with a common-mode filter as an additional measure.

Cabling, grounding, and EMC

Synchronous reluctance motors are not equipped with EMC filters as standard. The variant code to order EMC cable glands is +704.

The use of a frequency converter sets higher demands on the cabling and grounding of the drive system. In other than exceptional circumstances, the motor must be cabled with shielded symmetrical cables and cable glands providing 360-degree bonding (EMC glands). For motors up to 30 kW, asymmetrical cables can be used, but shielded cables are always recommended, especially if there are sensitive components in the driven application.

For motors from frame size 280 upwards, additional potential equalization is needed between the motor frame and machinery, unless the motor and the driven machine are installed on a common steel base. When a steel base is used for potential equalization, the high frequency conductivity of the connection must be checked. For more information, see the ABB manual "Grounding and cabling of drive systems", 3AFY61201998 Rev C.

To meet EMC requirements, special EMC cables must be used in addition to the correct cable gland mounting, with additional special earthing pieces. For more information, refer to drive manuals.

Introduction to Synchronous Reluctance technology

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)	Eff. (110 kW/ (110 + 5,25 kW)
= 96,3%	= 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

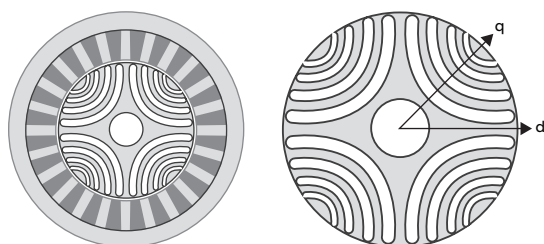
Technology

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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)

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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01

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 di-

rect-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 industry applications such as compressors, conveyors, mixers, pumps and fans, as well as many other linear, variable and constant torque applications.
- The assistant control panel with multiple language choices as standard.
- An optional Bluetooth control panel for wireless commissioning and monitoring. Primary settings and application control macros ensure quick product setup.
- Enclosure IP55 for harsh conditions.
- Supports various motor types: induction, permanent magnet, and synchronous reluctance motors.
- Integrated safety, including the safe-torque off (STO) feature as standard.
- Supports various motor types: induction, permanent magnet, and synchronous reluctance motors.

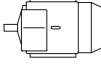
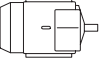
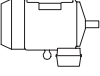
Industry specific ACH580 drives for HVAC and ACQ580 drives for water and wastewater are also available for SynRM control. Consult ABB to find the drive that matches your business needs the best or visit our web page [www.new.abb.com/drives](https://new.abb.com/drives).

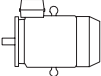
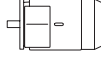
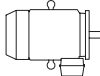
ACS880 industrial drive highlights

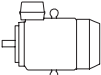
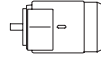
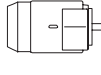
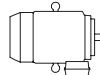
- All compatible drives range for numerous demanding industries and applications such as cranes, extruders, winches, winders, conveyors and compressors, among others.
- Compact design for easy installation, commissioning, and maintenance.
- Enclosure classes IP21, IP22, IP42, IP54 and IP55 for various 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, permanent 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.

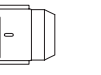
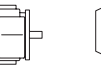
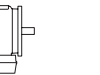
Consult ABB to find the drive that matches your business needs the best or visit our web page <https://new.abb.com/drives>.

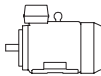
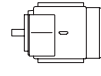
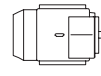
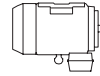
Mounting arrangements

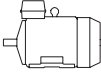
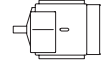
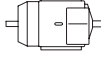
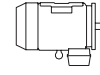
Foot-mounted motor						Product code pos. 12
Code I / code II						A: foot-mounted, term. box top R: foot-mounted, term. box RHS L: foot-mounted, term. box LHS
						
IM B3	IM V5	IM V6	IM B6	IM B7	IM B8	
IM 1001	IM 1011	IM 1031	IM 1051	IM 1061	IM 1071	

Flange-mounted motor, large flange						Product code pos. 12
Code I / code II						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						Product code pos. 12
Code I / code II						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						Product code pos. 12
Code I / code II						H: foot/flange-mounted, term. box top S: foot/flange-mounted, term. box RHS T: foot/flange-mounted, term. box LHS
						
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						Product code pos. 12
Code I / code II						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						Product code pos. 12
Code I / code II						
						
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.

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	
Running number	

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 arrangement	

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

1	ABB		ABB Oy, Motors and Generators Strömbergin puistotie 5 A 65320 Vaasa, Finland		2		
3	CE		IEC60034-1		4	II 3G	
5	3~ SYNCHRONOUS RELUCTANCE MOTOR		2023		6		
	M3GL 250SMG 4 IMB3/IM1001						
	Ex ec IIC T3 Gc						
	MP1732678-11						
7	No. 3G1F1940629168		Ins. cl. F IP 55		9		
8	V	Hz	kW	r/min	A	Eff.	Duty
10	370	Y	50	45	1500	49.5	95.6%
							S1
11	Product code 3GGL252273-ASC		IE5 - IEC TS 60034-30-2				
	NETWORK VOLTAGE 400V		EESF 23 ATEX 066X / IECEx EESF 23.0004X				
	Manual: 3GZF500730-47		Nmax		r/min		
12	6315/CE		6213/CE		160 kg		13

- 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

01 Converter supply plate
as standard

ABB

CONVERTER SUPPLY

No. 3G1F1940629168

Min. switching frequency2 kHz

I = 1,5 x INtOL = 10 s tCOOL = 10 min

Ex. Temp. Control for converter operation by PTC 150°C

PWM SynRM capable converter

f [Hz]	0	10	20	100	120
T/Tn [%]	63	75	100	100	83

01

Technical data

IE5 SynRM Increased safety Ex eb motors 400 V

IE5 SynRM Increased safety Ex eb motors, network 400 V

Output kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/min)	IE class acc. to IEC TS60034- 30-2	Efficiency IEC 60034- 2 - 1; 2014			Power factor cos φ	Cur- rent	Torque	Rotor inertia (J = 1/4GD2) (M) (kgm2)	Weight, Kg	Temperature rise class (M)
					Full load 100 %	3/4 load 75 %	1/2 load 50 %						
					In A	Tn/Nm							
3000 r/min (100 Hz)			400 V network										
5,5	M3HL 132SMA 4	3GHL132217-●●C	3000	IE5	92,8	91,9	89,5	0,73	12,1	17,5	0,0145	63	B
7,5	M3HL 132SMB 4	3GHL132227-●●C	3000	IE5	93,1	92,5	90,6	0,74	16,5	23,9	0,0145	63	B
11	M3HL 132SMC 4	3GHL132237-●●C	3000	IE5	94,0	93,1	90,9	0,72	24,5	35,0	0,0184	69	B
15	M3HL 132SMD 4	3GHL132247-●●C	3000	IE5	94,1	93,6	92,0	0,73	32,9	47,8	0,0184	69	B
11	M3HL 160MLA 4	3GHL162417-●●C	3000	IE5	93,6	93,2	91,8	0,72	25,6	35,0	0,0579	133	B
15	M3HL 160MLB 4	3GHL162427-●●C	3000	IE5	95,1	94,9	93,8	0,73	34,6	48,0	0,0579	133	B
18,5	M3HL 160MLC 4	3GHL162437-●●C	3000	IE5	94,6	94,4	93,4	0,70	43,3	59,0	0,0579	133	B
22	M3HL 180MLB 4	3GHL182427-●●C	3000	IE5	95,5	95,5	95,3	0,70	50,5	70,0	0,116	190	B
30	M3HL 200MLC 4	3GHL202437-●●C	3000	IE5	95,9	95,4	95,2	0,71	68,9	95,6	0,207	277	B
37	M3HL 200MLD 4	3GHL202447-●●C	3000	IE5	96,1	95,7	95,0	0,71	84,5	118	0,207	277	B
45	M3HL 225SMB 4	3GHL222227-●●C	3000	IE5	96,1	96,1	95,3	0,73	99,8	143	0,302	330	B
55	M3HL 250SMA 4	3GHL252217-●●C	3000	IE5	96,4	96,0	95,2	0,73	123	175	0,499	396	B
75	M3HL 250SMB 4	3GHL252227-●●C	3000	IE5	96,5	96,0	95,2	0,72	167	239	0,499	396	B
90	M3HL 250SMC 4	3GHL252237-●●C	3000	IE5	96,4	95,9	95,0	0,74	198	287	0,632	454	B
1500 r/min (50 Hz)			400 V network										
5,5	M3HL 132SMA 4	3GHL132213-●●C	1500	IE5	93,7	93,7	92,6	0,75	11,7	35,0	0,0277	85	B
7,5	M3HL 132SMB 4	3GHL132223-●●C	1500	IE5	93,7	93,9	93,2	0,76	15,7	47,8	0,0277	85	B
11	M3HL 160MLA 4	3GHL162413-●●C	1500	IE5	94,0	94,2	93,6	0,75	24,2	70,0	0,0702	160	B
15	M3HL 160MLB 4	3GHL162423-●●C	1500	IE5	94,8	94,9	94,6	0,77	32,1	95,0	0,0864	177	B
18,5	M3HL 180MLB 4	3GHL182423-●●C	1500	IE5	95,0	94,6	94,2	0,72	42,8	118	0,156	222	B
22	M3HL 180MLC 4	3GHL182433-●●C	1500	IE5	95,4	95,3	95,0	0,72	49,4	140	0,156	222	B
30	M3HL 200MLB 4	3GHL202423-●●C	1500	IE5	95,9	95,8	95,0	0,75	65,0	191	0,287	304	B
37	M3HL 225SMB 4	3GHL222223-●●C	1500	IE5	96,3	96,3	96,1	0,76	79,3	236	0,38	385	B
45	M3HL 225SMC 4	3GHL222233-●●C	1500	IE5	96,3	96,3	96,0	0,74	98,5	286	0,38	350	B
55	M3HL 250SMB 4	3GHL252223-●●C	1500	IE5	96,5	95,8	95,0	0,76	117	350	0,632	454	B
75	M3HL 280SMA 4	3GHL282213-●●C	1500	IE5	96,2	95,7	94,6	0,73	166	478	1	639	B
90	M3HL 280SMB 4	3GHL282223-●●C	1500	IE5	96,5	96,2	95,2	0,73	199	573	1	639	B
110	M3HL 280SMC 4	3GHL282233-●●C	1500	IE5	96,7	96,4	95,4	0,74	241	699	1,21	697	B
110	M3HL 315SMA 4	3GHL312213-●●C	1500	IE5	96,8	96,4	95,2	0,73	243	702	1,64	873	B
132	M3HL 315SMB 4	3GHL312223-●●C	1500	IE5	96,8	96,4	95,3	0,73	290	842	1,87	925	B
160	M3HL 315SMC 4	3GHL312233-●●C	1500	IE5	97,1	96,8	96,0	0,75	343	1018	2,04	965	B
200	M3HL 315MLA 4	3GHL312413-●●C	1500	IE5	97,2	97,0	96,2	0,75	428	1272	2,45	1116	B
250	M3HL 315LKA 4	3GHL312813-●●C	1500	IE5	97,1	96,7	95,7	0,73	552	1591	3,04	1357	B
315	M3HL 315LKC 4	3GHL312833-●●C	1500	IE5	97,2	97,0	96,2	0,76	662	2006	3,77	1533	F
1000 r/min (33,3 Hz)			400 V network										
7,5	M3HL 160MLA 4	3GHL162412-●●C	1000	IE5	93,1	93,5	93,1	0,76	16,5	72	0,0702	160	B
11	M3HL 160MLB 4	3GHL162422-●●C	1000	IE5	93,7	94,0	93,7	0,76	24,1	105	0,0864	177	B
15	M3HL 180MLC 4	3GHL182432-●●C	1000	IE5	94,2	94,2	93,8	0,73	34,1	143	0,156	216	B
18,5	M3HL 200MLA 4	3GHL202412-●●C	1000	IE5	95,2	95,3	94,9	0,76	39,9	177	0,287	304	B
22	M3HL 200MLB 4	3GHL202422-●●C	1000	IE5	95,0	95,2	94,9	0,77	47,0	210	0,287	304	B
30	M3HL 225SMB 4	3GHL222222-●●C	1000	IE5	95,5	95,5	94,3	0,76	64,7	287	0,38	348	B
37	M3HL 250SMA 4	3GHL252212-●●C	1000	IE5	95,6	95,7	95,4	0,75	80,5	353	0,575	428	B
45	M3HL 280SMA 4	3GHL282212-●●C	1000	IE5	96,2	96,0	95,2	0,74	98,6	430	1	639	B
55	M3HL 280SMB 4	3GHL282222-●●C	1000	IE5	96,0	95,9	95,3	0,75	119	526	1	639	B
75	M3HL 280SMC 4	3GHL282232-●●C	1000	IE5	96,2	96,2	95,7	0,76	160	715	1,21	697	B
75	M3HL 315SMA 4	3GHL312212-●●C	1000	IE5	96,5	96,4	95,6	0,74	164	717	1,64	873	B
90	M3HL 315SMB 4	3GHL312222-●●C	1000	IE5	96,8	96,7	96,0	0,73	199	859	1,87	925	B
110	M3HL 315SMC 4	3GHL312232-●●C	1000	IE5	96,8	96,7	96,1	0,74	241	1051	2,04	965	B
132	M3HL 315MLA 4	3GHL312412-●●C	1000	IE5	97,1	97,1	96,7	0,76	278	1261	2,45	1116	B
160	M3HL 315LKA 4	3GHL312812-●●C	1000	IE5	97,1	97,0	96,4	0,75	341	1527	3,04	1357	B
200	M3HL 315LKC 4	3GHL312832-●●C	1000	IE5	97,3	97,2	96,7	0,77	416	1910	3,77	1533	B

Technical data

IE5 SynRM Increased safety Ex eb motors 500 V

IE5 SynRM Increased safety Ex eb motors, network 500 V

Output, kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/min)	IE class acc. to IEC TS60034- 30-2	Efficiency IEC 60034- 2 - 1; 2014			Power factor cos φ	Cur- rent	Torque	Rotor inertia (J = 1/4GD2) (M) (kgm2)	Weight, Kg	Temperature rise class (M)
					Full load	3/4 load	1/2 load						
					100 %	75 %	50 %						
3000 r/min (100 Hz)			500 V network										
5,5	M3HL 132SMA 4	3GHL132217-●●C	3000	IE5	92,8	91,9	89,4	0,76	9,6	17,5	0,0145	63	B
7,5	M3HL 132SMB 4	3GHL132227-●●C	3000	IE5	93,1	92,5	90,5	0,75	13,3	23,9	0,0145	63	B
11	M3HL 132SMC 4	3GHL132237-●●C	3000	IE5	93,1	92,5	90,6	0,74	19,8	35,0	0,0184	69	B
11	M3HL 160MLA 4	3GHL162417-●●C	3000	IE5	93,6	93,2	91,8	0,70	20,8	35,0	0,0579	133	B
15	M3HL 132SMD 4	3GHL132247-●●C	3000	IE5	94,1	93,6	91,9	0,74	26,6	47,8	0,0184	69	B
15	M3HL 160MLB 4	3GHL162427-●●C	3000	IE5	95,1	94,8	93,8	0,72	27,2	47,8	0,0579	133	B
18,5	M3HL 160MLC 4	3GHL162437-●●C	3000	IE5	94,5	94,3	93,4	0,71	34,1	58,9	0,0579	133	B
22	M3HL 180MLB 4	3GHL182427-●●C	3000	IE5	95,5	95,5	95,3	0,71	39,7	70,0	0,116	190	B
30	M3HL 200MLC 4	3GHL202437-●●C	3000	IE5	95,9	95,4	95,2	0,71	50,9	95,5	0,207	277	B
37	M3HL 200MLD 4	3GHL202447-●●C	3000	IE5	96,1	95,7	95,0	0,71	66,4	118	0,207	277	B
45	M3HL 225SMB 4	3GHL222227-●●C	3000	IE5	96,1	96,1	95,3	0,74	78,4	143	0,302	330	B
55	M3HL 250SMA 4	3GHL252217-●●C	3000	IE5	96,9	96,0	95,2	0,72	97,0	175	0,499	396	B
75	M3HL 250SMB 4	3GHL252227-●●C	3000	IE5	96,5	96,0	95,2	0,71	134	239	0,499	396	B
90	M3HL 250SMC 4	3GHL252237-●●C	3000	IE5	96,4	96,2	95,2	0,74	153	286	0,632	454	B
1500 r/min (50 Hz)			500 V network										
5,5	M3HL 132SMA 4	3GHL132213-●●C	1500	IE5	93,7	93,7	92,7	0,76	9,5	35,0	0,0277	85	B
7,5	M3HL 132SMB 4	3GHL132223-●●C	1500	IE5	93,7	93,9	93,2	0,77	12,8	47,8	0,0277	85	B
11	M3HL 160MLA 4	3GHL162413-●●C	1500	IE5	94,0	94,1	93,6	0,76	19,1	70,0	0,0702	160	B
15	M3HL 160MLB 4	3GHL162423-●●C	1500	IE5	94,8	94,9	94,4	0,77	25,3	95,5	0,0864	177	B
18,5	M3HL 180MLB 4	3GHL182423-●●C	1500	IE5	95,0	94,6	94,2	0,72	33,2	118	0,156	222	B
22	M3HL 180MLC 4	3GHL182433-●●C	1500	IE5	95,4	95,3	94,8	0,72	39,5	140	0,156	222	B
30	M3HL 200MLB 4	3GHL202423-●●C	1500	IE5	95,9	95,8	95,0	0,75	51,2	191	0,287	304	B
37	M3HL 225SMB 4	3GHL222223-●●C	1500	IE5	96,3	96,3	96,1	0,76	61,2	236	0,38	385	B
45	M3HL 225SMC 4	3GHL222233-●●C	1500	IE5	96,3	96,3	96,0	0,74	78,2	286	0,389	350	B
55	M3HL 250SMB 4	3GHL252223-●●C	1500	IE5	96,5	95,8	95,0	0,76	91,6	350	0,632	454	B
75	M3HL 280SMA 4	3GHL282213-●●C	1500	IE5	96,2	95,7	94,7	0,74	131	477	1	639	B
90	M3HL 280SMB 4	3GHL282223-●●C	1500	IE5	96,5	96,2	95,3	0,73	157	573	1	639	B
110	M3HL 280SMC 4	3GHL282233-●●C	1500	IE5	96,7	96,5	95,6	0,74	190	700	1,21	697	B
110	M3HL 315SMA 4	3GHL312213-●●C	1500	IE5	96,8	96,4	95,3	0,74	191	700	1,64	873	B
132	M3HL 315SMB 4	3GHL312223-●●C	1500	IE5	96,8	96,4	95,3	0,73	232	840	1,87	925	B
160	M3HL 315SMC 4	3GHL312233-●●C	1500	IE5	97,1	96,8	96,0	0,75	271	1018,59	2,04	965	B
200	M3HL 315MLA 4	3GHL312413-●●C	1500	IE5	97,2	97,0	96,4	0,78	326	1273,24	2,45	1116	B
250	M3HL 315LKA 4	3GHL312813-●●C	1500	IE5	97,1	96,7	95,8	0,73	434	1591,55	3,04	1357	B
315	M3HL 315LKC 4	3GHL312833-●●C	1500	IE5	97,2	97,0	96,4	0,78	517	2005,35	3,77	1533	F
1000 r/min (33,3 Hz)			500 V network										
7,5	M3HL 160MLA 4	3GHL162412-●●C	1000	IE5	93,3	93,6	93,2	0,76	13,1	71,6	0,0702	160	B
11	M3HL 160MLB 4	3GHL162422-●●C	1000	IE5	93,7	94,0	93,7	0,76	19,0	105	0,0864	177	B
15	M3HL 180MLC 4	3GHL182432-●●C	1000	IE5	94,2	94,2	93,8	0,73	25,2	143	0,156	216	B
18,5	M3HL 200MLA 4	3GHL202412-●●C	1000	IE5	95,4	95,4	94,9	0,76	31,5	177	0,287	304	B
22	M3HL 200MLB 4	3GHL202422-●●C	1000	IE5	95,2	95,3	94,9	0,77	37,0	210	0,287	304	B
30	M3HL 225SMB 4	3GHL222222-●●C	1000	IE5	95,5	95,5	94,3	0,76	51,3	287	0,38	348	B
37	M3HL 250SMA 4	3GHL252212-●●C	1000	IE5	95,8	95,9	95,3	0,75	63,4	353	0,575	428	B
45	M3HL 280SMA 4	3GHL282212-●●C	1000	IE5	96,2	96,0	95,2	0,75	77,6	430	1	639	B
55	M3HL 280SMB 4	3GHL282222-●●C	1000	IE5	96,1	96,0	95,4	0,76	93,7	525	1	639	B
75	M3HL 280SMC 4	3GHL282232-●●C	1000	IE5	96,2	96,3	95,8	0,77	126	716	1,21	697	B
75	M3HL 315SMA 4	3GHL312212-●●C	1000	IE5	96,5	96,4	95,7	0,75	129	716	1,64	873	B
90	M3HL 315SMB 4	3GHL312222-●●C	1000	IE5	96,8	96,7	96,0	0,73	157	859	1,87	925	B
110	M3HL 315SMC 4	3GHL312232-●●C	1000	IE5	96,8	96,7	96,0	0,74	190	1050,42	2,04	965	B
132	M3HL 315MLA 4	3GHL312412-●●C	1000	IE5	97,1	97,1	96,7	0,77	219	1260,63	2,45	1116	B
160	M3HL 315LKA 4	3GHL312812-●●C	1000	IE5	97,1	97,0	96,4	0,76	269	1527,89	3,04	1357	B
200	M3HL 315LKC 4	3GHL312832-●●C	1000	IE5	97,3	97,3	96,9	0,78	327	1909,86	3,77	1533	B

Technical data

IE5 SynRM Increased safety Ex eb motors 690 V

IE5 SynRM Increased safety Ex eb motors, network 690 V

Output, kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/min)	IE class acc. to IEC TS60034- 30-2	Efficiency IEC 60034- 2 - 1; 2014			Power factor cos φ	Cur- rent	Torque	Rotor inertia (J = 1/4GD2) (M) (kgm2)	Weight, Kg	Temperature rise class (M)
					Full load 100 %	3/4 load 75 %	1/2 load 50 %						
					In A	Tn/Nm							
3000 r/min (100 Hz)			690 V network										
5,5	M3HL 132SMA 4	3GHL132217-●●C	3000	IE5	92,5	91,5	89,0	0,76	7,0	17,5	0,0145	63	B
7,5	M3HL 132SMB 4	3GHL132227-●●C	3000	IE5	92,8	92,3	90,5	0,76	9,5	23,9	0,0145	63	B
11	M3HL 132SMC 4	3GHL132237-●●C	3000	IE5	92,9	92,5	90,9	0,75	14,1	35,0	0,0184	69	B
15	M3HL 132SMD 4	3GHL132247-●●C	3000	IE5	93,7	93,5	92,1	0,76	18,9	47,8	0,0184	69	B
11	M3HL 160MLA 4	3GHL162417-●●C	3000	IE5	93,6	93,1	91,7	0,71	14,8	35,0	0,0579	133	B
15	M3HL 160MLB 4	3GHL162423-●●C	3000	IE5	94,9	94,7	93,7	0,71	20,0	47,8	0,0579	177	B
18,5	M3HL 160MLC 4	3GHL162437-●●C	3000	IE5	94,5	94,3	93,3	0,70	25,1	58,9	0,0579	133	B
22	M3HL 180MLB 4	3GHL182427-●●C	3000	IE5	95,4	95,3	95,3	0,71	28,9	70,0	0,116	190	B
30	M3HL 200MLC 4	3GHL202437-●●C	3000	IE5	95,9	95,4	95,2	0,71	39,3	95,5	0,207	277	B
37	M3HL 200MLD 4	3GHL202447-●●C	3000	IE5	96,1	95,7	95,0	0,71	47,8	118	0,207	277	B
45	M3HL 225SMB 4	3GHL222227-●●C	3000	IE5	96,1	96,1	95,1	0,73	57,2	143	0,302	330	B
55	M3HL 250SMA 4	3GHL252217-●●C	3000	IE5	94,4	96,0	95,2	0,73	70,0	175	0,499	396	B
75	M3HL 250SMB 4	3GHL252227-●●C	3000	IE5	96,5	96,0	95,2	0,72	96,0	239	0,499	396	B
90	M3HL 250SMC 4	3GHL252237-●●C	3000	IE5	96,4	96,2	95,2	0,75	111	286	0,632	454	B
1500 r/min (50 Hz)			690 V network										
5,5	M3HL 132SMA 4	3GHL132213-●●C	1500	IE5	93,3	93,3	92,4	0,78	6,8	35,0	0,0277	85	B
7,5	M3HL 132SMB 4	3GHL132223-●●C	1500	IE5	93,3	93,5	92,7	0,78	9,2	47,8	0,0277	85	B
11	M3HL 160MLA 4	3GHL162413-●●C	1500	IE5	93,6	93,8	93,4	0,75	14,1	70,0	0,0702	160	B
15	M3HL 160MLB 4	3GHL162423-●●C	1500	IE5	94,6	94,7	94,4	0,77	18,4	95,5	0,0864	177	B
18,5	M3HL 180MLB 4	3GHL182423-●●C	1500	IE5	95,0	94,6	94,2	0,71	24,3	118	0,156	222	B
22	M3HL 180MLC 4	3GHL182433-●●C	1500	IE5	95,4	95,3	95,0	0,73	28,0	140	0,156	222	B
30	M3HL 200MLB 4	3GHL202423-●●C	1500	IE5	95,5	95,6	95,0	0,75	37,3	191	0,287	304	B
37	M3HL 225SMB 4	3GHL222223-●●C	1500	IE5	96,3	96,3	96,1	0,76	45,2	236	0,38	385	B
45	M3HL 225SMC 4	3GHL222233-●●C	1500	IE5	96,3	96,3	96,0	0,74	54,8	286	0,38	350	B
55	M3HL 250SMB 4	3GHL252223-●●C	1500	IE5	96,5	95,8	95,0	0,76	67,0	350	0,632	454	B
75	M3HL 280SMA 4	3GHL282213-●●C	1500	IE5	96,2	95,7	94,7	0,75	92,6	477	1	639	B
90	M3HL 280SMB 4	3GHL282223-●●C	1500	IE5	96,3	96,1	95,3	0,76	110	573	1	639	B
110	M3HL 280SMC 4	3GHL282233-●●C	1500	IE5	96,6	96,4	95,7	0,77	133	700	1,21	697	B
110	M3HL 315SMA 4	3GHL312213-●●C	1500	IE5	96,7	96,4	95,4	0,74	138	700	1,64	873	B
132	M3HL 315SMB 4	3GHL312223-●●C	1500	IE5	96,7	96,4	95,6	0,74	165	840	1,87	925	B
160	M3HL 315SMC 4	3GHL312233-●●C	1500	IE5	97,0	96,9	96,2	0,76	195	1019	2,04	965	B
200	M3HL 315MLA 4	3GHL312413-●●C	1500	IE5	97,1	96,8	96,0	0,75	244	1273	2,45	1116	B
250	M3HL 315LKA 4	3GHL312813-●●C	1500	IE5	97,0	96,8	96,1	0,73	314	1592	3,04	1357	B
315	M3HL 315LKC 4	3GHL312833-●●C	1500	IE5	97,1	96,9	96,1	0,77	377	2005	3,77	1533	F
1000 r/min (33,3 Hz)			690 V network										
7,5	M3HL 160MLA 4	3GHL162412-●●C	1000	IE5	93,0	93,3	92,8	0,76	9,5	71,6	0,0702	160	B
11	M3HL 160MLB 4	3GHL162422-●●C	1000	IE5	93,4	93,7	93,4	0,76	13,8	105	0,0864	177	B
15	M3HL 180MLC 4	3GHL182432-●●C	1000	IE5	94,2	94,2	93,8	0,73	19,3	143	0,156	216	B
18,5	M3HL 200MLA 4	3GHL202412-●●C	1000	IE5	95,0	95,3	94,9	0,77	22,6	177	0,287	304	B
22	M3HL 200MLB 4	3GHL202422-●●C	1000	IE5	94,9	95,2	94,9	0,78	26,5	210	0,287	304	B
30	M3HL 225SMB 4	3GHL222222-●●C	1000	IE5	95,5	95,5	94,3	0,76	36,7	287	0,38	348	B
37	M3HL 250SMA 4	3GHL252212-●●C	1000	IE5	95,6	95,7	95,3	0,75	46,0	353	0,575	428	B
45	M3HL 280SMA 4	3GHL282212-●●C	1000	IE5	96,0	96,0	95,3	0,77	54,6	430	1	639	B
55	M3HL 280SMB 4	3GHL282222-●●C	1000	IE5	95,8	95,8	95,3	0,77	66,8	525	1	639	B
75	M3HL 280SMC 4	3GHL282232-●●C	1000	IE5	96,0	96,1	95,8	0,78	89,8	716	1,21	697	B
75	M3HL 315SMA 4	3GHL312212-●●C	1000	IE5	96,4	96,3	95,7	0,76	91,6	716	1,64	873	B
90	M3HL 315SMB 4	3GHL312222-●●C	1000	IE5	96,6	96,6	96,0	0,76	111	860	1,87	925	B
110	M3HL 315SMC 4	3GHL312232-●●C	1000	IE5	96,7	96,7	96,3	0,76	134	1051	2,04	965	B
132	M3HL 315MLA 4	3GHL312412-●●C	1000	IE5	96,9	97,0	96,8	0,78	156	1261	2,45	1116	B
160	M3HL 315LKA 4	3GHL312812-●●C	1000	IE5	96,9	96,9	96,5	0,78	189	1528	3,04	1357	B
200	M3HL 315LKC 4	3GHL312832-●●C	1000	IE5	97,0	97,1	96,8	0,79	232	1910	3,77	1533	B

Technical data

IE5 SynRM Increased safety Ex ec motors 400 V

IE5 SynRM Increased safety Ex ec motors, network 400 V

Output kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/min)	IE class acc. to IEC TS60034- 30-2	Efficiency IEC 60034- 2 - 1; 2014			Power factor cos φ	Cur- rent	Torque	Rotor inertia (J = 1/4GD2) (M) (kgm2)	Weight, Kg	Temperature rise class (M)
					Full load 100 %	3/4 load 75 %	1/2 load 50 %						
3000 r/min (100 Hz)			400 V network										
5,5	M3GL 132SMA 4	3GGL132217-●●C	3000	IE5	92,8	91,9	89,5	0,73	12,1	17,5	0,0145	62	B
7,5	M3GL 132SMB 4	3GGL132227-●●C	3000	IE5	93,1	92,5	90,6	0,74	16,5	23,9	0,0145	62	B
11	M3GL 132SMC 4	3GGL132237-●●C	3000	IE5	94,0	93,1	90,9	0,72	24,5	35,0	0,0184	69	B
15	M3GL 132SMD 4	3GGL132247-●●C	3000	IE5	94,1	93,6	92,0	0,73	32,9	47,8	0,0184	69	B
11	M3GL 160MLA 4	3GGL162417-●●C	3000	IE5	93,6	93,2	91,8	0,72	25,6	35,0	0,0579	133	B
15	M3GL 160MLB 4	3GGL162427-●●C	3000	IE5	95,1	94,9	93,8	0,73	34,6	48,0	0,0579	133	B
18,5	M3GL 160MLC 4	3GGL162437-●●C	3000	IE5	94,6	94,4	93,4	0,70	43,3	59,0	0,0579	133	B
22	M3GL 180MLB 4	3GGL182427-●●C	3000	IE5	95,5	95,5	95,3	0,70	50,5	70,0	0,116	190	B
30	M3GL 200MLC 4	3GGL202437-●●C	3000	IE5	95,9	95,4	95,2	0,71	68,9	95,6	0,207	277	B
37	M3GL 200MLD 4	3GGL202447-●●C	3000	IE5	96,1	95,7	95,0	0,71	84,5	118	0,207	277	B
45	M3GL 225SMB 4	3GGL222227-●●C	3000	IE5	96,1	96,1	95,3	0,73	99,8	143	0,302	330	B
55	M3GL 250SMA 4	3GGL252217-●●C	3000	IE5	96,4	96,0	95,2	0,73	123	175	0,499	396	B
75	M3GL 250SMB 4	3GGL252227-●●C	3000	IE5	96,5	96,0	95,2	0,72	167	239	0,499	396	B
90	M3GL 250SMC 4	3GGL252237-●●C	3000	IE5	96,4	95,9	95,0	0,74	198	286	0,632	454	B
1500 r/min (50 Hz)			400 V network										
5,5	M3GL 132SMA 4	3GGL132213-●●C	1500	IE5	93,7	93,7	92,6	0,75	11,7	35,0	0,0277	85	B
7,5	M3GL 132SMB 4	3GGL132223-●●C	1500	IE5	93,7	93,9	93,2	0,76	15,7	47,8	0,0277	85	B
11	M3GL 160MLA 4	3GGL162413-●●C	1500	IE5	94,0	94,2	93,6	0,75	24,2	70,0	0,0702	160	B
15	M3GL 160MLB 4	3GGL162423-●●C	1500	IE5	94,8	94,9	94,6	0,77	32,1	95,0	0,0864	177	B
18,5	M3GL 180MLB 4	3GGL182423-●●C	1500	IE5	95,0	94,6	94,2	0,72	42,8	118	0,156	222	B
22	M3GL 180MLC 4	3GGL182433-●●C	1500	IE5	95,4	95,3	95,0	0,72	49,4	140	0,156	222	B
30	M3GL 200MLB 4	3GGL202423-●●C	1500	IE5	95,9	95,8	95,0	0,75	65,0	191	0,287	304	B
37	M3GL 225SMB 4	3GGL222223-●●C	1500	IE5	96,3	96,3	96,1	0,76	79,3	236	0,38	385	B
45	M3GL 225SMC 4	3GGL222233-●●C	1500	IE5	96,3	96,3	96,0	0,74	98,5	286	0,38	350	B
55	M3GL 250SMB 4	3GGL252223-●●C	1500	IE5	96,5	95,8	95,0	0,76	117	350	0,632	454	B
75	M3GL 280SMA 4	3GGL282213-●●C	1500	IE5	96,2	95,7	94,6	0,73	166	478	1	639	B
90	M3GL 280SMB 4	3GGL282223-●●C	1500	IE5	96,5	96,2	95,2	0,73	199	573	1	639	B
110	M3GL 280SMC 4	3GGL282233-●●C	1500	IE5	96,7	96,4	95,4	0,74	241	699	1,21	697	B
110	M3GL 315SMA 4	3GGL312213-●●C	1500	IE5	96,8	96,4	95,2	0,73	243	702	1,64	873	B
132	M3GL 315SMB 4	3GGL312223-●●C	1500	IE5	96,8	96,4	95,3	0,73	290	842	1,87	925	B
160	M3GL 315SMC 4	3GGL312233-●●C	1500	IE5	97,1	96,8	96,0	0,75	343	1018	2,04	965	B
200	M3GL 315MLA 4	3GGL312413-●●C	1500	IE5	97,2	97,0	96,2	0,75	428	1272	2,45	1116	B
250	M3GL 315LKA 4	3GGL312813-●●C	1500	IE5	97,1	96,7	95,7	0,73	552	1591	3,04	1357	B
315	M3GL 315LKC 4	3GGL312833-●●C	1500	IE5	97,2	97,0	96,2	0,76	662	2006	3,77	1533	F
1000 r/min (33,3 Hz)			400 V network										
7,5	M3GL 160MLA 4	3GGL162412-●●C	1000	IE5	93,1	93,5	93,1	0,76	16,5	72,0	0,0702	160	B
11	M3GL 160MLB 4	3GGL162422-●●C	1000	IE5	93,7	94,0	93,7	0,76	24,1	105	0,0864	177	B
15	M3GL 180MLC 4	3GGL182432-●●C	1000	IE5	94,2	94,2	93,8	0,73	34,1	143	0,156	216	B
18,5	M3GL 200MLA 4	3GGL202412-●●C	1000	IE5	95,2	95,3	94,9	0,76	39,9	177	0,287	304	B
22	M3GL 200MLB 4	3GGL202422-●●C	1000	IE5	95,0	95,2	94,9	0,77	47,0	210	0,287	304	B
30	M3GL 225SMB 4	3GGL222222-●●C	1000	IE5	95,5	95,5	94,3	0,76	64,7	287	0,38	348	B
37	M3GL 250SMA 4	3GGL252212-●●C	1000	IE5	95,6	95,7	95,4	0,75	80,5	353	0,575	428	B
45	M3GL 280SMA 4	3GGL282212-●●C	1000	IE5	96,2	96,0	95,2	0,74	98,6	430	1	639	B
55	M3GL 280SMB 4	3GGL282222-●●C	1000	IE5	96,0	95,9	95,3	0,75	119	526	1	639	B
75	M3GL 280SMC 4	3GGL282232-●●C	1000	IE5	96,2	96,2	95,7	0,76	160	715	1,21	697	B
75	M3GL 315SMA 4	3GGL312212-●●C	1000	IE5	96,5	96,4	95,6	0,74	164	717	1,64	873	B
90	M3GL 315SMB 4	3GGL312222-●●C	1000	IE5	96,8	96,7	96,0	0,73	199	859	1,87	925	B
110	M3GL 315SMC 4	3GGL312232-●●C	1000	IE5	96,8	96,7	96,1	0,74	241	1051	2,04	965	B
132	M3GL 315MLA 4	3GGL312412-●●C	1000	IE5	97,1	97,1	96,7	0,76	278	1261	2,45	1116	B
160	M3GL 315LKA 4	3GGL312812-●●C	1000	IE5	97,1	97,0	96,4	0,75	341	1527	3,04	1357	B
200	M3GL 315LKC 4	3GGL312832-●●C	1000	IE5	97,3	97,2	96,7	0,77	416	1910	3,77	1533	B

Technical data

IE5 SynRM Increased safety Ex ec motors 500 V

IE5 SynRM Increased safety Ex ec motors, network 500 V

Output, kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/ min)	IE class acc. to IEC TS60034- 30-2	Efficiency IEC 60034- 2 - 1; 2014			Power factor cos φ	Cur- rent	Torque	Rotor inertia (J = 1/4GD2) (M) (kgm2)	Weight, Kg	Temperature rise class (M)
					Full load 100 %	3/4 load 75 %	1/2 load 50 %						
3000 r/min (100 Hz)			500 V network										
5,5	M3GL 132SMA 4	3GGL132217-●●C	3000	IE5	92,8	91,9	89,4	0,76	9,6	17,5	0,0145	63	B
7,5	M3GL 132SMB 4	3GGL132227-●●C	3000	IE5	93,1	92,5	90,5	0,75	13,3	23,9	0,0145	63	B
11	M3GL 132SMC 4	3GGL132237-●●C	3000	IE5	93,1	92,5	90,6	0,74	19,8	35,0	0,0184	69	B
15	M3GL 132SMD 4	3GGL132247-●●C	3000	IE5	94,1	93,6	91,9	0,74	26,6	47,8	0,0184	69	B
11	M3GL 160MLA 4	3GGL162417-●●C	3000	IE5	93,6	93,2	91,8	0,70	20,8	35,0	0,0579	133	B
15	M3GL 160MLB 4	3GGL162427-●●C	3000	IE5	95,1	94,8	93,8	0,72	27,2	47,8	0,0579	133	B
18,5	M3GL 160MLC 4	3GGL162437-●●C	3000	IE5	94,5	94,3	93,4	0,71	34,1	58,9	0,0579	133	B
22	M3GL 180MLB 4	3GGL182427-●●C	3000	IE5	95,5	95,5	95,3	0,71	39,7	70,0	0,116	190	B
30	M3GL 200MLC 4	3GGL202437-●●C	3000	IE5	95,9	95,4	95,2	0,71	50,9	95,5	0,207	277	B
37	M3GL 200MLD 4	3GGL202447-●●C	3000	IE5	96,1	95,7	95,0	0,71	66,4	118	0,207	277	B
45	M3GL 225SMB 4	3GGL222227-●●C	3000	IE5	96,1	96,1	95,3	0,74	78,4	143	0,302	330	B
55	M3GL 250SMA 4	3GGL252217-●●C	3000	IE5	96,9	96,0	95,2	0,72	97,0	175	0,499	396	B
75	M3GL 250SMB 4	3GGL252227-●●C	3000	IE5	96,5	96,0	95,2	0,71	134	239	0,499	396	B
90	M3GL 250SMC 4	3GGL252237-●●C	3000	IE5	96,4	96,2	95,2	0,74	153	286	0,632	454	B
1500 r/min (50 Hz)			500 V network										
5,5	M3GL 132SMA 4	3GGL132213-●●C	1500	IE5	93,7	93,7	92,7	0,76	9,5	35,0	0,0277	85	B
7,5	M3GL 132SMB 4	3GGL132223-●●C	1500	IE5	93,7	93,9	93,2	0,77	12,8	47,8	0,0277	85	B
11	M3GL 160MLA 4	3GGL162413-●●C	1500	IE5	94,0	94,1	93,6	0,76	19,1	70,0	0,0702	160	B
15	M3GL 160MLB 4	3GGL162423-●●C	1500	IE5	94,8	94,9	94,4	0,77	25,3	95,5	0,0864	177	B
18,5	M3GL 180MLB 4	3GGL182423-●●C	1500	IE5	95,0	94,6	94,2	0,72	33,2	118	0,156	222	B
22	M3GL 180MLC 4	3GGL182433-●●C	1500	IE5	95,4	95,3	94,8	0,72	39,5	140	0,156	222	B
30	M3GL 200MLB 4	3GGL202423-●●C	1500	IE5	95,9	95,8	95,0	0,75	51,2	191	0,287	304	B
37	M3GL 225SMB 4	3GGL222223-●●C	1500	IE5	96,3	96,3	96,1	0,76	61,2	236	0,38	385	B
45	M3GL 225SMC 4	3GGL222233-●●C	1500	IE5	96,3	96,3	96,0	0,74	78,2	286	0,389	350	B
55	M3GL 250SMB 4	3GGL252223-●●C	1500	IE5	96,5	95,8	95,0	0,76	91,6	350	0,632	454	B
75	M3GL 280SMA 4	3GGL282213-●●C	1500	IE5	96,2	95,7	94,7	0,74	131	477	1	639	B
90	M3GL 280SMB 4	3GGL282223-●●C	1500	IE5	96,5	96,2	95,3	0,73	157	573	1	639	B
110	M3GL 280SMC 4	3GGL282233-●●C	1500	IE5	96,7	96,5	95,6	0,74	190	700	1,21	697	B
110	M3GL 315SMA 4	3GGL312213-●●C	1500	IE5	96,8	96,4	95,3	0,74	191	700	1,64	873	B
132	M3GL 315SMB 4	3GGL312223-●●C	1500	IE5	96,8	96,4	95,3	0,73	232	840	1,87	925	B
160	M3GL 315SMC 4	3GGL312233-●●C	1500	IE5	97,1	96,8	96,0	0,75	271	1019	2,04	965	B
200	M3GL 315MLA 4	3GGL312413-●●C	1500	IE5	97,2	97,0	96,4	0,78	326	1273	2,45	1116	B
250	M3GL 315LKA 4	3GGL312813-●●C	1500	IE5	97,1	96,7	95,8	0,73	434	1592	3,04	1357	B
315	M3GL 315LKC 4	3GGL312833-●●C	1500	IE5	97,2	97,0	96,4	0,78	517	2005	3,77	1533	F
1000 r/min (33,3 Hz)			500 V network										
7,5	M3GL 160MLA 4	3GGL162412-●●C	1000	IE5	93,3	93,6	93,2	0,76	13,1	71,6	0,0702	160	B
11	M3GL 160MLB 4	3GGL162422-●●C	1000	IE5	93,7	94,0	93,7	0,76	19,0	105	0,0864	177	B
15	M3GL 180MLC 4	3GGL182432-●●C	1000	IE5	94,2	94,2	93,8	0,73	25,2	143	0,156	216	B
18,5	M3GL 200MLA 4	3GGL202412-●●C	1000	IE5	95,4	95,4	94,9	0,76	31,5	177	0,287	304	B
22	M3GL 200MLB 4	3GGL202422-●●C	1000	IE5	95,2	95,3	94,9	0,77	37,0	210	0,287	304	B
30	M3GL 225SMB 4	3GGL222222-●●C	1000	IE5	95,5	95,5	94,3	0,76	51,3	287	0,38	348	B
37	M3GL 250SMA 4	3GGL252212-●●C	1000	IE5	95,8	95,9	95,3	0,75	63,4	353	0,575	428	B
45	M3GL 280SMA 4	3GGL282212-●●C	1000	IE5	96,2	96,0	95,2	0,75	77,6	430	1	639	B
55	M3GL 280SMB 4	3GGL282222-●●C	1000	IE5	96,1	96,0	95,4	0,76	93,7	525	1	639	B
75	M3GL 280SMC 4	3GGL282232-●●C	1000	IE5	96,2	96,3	95,8	0,77	126	716	1,21	697	B
75	M3GL 315SMA 4	3GGL312212-●●C	1000	IE5	96,5	96,4	95,7	0,75	129	716	1,64	873	B
90	M3GL 315SMB 4	3GGL312222-●●C	1000	IE5	96,8	96,7	96,0	0,73	157	859	1,87	925	B
110	M3GL 315SMC 4	3GGL312232-●●C	1000	IE5	96,8	96,7	96,0	0,74	190	1050	2,04	965	B
132	M3GL 315MLA 4	3GGL312412-●●C	1000	IE5	97,1	97,1	96,7	0,77	219	1261	2,45	1116	B
160	M3GL 315LKA 4	3GGL312812-●●C	1000	IE5	97,1	97,0	96,4	0,76	269	1528	3,04	1357	B
200	M3GL 315LKC 4	3GGL312832-●●C	1000	IE5	97,3	97,3	96,9	0,78	327	1910	3,77	1533	B

Technical data

IE5 SynRM Increased safety Ex ec motors 690 V

IE5 SynRM Increased safety Ex ec motors, network 690 V

Output, kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/ min)	IE class acc. to IEC TS60034- 30-2	Efficiency IEC 60034- 2 - 1; 2014			Power factor cos φ	Cur- rent	Torque	Rotor inertia (J = 1/4GD2) (M) (kgm2)	Weight, Kg	Temperature rise class (M)
					Full load 100 %	3/4 load 75 %	1/2 load 50 %						
3000 r/min (100 Hz)			690 V network										
5,5	M3GL 132SMA 4	3GGL132217-●●C	3000	IE5	92,5	91,5	89,0	0,76	7,0	17,5	0,0145	63	B
7,5	M3GL 132SMB 4	3GGL132227-●●C	3000	IE5	92,8	92,3	90,5	0,76	9,5	23,9	0,0145	63	B
11	M3GL 132SMC 4	3GGL132237-●●C	3000	IE5	92,9	92,5	90,9	0,75	14,1	35,0	0,0184	69	B
15	M3GL 132SMD 4	3GGL132247-●●C	3000	IE5	93,7	93,5	92,1	0,76	18,9	47,8	0,0184	69	B
11	M3GL 160MLA 4	3GGL162417-●●C	3000	IE5	93,6	93,1	91,7	0,71	14,8	35,0	0,0579	133	B
15	M3GL 160MLB 4	3GGL162427-●●C	3000	IE5	94,9	94,7	93,7	0,71	20,0	47,8	0,0579	133	B
18,5	M3GL 160MLC 4	3GGL162437-●●C	3000	IE5	94,5	94,3	93,3	0,70	25,1	58,9	0,0579	133	B
22	M3GL 180MLB 4	3GGL182427-●●C	3000	IE5	95,4	95,3	95,3	0,71	28,9	70,0	0,116	190	B
30	M3GL 200MLC 4	3GGL202437-●●C	3000	IE5	95,9	95,4	95,2	0,71	39,3	95,5	0,207	277	B
37	M3GL 200MLD 4	3GGL202447-●●C	3000	IE5	96,1	95,7	95,0	0,71	47,8	118	0,207	277	B
45	M3GL 225SMA 4	3GGL222227-●●C	3000	IE5	96,1	96,1	95,1	0,73	57,2	143	0,302	330	B
55	M3GL 250SMA 4	3GGL252217-●●C	3000	IE5	94,4	96,0	95,2	0,73	70,0	175	0,499	396	B
75	M3GL 250SMB 4	3GGL252227-●●C	3000	IE5	96,5	96,0	95,2	0,72	96,0	239	0,499	396	B
90	M3GL 250SMC 4	3GGL252237-●●C	3000	IE5	96,4	96,2	95,2	0,75	111	286	0,632	454	B
1500 r/min (50 Hz)			690 V network										
5,5	M3GL 132SMA 4	3GGL132213-●●C	1500	IE5	93,3	93,3	92,4	0,78	6,8	35,0	0,0277	85	B
7,5	M3GL 132SMB 4	3GGL132223-●●C	1500	IE5	93,3	93,5	92,7	0,78	9,2	47,8	0,0277	85	B
11	M3GL 160MLA 4	3GGL162413-●●C	1500	IE5	93,6	93,8	93,4	0,75	14,1	70,0	0,0702	160	B
15	M3GL 160MLB 4	3GGL162423-●●C	1500	IE5	94,6	94,7	94,4	0,77	18,4	95,5	0,0864	177	B
18,5	M3GL 180MLB 4	3GGL182423-●●C	1500	IE5	95,0	94,6	94,2	0,71	24,3	118	0,156	222	B
22	M3GL 180MLC 4	3GGL182433-●●C	1500	IE5	95,4	95,3	95,0	0,73	28,0	140	0,156	222	B
30	M3GL 200MLB 4	3GGL202423-●●C	1500	IE5	95,5	95,6	95,0	0,75	37,3	191	0,287	304	B
37	M3GL 225SMB 4	3GGL222223-●●C	1500	IE5	96,3	96,3	96,1	0,76	45,2	236	0,38	385	B
45	M3GL 225SMC 4	3GGL222233-●●C	1500	IE5	96,3	96,3	96,0	0,74	54,8	286	0,38	350	B
55	M3GL 250SMB 4	3GGL252223-●●C	1500	IE5	96,5	95,8	95,0	0,76	67,0	350	0,632	454	B
75	M3GL 280SMA 4	3GGL282213-●●C	1500	IE5	96,2	95,7	94,7	0,75	92,6	477	1	639	B
90	M3GL 280SMB 4	3GGL282223-●●C	1500	IE5	96,3	96,1	95,3	0,76	110	573	1	639	B
110	M3GL 280SMC 4	3GGL282233-●●C	1500	IE5	96,6	96,4	95,7	0,77	133	700	1,21	697	B
110	M3GL 315SMA 4	3GGL312213-●●C	1500	IE5	96,7	96,4	95,4	0,74	138	700	1,64	873	B
132	M3GL 315SMB 4	3GGL312223-●●C	1500	IE5	96,7	96,4	95,6	0,74	165	840	1,87	925	B
160	M3GL 315SMC 4	3GGL312233-●●C	1500	IE5	97,0	96,9	96,2	0,76	195	1019	2,04	965	B
200	M3GL 315MLA 4	3GGL312413-●●C	1500	IE5	97,1	96,8	96,0	0,75	244	1273	2,45	1116	B
250	M3GL 315LKA 4	3GGL312813-●●C	1500	IE5	97,0	96,8	96,1	0,73	314	1592	3,04	1357	B
315	M3GL 315LKC 4	3GGL312833-●●C	1500	IE5	97,1	96,9	96,1	0,77	377	2005	3,77	1533	F
1000 r/min (33,3 Hz)			690 V network										
7,5	M3GL 160MLA 4	3GGL162412-●●C	1000	IE5	93,0	93,3	92,8	0,76	9,5	71,6	0,0702	160	B
11	M3GL 160MLB 4	3GGL162422-●●C	1000	IE5	93,4	93,7	93,4	0,76	13,8	105	0,0864	177	B
15	M3GL 180MLC 4	3GGL182432-●●C	1000	IE5	94,2	94,2	93,8	0,73	19,3	143	0,156	216	B
18,5	M3GL 200MLA 4	3GGL202412-●●C	1000	IE5	95,0	95,3	94,9	0,77	22,6	177	0,287	304	B
22	M3GL 200MLB 4	3GGL202422-●●C	1000	IE5	94,9	95,2	94,9	0,78	26,5	210	0,287	304	B
30	M3GL 225SMB 4	3GGL222222-●●C	1000	IE5	95,5	95,5	94,3	0,76	36,7	287	0,38	348	B
37	M3GL 250SMA 4	3GGL252212-●●C	1000	IE5	95,6	95,7	95,3	0,75	46,0	353	0,575	428	B
45	M3GL 280SMA 4	3GGL282212-●●C	1000	IE5	96,0	96,0	95,3	0,77	54,6	430	1	639	B
55	M3GL 280SMB 4	3GGL282222-●●C	1000	IE5	95,8	95,8	95,3	0,77	66,8	525	1	639	B
75	M3GL 280SMC 4	3GGL282232-●●C	1000	IE5	96,0	96,1	95,8	0,78	89,8	716	1,21	697	B
75	M3GL 315SMA 4	3GGL312212-●●C	1000	IE5	96,4	96,3	95,7	0,76	91,6	716	1,64	873	B
90	M3GL 315SMB 4	3GGL312222-●●C	1000	IE5	96,6	96,6	96,0	0,76	111	860	1,87	925	B
110	M3GL 315SMC 4	3GGL312232-●●C	1000	IE5	96,7	96,7	96,3	0,76	134	1051	2,04	965	B
132	M3GL 315MLA 4	3GGL312412-●●C	1000	IE5	96,9	97,0	96,8	0,78	156	1261	2,45	1116	B
160	M3GL 315LKA 4	3GGL312812-●●C	1000	IE5	96,9	96,9	96,5	0,78	189	1528	3,04	1357	B
200	M3GL 315LKC 4	3GGL312832-●●C	1000	IE5	97,0	97,1	96,8	0,79	232	1910	3,77	1533	B

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-conduc- tive 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 °C, in stator winding ¹⁾	●	●	●	●	●	●	●	●
436	PTC - thermistors (3 in series), 150 °C, in stator winding ²⁾	○	○	○	○	○	○	○	○
435	PTC - thermistors (3 in series), 130 °C, in stator winding ³⁾	○	○	○	○	○	○	○	○
436	PTC - thermistors (3 in series), 150 °C, in stator winding ⁴⁾	●	●	●	●	●	●	●	●
439	PTC - thermistors (2x3 in series), 150 °C, in stator winding	●	●	●	●	●	●	●	●
441	PTC - thermistors (3 in series, 130 °C & 3 in series, 150 °C), 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 °C, 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

—
01 As standard, the motor is delivered with drain holes and closable plugs

Motor frame

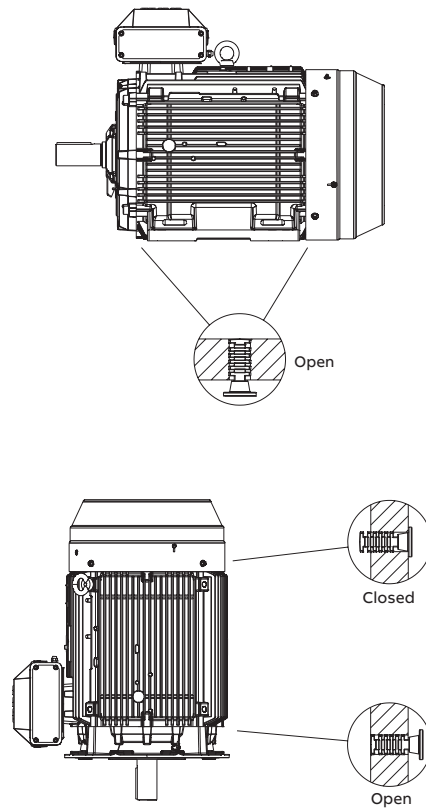
The motor frame, end shields and main terminal box are made of cast iron. Feet are integrated with the frame, except for sizes 160-250 with side mounted terminal box, which have detachable feet.

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.



—
01

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

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. The variant 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 bearing (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

Mechanical design

Bearing life and lubrication

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 $\geq 100,000$ 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 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 interval times. 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 40 000 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

Cylindrical 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

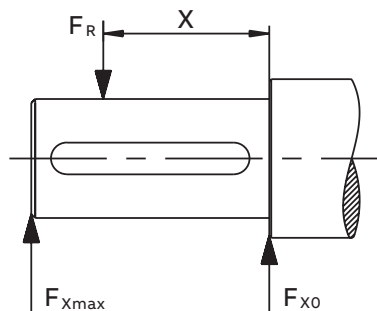
Motor size	Speed r/min	Length of shaft extension E (mm)	Ball bearings				Roller bearings			
			20 000 hours		40 000 hours		20 000 hours		40 000 hours	
			F _{x0} (N)	F _{xmax} (N)	F _{x0} (N)	F _{xmax} (N)	F _{x0} (N)	F _{xmax} (N)	F _{x0} (N)	F _{xmax} (N)
132	3000	80	2120	1610	2120	1610	-	-	-	-
132	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

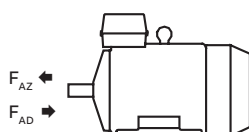
Axial forces

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.

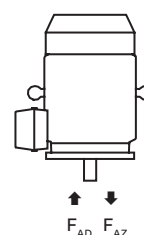
Permissible loads of simultaneous radial and axial forces can be supplied on request. For axial force F_{AD} , it is assumed that the D-bearing is locked with a locking ring.

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 'eb' increased safety and prevents all ignition sources such as sparks, excessive overheating 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 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 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 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 aluminium 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

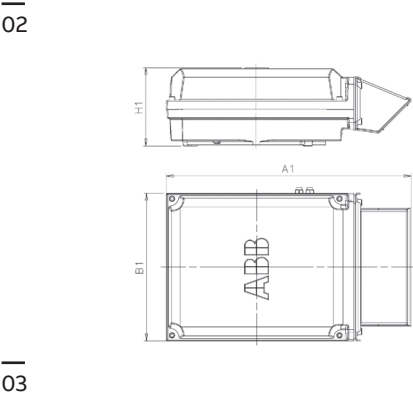
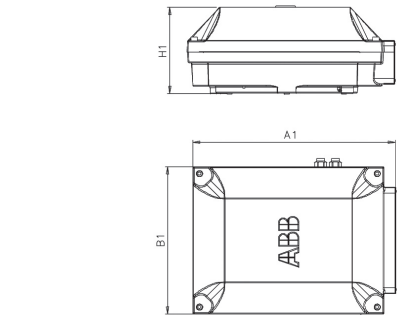
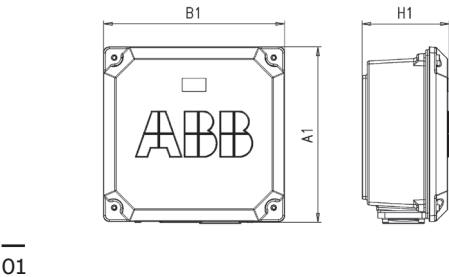
Terminal box

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.

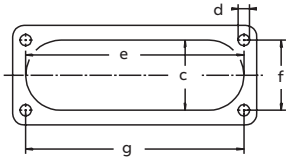
To match the correct terminal box with motor sizes 160-315, find the motor type and correspondent terminal box type on the previous page. The box types and heir dimensions are presented on this page.



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

*) for frame sizes 200-225

**) for frame size 280



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

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

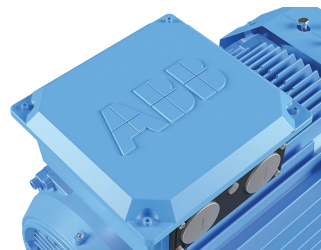


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01



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02

Motor sizes 160-250

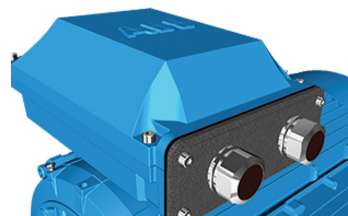


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03

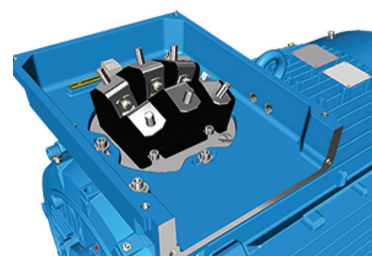


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04

Motor sizes 280 - 315



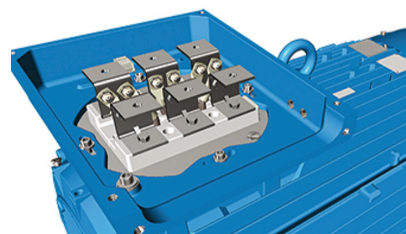
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05



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06



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07



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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 mm ² . 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)

Terminal box

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.

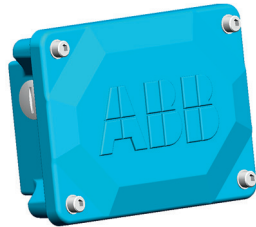
Auxiliary terminal box

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.

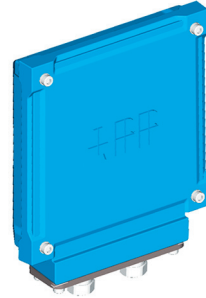
Connection terminals are of spring-loaded type for quick and easy connection. These are suitable for up to 2.5 mm² wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard.

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



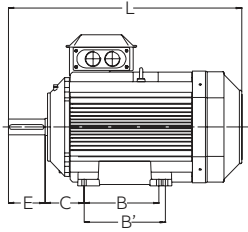
Auxiliary cast iron terminal box for motor size 160-250 (variant code 418). 111 x 162 mm.



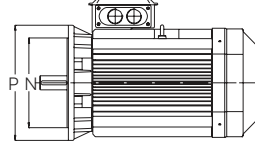
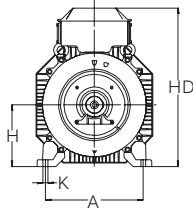
Auxiliary cast iron terminal box for motor sizes 280-450 (variant code 567). 208 x 180 mm.

Dimension drawings

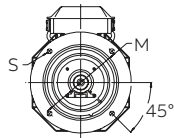
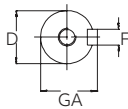
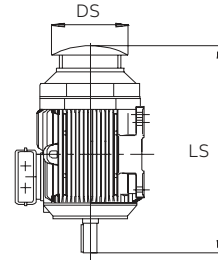
IE5 SynRM Increased safety cast iron motors



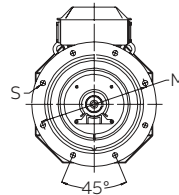
Foot-mounted motor IM 1001, IM B3



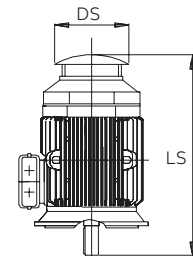
Flange-mounted motor IM 3001, IM B5



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	
		L					HD																					
		D	GA	F	E	max	A	B	B1	C	H	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

Certificate examples

01 EU Type ATEX Examination Certificate

02 Eurofins ATEX Type Examination Certificate

03 IECEx Certificate of Conformity



EESF 23 ATEX 005X
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

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. EUFI29-22005112-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 / IEC 60079-31:2022-01

10. If the sign "C" 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 II 2D Ex eb IIC T3 Db
II 2D Ex tb IIC T100°C... T150°C Db
II 2D Ex tb IIB T100°C... T150°C Db
M3GL II 2D Ex tb IIC T100°C... T150°C Db
II 2D Ex tb IIB T100°C... T150°C Db

Espoo, 7.6.2023
Eurofins Electric & Electronics Finland Oy

Karl Koskela
Senior Expert


Jenni Hirvö
Senior Expert



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Eurofins Electric & Electronics Finland Oy, Kuivahenttie 4, FI-02150 Espoo, Finland
www.eurofins.fi/electrical-and-electronics



01



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 3 Certificate history:

Status: Current Issue No: 0

Date of Issue: 2023-06-07

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

Equipment: Series of synchronous reluctance motors, M3HL and M3GL

Optional accessory: Increased safety and dust ignition protection by enclosure

Type of Protection: M3HL
Ex eb IIC T3 Db
Ex tb IIB T100°C... T150°C Db
Ex tb IIC T100°C... T150°C Db
M3GL
Ex ec IIC T3/T2/T1 Gc
Ex tb IIB T100°C... T150°C Db
Ex tb IIC T100°C... T150°C Db
Ex tb IIB T100°C... T150°C Db
Ex te IIC T100°C... T150°C Db
Ex te IIC T100°C... T150°C Db

Approved for issue on behalf of the IECEx
Certification Body:
Position:
Signature:
(for printed version)
Date:
(for printed version)

Kari Koskela
Senior Expert

2023-06-07

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 Electric & Electronics Finland Oy
Kuivahenttie 4
Espoo FI-02150
Finland



03



EESF 23 ATEX 006X
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

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. EUFI29-22005112-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 / IEC 60079-31:2022-01

10. If the sign "C" 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 IIC T3/T2/T1 Gc
II 3D Ex te IIC T100°C... T150°C Dc
II 3D Ex te IIB T100°C... T150°C Dc

Espoo, 7.6.2023
Eurofins Electric & Electronics Finland Oy

Karl Koskela
Senior Expert


Jenni Hirvö
Senior Expert

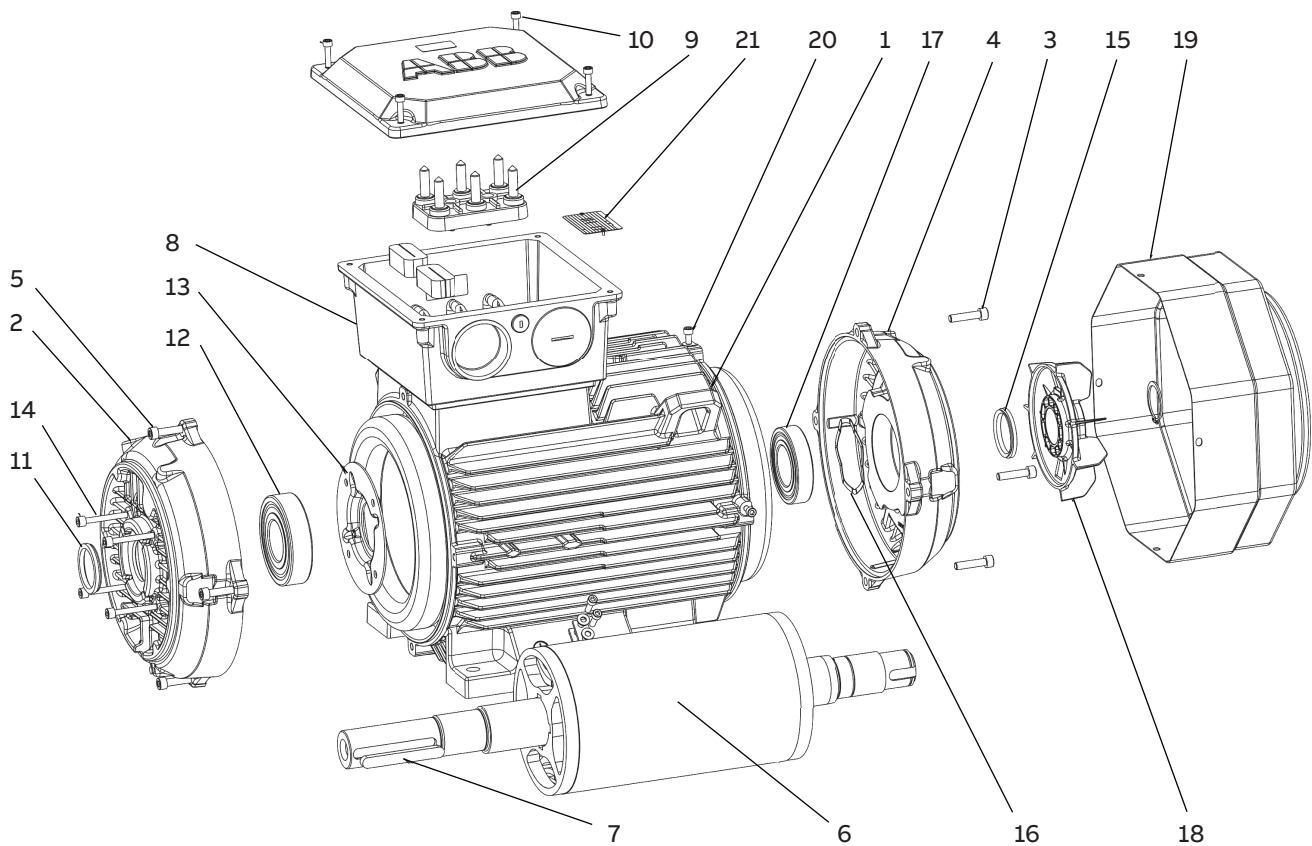


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02

Motor construction



Typical exploded view of cast iron motors, frame size 160

- | | | |
|--------------------------------|----------------------------------|-------------------------|
| 1 Stator frame | 8 Terminal box | 15 Seal, N-end |
| 2 End shield, D-end | 9 Terminal board | 16 Wave spring |
| 3 Screws for end shield, N-end | 10 Screws for terminal box cover | 17 Bearing, N-end |
| 4 End shield, N-end | 11 Seal, D-end | 18 Fan |
| 5 Screws for end shield, D-end | 12 Bearing, D-end | 19 Fan cover |
| 6 Rotor with shaft | 13 Inner bearing cover, D-end | 20 Screws for fan cover |
| 7 Key, D-end | 14 Screws for bearing cover | 21 Rating plate |

Total product offering

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