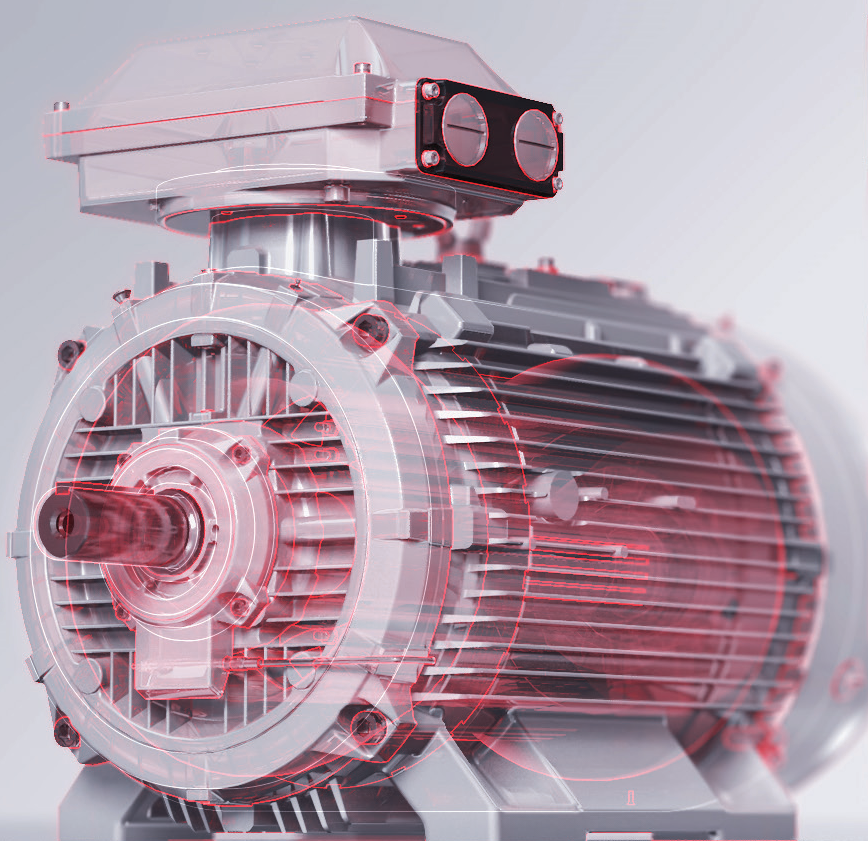


CATALOG | DECEMBER 2021

# Low voltage

## IE5 Synchronous reluctance motors





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

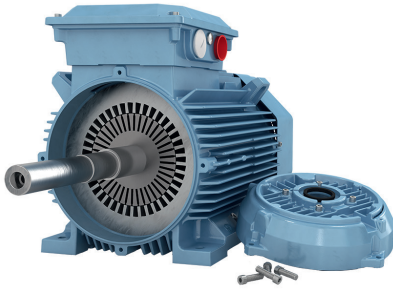
# Low voltage IE5 Synchronous reluctance motors

Sizes 132 to 315, 5.5 to 315 kW

<b>4</b>	<b>Synchronous reluctance motors</b>
4	Ultimate efficiency and reliability to optimize your cost of ownership
6	IE5 according to IEC TS 60034-30-2
8	Technology
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# Synchronous reluctance motors

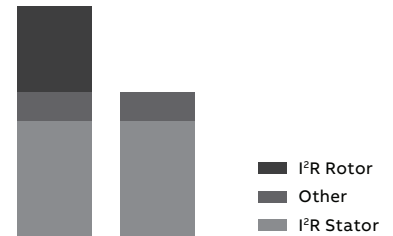
Ultimate efficiency and reliability to optimize your cost of ownership



Traditional induction motor



IE5 SynRM motor



Losses

## Innovation inside

The idea is simple. Take a conventional, proven stator technology and an 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	Perfect for retrofits



**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.

**Perfect for retrofits**

The SynRM package is a perfect solution for motor retrofits. The IE5 SynRM 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.

# Synchronous reluctance motors

## 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.

efficiency with VSD supply are listed for comparison.

### 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) = 96,3%	Eff. (110 kW/ (110 + 5,25 kw)) = 95,4%
IE4 limit 96,3%	IE4 limit 95,4% %

Same motor is IE4 according to both standards

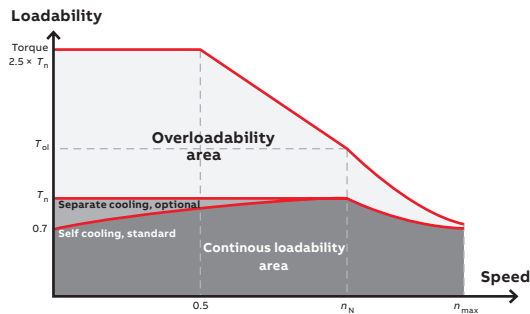
IE5 SynRM efficiency with VSD duty for same rating is 96,8 %.

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

# Synchronous reluctance motors

## IE5 synchronous reluctance motors

01 Torque characteristics of SynRM motors



01

### 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 November 2019.

### 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.

### Package selection

The technical data section lists matching motor and drive packages for easy package selection for pump and fan applications. Refer to ABB for package selection for other speeds or applications, or use the Drive-Size software.

### 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.



# Synchronous reluctance motors

## Technology

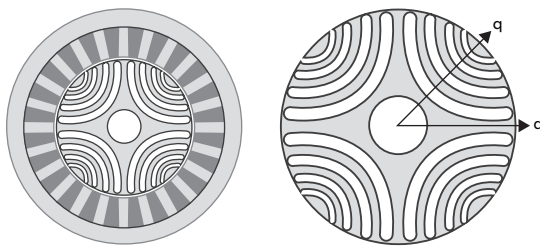
01 Cross-sectional illustration of a four-pole synchronous reluctance motor (left), and the definition of the magnetic d- and q-axes of its rotor (right).

### Introduction

The synchronous reluctance motor is a three-phase electric motor with a magnetically anisotropic rotor structure. In the four-pole version, the rotor has four high- and four low-permeance axes. High permeance means high magnetic conductivity and higher inductance, while low permeance means lower inductance.

Reluctance is the inverse of permeance and is, in practical terms, magnetic resistance; high reluctance results in low inductance. The axes with high permeance can be referred to as the direct or d-axis, while the axes with high reluctance can be referred to as the quadrature or q-axis.

The figures below show cross-sectionals of a synchronous reluctance motor. The different axes in the rotor are identified in the figure on the right.



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 direct-on-line supply. The rotor runs in synchronism with the applied vector field, striving to minimize reluctance in the magnetic circuit that is present. This functional principle has given its name to the technology – synchronous reluctance.

Synchronous reluctance motors run smoothly due to the sinusoidal air gap field distribution and operation with sinusoidal current.

### Rotor design

The rotor design of a synchronous reluctance motor comprises electric steel plates stacked together to form a rotor package. The electric steel plates have punched holes as flux barriers, as illustrated in the figure 01.

The torque produced by the motor is proportional to the difference between the inductances on the d- and q-axes: the greater this difference, the greater the torque production. The synchronous reluctance motor is therefore designed with magnetically conductive material, iron, in the d-axis and magnetically insulating material, air, in the q-axis.

As the rotor has no windings and consequently no joule losses, it runs considerably cooler and with better efficiency than the rotor in an induction motor. The cool running of the rotor also means lower bearing temperatures, which in turn increase the reliability of the bearing system.

### Further considerations

Eliminating rotor joule losses in the synchronous reluctance motor has led to compact construction, good efficiency levels and cooler bearing temperatures. The main disadvantage of this technology is that the motor's power factor is generally not as good as with induction motors.

Since there is always a frequency converter between the motor and the grid, the lower power factor is not apparent on the grid side and conse-

quently 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.

# Synchronous reluctance motors with ABB variable speed 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.

General purpose ACS580 drives and 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 <https://new.abb.com/drives>



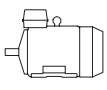
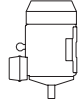
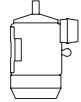
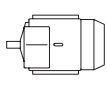
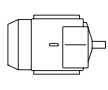
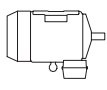
# Mounting arrangements

## Foot-mounted motor

Code I / code II

Product code pos. 12

A: foot-mounted, term. box top  
R: foot-mounted, term. box RHS  
L: foot-mounted, term. box LHS

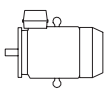
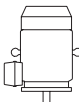
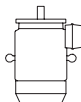
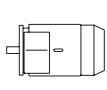
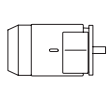
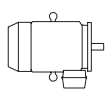
					
IM B3	IM V5	IM V6	IM B6	IM B7	IM B8
IM 1001	IM 1011	IM 1031	IM 1051	IM 1061	IM 1071

## Flange-mounted motor, large flange

Code I / code II

Product code pos. 12

B: flange mounted, large flange

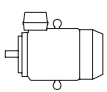
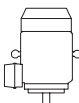
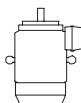
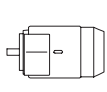
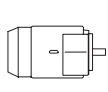
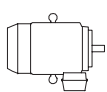
					
IM B5	IM V1	IM V3	*)	*)	*)
IM 3001	IM 3011	IM 3031	IM 3051	IM 3061	IM 3071

## Flange-mounted motor, small flange

Code I / code II

Product code pos. 12

C: flange mounted, small flange

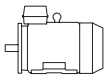
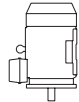
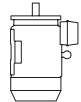
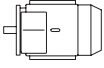
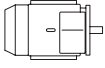
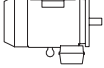
					
IM B14	IM V18	IM V19	*)	*)	*)
IM 3601	IM 3611	IM 3631	IM 3651	IM 3661	IM 3671

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

Code I / code II

Product code pos. 12

H: foot/flange-mounted, term. box top  
S: foot/flange-mounted, term. box RHS  
T: foot/flange-mounted, term. box LHS

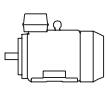

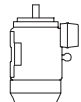
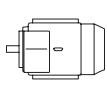
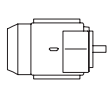
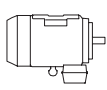
					
IM B35	IM V15	IM V35	*)	*)	*)
IM 2001	IM 2011	IM 2031	IM 2051	IM 2061	IM 2071

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

Code I / code II

Product code pos. 12


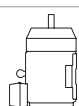
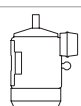
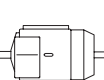
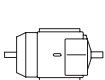
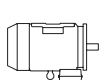
J: foot/flange-mounted, small flange

					
IM B34	IM V17				
IM 2101	IM 2111	IM 2131	IM 2151	IM 2161	IM 2171

## Foot-mounted motor, shaft with free extensions

Code I / code II

Product code pos. 12

					
IM 1002	IM 1012	IM 1032	IM 1052	IM 1062	IM 1072

\*) Not stated in IEC 60034-7.

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

# Ordering information

## Explanation of the product code

Motor type	Motor size	Product code	Mounting arrangement code, Voltage and frequency code, Generation code	Variant codes
M3BL	160	MLA 3GBL 162 413	- ASC	445
		1 2 3 4 5 6 7 8 9 10 11 12 13 14		

### Positions 1 to 4

3GAL	Totally enclosed fan-cooled synchronous reluctance motor with cast aluminum frame, sizes 90 - 132
3GBL	Totally enclosed fan-cooled synchronous reluctance motor with cast iron frame, sizes 160 - 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 with clearance holes.
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 50 Hz
E:	500 VΔ 50 Hz
F:	500 VY 50 Hz
S:	400 VY 50 Hz
U:	690 VΔ 50 Hz

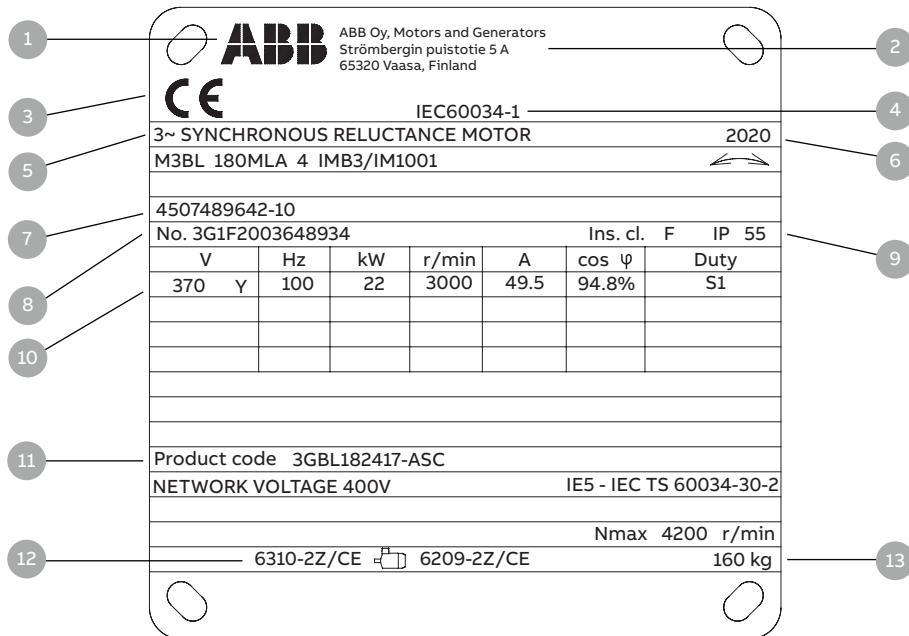
### Position 14

Generation code	
C	IE5 synchronous reluctance motors

### Variant codes

The product code must be, if needed, followed by variant codes.

# Rating plates



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



# Technical data

## IE5 synchronous reluctance motors, 400 V

These tables present technical performance data for the currently available IE5 motor and drive packages.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034- 30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current I <sub>n</sub> / A	Torque		Inertia J kgm <sup>2</sup>	Weight kg	Tempera- ture rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>3000 r/min (100 Hz)</b>												
<b>Network: 400 V</b>												
5.5	M3AL 132SMA 4	3GAL132217--SC	IE5	92.8	87.8	4500	12.1	17.5	1.5	0.0145	41	B
7.5	M3AL 132SMB 4	3GAL132227--SC	IE5	93.1	88.8	4500	16.5	23.9	1.5	0.0145	41	B
11	M3AL 132SMC 4	3GAL132237--SC	IE5	94.0	90.0	4500	24.5	35.0	1.5	0.0184	47	B
15	M3AL 132SMD 4	3GAL132247--SC	IE5	94.1	90.8	4500	32.9	47.7	1.5	0.0184	47	B
11	M3BL 160MLA 4	3GBL162417--SC	IE5	93.7	90.0	4500	25.6	35.0	1.5	0.05789	133	B
15	M3BL 160MLB 4	3GBL162427--SC	IE5	95.1	90.8	4500	34.6	48.0	1.5	0.05789	133	B
18.5	M3BL 160MLC 4	3GBL162437--SC	IE5	94.6	91.4	4500	43.3	59.0	1.5	0.05789	133	B
22	M3BL 180MLA 4	3GBL182417--SC	IE5	94.8	91.7	4500	49.5	70.0	1.5	0.07022	160	B
30	M3BL 200MLA 4	3GBL202417--SC	IE4	94.6	92.4	4500	68.3	95.0	1.5	0.2067	259	B
37	M3BL 200MLB 4	3GBL202427--SC	IE5	95.5	92.8	4500	84.5	118	1.5	0.2067	259	B
45	M3BL 225SMA 4	3GBL222217--SC	IE5	96.0	93.2	4500	101	143	1.5	0.24247	282	B
55	M3BL 225SMF 4	3GBL222267--SC	IE4	95.3	93.5	4500	124	175	1.5	0.24247	282	B

\* Additional motor losses acc. to IEC TS 60034-30-2.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>1500 r/min (50 Hz)</b>				<b>Network: 400 V</b>								
5.5	M3AL 132SMA 4	3GAL132213--SC	IE5	93.7	88.2	4500	11.7	35.0	1.5	0.0277	63	B
7.5	M3AL 132SMB 4	3GAL132223--SC	IE5	93.7	89.1	4500	15.7	47.7	1.5	0.0277	63	B
11	M3AL 132SMC 4	3GAL132233--SC	IE5	94.2	90.2	4500	23.8	70.0	1.5	0.0317	69	B
11	M3BL 160MLA 4	3GBL162413--SC	IE5	94.0	90.2	4500	24.2	70.0	1.5	0.07022	160	B
15	M3BL 160MLB 4	3GBL162423--SC	IE5	94.9	91.0	4500	31.3	95.0	1.5	0.08637	177	B
18.5	M3BL 180MLA 4	3GBL182413--SC	IE4	94.3	91.6	4500	40.3	118	1.5	0.08637	177	B
22	M3BL 200MLF 4	3GBL202463--SC	IE5	95.7	92.0	4500	48.1	140	1.5	0.28718	304	B
30	M3BL 200MLA 4	3GBL202413--SC	IE4	95.3	92.7	4500	66.1	191	1.5	0.28718	304	B
37	M3BL 250SMF 4	3GBL252263--SC	IE5	95.5	93.0	3600	83.0	236	1.5	0.57534	428	B
45	M3BL 250SMG 4	3GBL252273--SC	IE4	95.6	93.4	3600	98.9	286	1.5	0.57534	428	B
55	M3BL 250SMA 4	3GBL252213--SC	IE4	95.6	93.8	3600	119	350	1.5	0.6325	454	B
75	M3BL 280SMA 4	3GBL282213--DC	IE4	96.1	94.3	2600	166	478	2.0	1	639	B
90	M3BL 280SMB 4	3GBL282223--DC	IE5	96.5	94.5	2600	199	573	2.1	1	639	B
110	M3BL 280SMC 4	3GBL282233--DC	IE5	96.7	94.3	2600	241	699	2.1	1.21	697	B
110	M3BL 315SMA 4	3GBL312213--DC	IE5	96.8	94.3	2200	243	702	2.0	1.64	873	B
132	M3BL 315SMB 4	3GBL312223--DC	IE5	96.8	94.6	2200	290	842	2.0	1.87	925	B
160	M3BL 315SMC 4	3GBL312233--DC	IE5	97.1	94.8	2200	343	1018	1.9	2.04	965	B
200	M3BL 315MLA 4	3GBL312413--DC	IE5	97.2	95.0	2200	428	1272	1.9	2.45	1116	B
250	M3BL 315LKA 4	3GBL312813--DC	IE5	97.1	95.0	2200	552	1591	2.0	3.04	1357	B
315	M3BL 315LKC 4	3GBL312833--DC	IE5	97.2	95.0	2200	662	2006	1.8	3.77	1533	F

\* Additional motor losses acc. to IEC TS 60034-30-2.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>1000 r/min (33.3 Hz)</b>				<b>Network: 400 V</b>								
7.5	M3BL 160MLA 4	3GBL162412--SC	IE5	93.1	87.7	4500	16.5	72.0	1.5	0.07022	160	B
11	M3BL 160MLB 4	3GBL162422--SC	IE5	93.7	89.0	4500	24.1	105	1.5	0.08637	177	B
15	M3BL 200MLF 4	3GBL202462--SC	IE5	94.7	90.0	4500	32.4	143	1.5	0.24247	282	B
18.5	M3BL 200MLA 4	3GBL202412--SC	IE5	95.2	90.6	4500	39.9	177	1.5	0.28718	304	B
22	M3BL 200MLB 4	3GBL202422--SC	IE5	95.0	91.1	4500	47.0	210	1.5	0.28718	304	B
30	M3BL 250SMF 4	3GBL252262--SC	IE5	95.3	91.9	3600	67.2	286	1.5	0.49911	391	B
37	M3BL 250SMA 4	3GBL252212--SC	IE5	95.6	92.4	3600	80.5	353	1.5	0.57534	428	B
45	M3BL 280SMA 4	3GBL282212--DC	IE5	96.2	92.8	2600	98.6	430	2.3	1	639	B
55	M3BL 280SMB 4	3GBL282222--DC	IE5	96.0	93.3	2600	119	526	2.0	1	639	B
75	M3BL 280SMC 4	3GBL282232--DC	IE5	96.2	93.8	2600	160	715	2.1	1.21	697	B
75	M3BL 315SMA 4	3GBL312212--DC	IE5	96.5	93.8	2200	164	717	2.0	1.64	873	B
90	M3BL 315SMB 4	3GBL312222--DC	IE5	96.8	94.2	2200	199	859	2.0	1.87	925	B
110	M3BL 315SMC 4	3GBL312232--DC	IE5	96.8	93.9	2200	241	1051	1.9	2.04	965	B
132	M3BL 315MLA 4	3GBL312412--DC	IE5	97.1	94.3	2200	278	1261	1.7	2.45	1116	B
160	M3BL 315LKA 4	3GBL312812--DC	IE5	97.1	94.6	2000	341	1527	1.9	3.04	1357	B
200	M3BL 315LKC 4	3GBL312832--DC	IE5	97.3	94.8	2000	416	1910	1.8	3.77	1533	B

\* Additional motor losses acc. to IEC TS 60034-30-2.

# Technical data

## IE5 synchronous reluctance motors, 500 V

This table presents technical performance data for the currently available IE5 motor and drive packages.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034- 30-2	Motor ef- ficiency with VSD supply TN= 100%, nN=100%	Typical IE3 in- duction motor ef- ficiency with VSD supply * TN= 100%, nN=100%	Max. Speed r/ min	Current I <sub>n</sub> / A	Torque		Inertia J kgm <sup>2</sup>	Weight kg	Tempera- ture rise class (M)
								T <sub>N</sub> Nm	T <sub>ol</sub> /T <sub>N</sub> Nm			
<b>3000 r/min (100 Hz)</b>												
<b>Network: 500 V</b>												
5.5	M3AL 132SMA 4	3GAL132217--FC	IE5	92.8	87.8	4500	9.6	17.5	1.5	0.0145	41	B
7.5	M3AL 132SMB 4	3GAL132227--FC	IE5	93.1	88.8	4500	13.3	23.9	1.5	0.0145	41	B
11	M3AL 132SMC 4	3GAL132237--FC	IE5	93.1	90.0	4500	19.8	35.0	1.5	0.0184	47	B
15	M3AL 132SMD 4	3GAL132247--FC	IE5	94.1	90.8	4500	26.6	47.7	1.5	0.0184	47	B
11	M3BL 160MLA 4	3GBL162417--FC	IE5	93.6	90.0	4500	20.8	35.0	1.5	0.0579	133	B
15	M3BL 160MLB 4	3GBL162427--FC	IE5	95.1	90.8	4500	27.2	47.7	1.5	0.0579	133	B
18.5	M3BL 160MLC 4	3GBL162437--FC	IE5	94.5	91.4	4500	34.1	58.9	1.5	0.0579	133	B
22	M3BL 180MLA 4	3GBL182417--FC	IE5	94.7	91.7	4500	39.5	70.0	1.5	0.0702	160	B
30	M3BL 200MLA 4	3GBL202417--FC	IE4	94.7	92.4	4500	53.8	95.5	1.5	0.207	259	B
37	M3BL 200MLB 4	3GBL202427--FC	IE5	95.5	92.8	4500	66.5	118	1.5	0.207	259	B
45	M3BL 225SMA 4	3GBL222217--FC	IE5	96.0	93.2	4500	79.5	143	1.5	0.242	282	B
55	M3BL 225SMF 4	3GBL222267--FC	IE4	95.3	93.5	4500	97.6	175	1.5	0.242	282	B

\* Additional motor losses acc. to IEC TS 60034-30-2.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>1500 r/min (50 Hz)</b>				<b>Network: 500 V</b>								
5.5	M3AL 132SMA 4	3GAL132213--FC	IE5	93.7	88.2	4500	9.5	35.0	1.5	0.0277	63	B
7.5	M3AL 132SMB 4	3GAL132223--FC	IE5	93.7	89.1	4500	12.8	47.7	1.5	0.0277	63	B
11	M3AL 132SMC 4	3GAL132233--FC	IE5	94.1	90.2	4500	19.3	70.0	1.5	0.0317	69	B
11	M3BL 160MLA 4	3GBL162413--FC	IE5	94.0	90.2	4500	19.1	70.0	1.5	0.0702	160	B
15	M3BL 160MLB 4	3GBL162423--FC	IE5	94.8	91.0	4500	25.3	95.5	1.5	0.0864	177	B
18.5	M3BL 180MLA 4	3GBL182413--FC	IE4	94.1	91.6	4500	31.7	118	1.5	0.0864	177	B
22	M3BL 200MLF 4	3GBL202463--FC	IE5	95.8	92.0	4500	37.9	140	1.5	0.287	304	B
30	M3BL 200MLA 4	3GBL202413--FC	IE4	95.4	92.7	4500	52.1	191	1.5	0.287	304	B
37	M3BL 250SMF 4	3GBL252263--FC	IE5	95.5	93.0	3600	65.3	236	1.5	0.575	428	B
45	M3BL 250SMG 4	3GBL252273--FC	IE4	95.7	93.4	3600	77.9	286	1.5	0.575	428	B
55	M3BL 250SMA 4	3GBL252213--FC	IE4	95.6	93.8	3600	93.7	350	1.5	0.632	454	B
75	M3BL 280SMA 4	3GBL282213--EC	IE4	96.1	94.3	2600	131	477	2.0	1	639	B
90	M3BL 280SMB 4	3GBL282223--EC	IE5	96.5	94.5	2600	157	573	2.1	1	639	B
110	M3BL 280SMC 4	3GBL282233--EC	IE5	96.7	94.3	2600	190	700	2.1	1.21	697	B
110	M3BL 315SMA 4	3GBL312213--EC	IE5	96.8	94.3	2200	191	700	2.0	1.64	873	B
132	M3BL 315SMB 4	3GBL312223--EC	IE5	96.8	94.6	2200	232	840	2.0	1.87	925	B
160	M3BL 315SMC 4	3GBL312233--EC	IE5	97.1	94.8	2200	271	1019	1.9	2.04	965	B
200	M3BL 315MLA 4	3GBL312413--EC	IE5	97.2	95.0	2200	326	1273	1.9	2.45	1116	B
250	M3BL 315LKA 4	3GBL312813--EC	IE5	97.1	95.0	2200	434	1592	2.0	3.04	1357	B
315	M3BL 315LKC 4	3GBL312833--EC	IE5	97.2	95.0	2200	517	2005	1.8	3.77	1533	F

\* Additional motor losses acc. to IEC TS 60034-30-2.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>1000 r/min (33.3 Hz)</b>				<b>Network: 500 V</b>								
7.5	M3BL 160MLA 4	3GBL162412--FC	IE5	93.3	87.7	4500	13.1	71.6	1.5	0.0702	160	B
11	M3BL 160MLB 4	3GBL162422--FC	IE5	93.7	89.0	4500	19.0	105	1.5	0.0864	177	B
15	M3BL 200MLF 4	3GBL202462--FC	IE5	94.9	90.0	4500	25.6	143	1.5	0.242	282	B
18.5	M3BL 200MLA 4	3GBL202412--FC	IE5	95.4	90.6	4500	31.5	177	1.5	0.287	304	B
22	M3BL 200MLB 4	3GBL202422--FC	IE5	95.2	91.1	4500	37.0	210	1.5	0.287	304	B
30	M3BL 250SMF 4	3GBL252262--FC	IE5	95.4	91.9	3600	52.9	287	1.5	0.499	391	B
37	M3BL 250SMA 4	3GBL252212--FC	IE5	95.8	92.4	3600	63.4	353	1.5	0.575	428	B
45	M3BL 280SMA 4	3GBL282212--EC	IE5	96.2	92.8	2600	77.6	430	2.3	1	639	B
55	M3BL 280SMB 4	3GBL282222--EC	IE5	96.1	93.3	2600	93.7	525	2.0	1	639	B
75	M3BL 280SMC 4	3GBL282232--EC	IE5	96.2	93.8	2600	126	716	2.1	1.21	697	B
75	M3BL 315SMA 4	3GBL312212--EC	IE5	96.5	93.8	2200	129	716	2.0	1.64	873	B
90	M3BL 315SMB 4	3GBL312222--EC	IE5	96.8	94.2	2200	157	859	2.0	1.87	925	B
110	M3BL 315SMC 4	3GBL312232--EC	IE5	96.8	93.9	2200	190	1050	1.9	2.04	965	B
132	M3BL 315MLA 4	3GBL312412--EC	IE5	97.1	94.3	2200	219	1261	1.7	2.45	1116	B
160	M3BL 315LKA 4	3GBL312812--EC	IE5	97.1	94.6	2000	269	1528	1.9	3.04	1357	B
200	M3BL 315LKC 4	3GBL312832--EC	IE5	97.3	94.8	2000	327	1910	1.8	3.77	1533	B

\* Additional motor losses acc. to IEC TS 60034-30-2.

# Technical data

## IE5 synchronous reluctance motors, 690 V

This table presents technical performance data for the currently available IE5 motor and drive packages.

Performance at nominal speed													
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)	
								TN Nm	TOL/TN Nm				
<b>3000 r/min (100 Hz)</b>													
<b>Network: 690 V</b>													
5.5	M3AL 132SMA 4	3GAL132217--UC	IE5	92.5	87.8	4500	7.0	17.5	1.5	0.0145	41	B	
7.5	M3AL 132SMB 4	3GAL132227--UC	IE5	92.8	88.8	4500	9.5	23.9	1.5	0.0145	41	B	
11	M3AL 132SMC 4	3GAL132237--UC	IE5	92.9	90.0	4500	14.1	35.0	1.5	0.0184	47	B	
15	M3AL 132SMD 4	3GAL132247--UC	IE5	93.7	90.8	4500	18.9	47.7	1.5	0.0184	47	B	
11	M3BL 160MLA 4	3GBL162417--UC	IE5	93.6	90.0	4500	14.8	35.0	1.5	0.0579	133	B	
15	M3BL 160MLB 4	3GBL162427--UC	IE5	94.9	90.8	4500	20.0	47.7	1.5	0.0579	133	B	
18.5	M3BL 160MLC 4	3GBL162437--UC	IE5	94.5	91.4	4500	25.1	58.9	1.5	0.0579	133	B	
22	M3BL 180MLA 4	3GBL182417--UC	IE5	94.7	91.7	4500	28.7	70.0	1.5	0.0702	160	B	
30	M3BL 200MLA 4	3GBL202417--UC	IE4	94.6	92.4	4500	39.6	95.5	1.5	0.207	259	B	
37	M3BL 200MLB 4	3GBL202427--UC	IE5	95.4	92.8	4500	49.0	118	1.5	0.207	259	B	
45	M3BL 225SMA 4	3GBL222217--UC	IE5	96.0	93.2	4500	58.6	143	1.5	0.242	282	B	
55	M3BL 225SMF 4	3GBL222267--UC	IE4	95.2	93.5	4500	71.9	175	1.5	0.242	282	B	

\* Additional motor losses acc. to IEC TS 60034-30-2.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>1500 r/min (50 Hz)</b>				<b>Network: 690 V</b>								
5.5	M3AL 132SMA 4	3GAL132213--UC	IE5	93.3	88.2	4500	6.8	35.0	1.5	0.0277	63	B
7.5	M3AL 132SMB 4	3GAL132223--UC	IE5	93.3	89.1	4500	9.2	47.7	1.5	0.0277	63	B
11	M3AL 132SMC 4	3GAL132233--UC	IE5	93.7	90.2	4500	13.9	70.0	1.5	0.0317	69	B
11	M3BL 160MLA 4	3GBL162413--UC	IE4	93.6	90.2	4500	14.1	70.0	1.5	0.0702	160	B
15	M3BL 160MLB 4	3GBL162423--UC	IE4	94.6	91.0	4500	18.4	95.5	1.5	0.0864	177	B
18.5	M3BL 180MLA 4	3GBL182413--UC	IE4	93.9	91.6	4500	23.0	118	1.5	0.0864	177	B
22	M3BL 200MLF 4	3GBL202463--UC	IE5	95.6	92.0	4500	27.4	140	1.5	0.287	304	B
30	M3BL 200MLA 4	3GBL202413--UC	IE4	95.3	92.7	4500	38.6	191	1.5	0.287	304	B
37	M3BL 250SMF 4	3GBL252263--UC	IE5	95.5	93.0	3600	47.4	236	1.5	0.575	428	B
45	M3BL 250SMG 4	3GBL252273--UC	IE4	95.6	93.4	3600	56.7	286	1.5	0.575	428	B
55	M3BL 250SMA 4	3GBL252213--UC	IE4	95.6	93.8	3600	68.1	350	1.5	0.632	454	B
75	M3BL 280SMA 4	3GBL282213--UC	IE4	96.0	94.3	2600	92.6	477	2.0	1	639	B
90	M3BL 280SMB 4	3GBL282223--UC	IE5	96.3	94.5	2600	110	573	2.1	1	639	B
110	M3BL 280SMC 4	3GBL282233--UC	IE5	96.6	94.3	2600	133	700	2.1	1.21	697	B
110	M3BL 315SMA 4	3GBL312213--UC	IE5	96.7	94.3	2200	138	700	2.0	1.64	873	B
132	M3BL 315SMB 4	3GBL312223--UC	IE5	96.7	94.6	2200	165	840	2.0	1.87	925	B
160	M3BL 315SMC 4	3GBL312233--UC	IE5	97.0	94.8	2200	195	1019	1.9	2.04	965	B
200	M3BL 315MLA 4	3GBL312413--UC	IE5	97.1	95.0	2200	244	1273	1.9	2.45	1116	B
250	M3BL 315LKA 4	3GBL312813--UC	IE5	97.0	95.0	2200	314	1592	2.0	3.04	1357	B
315	M3BL 315LKC 4	3GBL312833--UC	IE5	97.1	95.0	2200	377	2005	1.8	3.77	1533	F

\* Additional motor losses acc. to IEC TS 60034-30-2.

Performance at nominal speed												
Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply TN=100%, nN=100%	Typical IE3 induction motor efficiency with VSD supply * TN=100%, nN=100%	Max. Speed r/ min	Current In/ A	Torque		Inertia J kgm2	Weight kg	Temperature rise class (M)
								T <sub>N</sub> Nm	T <sub>OL</sub> /T <sub>N</sub> Nm			
<b>1000 r/min (33.3 Hz)</b>				<b>Network: 690 V</b>								
7.5	M3BL 160MLA 4	3GBL162412--UC	IE5	93.0	87.7	4500	9.5	71.6	1.5	0.0702	160	B
11	M3BL 160MLB 4	3GBL162422--UC	IE4	93.4	89.0	4500	13.8	105	1.5	0.0864	177	B
15	M3BL 200MLF 4	3GBL202462--UC	IE5	94.7	90.0	4500	18.5	143	1.5	0.242	282	B
18.5	M3BL 200MLA 4	3GBL202412--UC	IE5	95.0	90.6	4500	22.6	177	1.5	0.287	304	B
22	M3BL 200MLB 4	3GBL202422--UC	IE5	94.9	91.1	4500	26.5	210	1.5	0.287	304	B
30	M3BL 250SMF 4	3GBL252262--UC	IE5	95.2	91.9	3600	38.6	287	1.5	0.499	391	B
37	M3BL 250SMA 4	3GBL252212--UC	IE5	95.6	92.4	3600	46.0	353	1.5	0.575	428	B
45	M3BL 280SMA 4	3GBL282212--UC	IE5	96.0	92.8	2600	54.6	430	2.3	1	639	B
55	M3BL 280SMB 4	3GBL282222--UC	IE5	95.8	93.3	2600	66.8	525	2.0	1	639	B
75	M3BL 280SMC 4	3GBL282232--UC	IE5	96.0	93.8	2600	89.8	716	2.1	1.21	697	B
75	M3BL 315SMA 4	3GBL312212--UC	IE5	96.4	93.8	2200	91.6	716	2.0	1.64	873	B
90	M3BL 315SMB 4	3GBL312222--UC	IE5	96.6	94.2	2200	111	860	2.0	1.87	925	B
110	M3BL 315SMC 4	3GBL312232--UC	IE5	96.7	93.9	2200	134	1051	1.9	2.04	965	B
132	M3BL 315MLA 4	3GBL312412--UC	IE5	96.9	94.3	2200	156	1261	1.7	2.45	1116	B
160	M3BL 315LKA 4	3GBL312812--UC	IE5	96.9	94.6	2000	189	1528	1.9	3.04	1357	B
200	M3BL 315LKC 4	3GBL312832--UC	IE5	97.0	94.8	2000	232	1910	1.8	3.77	1533	B

\* Additional motor losses acc. to IEC TS 60034-30-2.



# IE5 SynRM motors and Drive packages

## SynRM motors and ACS880 drives package

Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply $T_N = 100\%$ , $n_n = 100\%$	Current $I_n$ / A	ACS880 drives and motor package efficiency at nominal point (no overload**)	
						Drive type	Eff.
<b>3000 r/min (100 Hz)</b>			<b>Network: 400 V</b>				
5.5	M3AL 132SMA 4	3GAL132217--SC	IE5	92.8	12.1	ACS880-01-14A3-3	90.3
7.5	M3AL 132SMB 4	3GAL132227--SC	IE5	93.1	16.5	ACS880-01-017A7-3	90.6
11	M3AL 132SMC 4	3GAL132237--SC	IE5	94.0	24.5	ACS880-01-025A5-3	91.1
15	M3AL 132SMD 4	3GAL132247--SC	IE5	94.1	32.9	ACS880-01-035A-3	91.7
11	M3BL 160MLA 4	3GBL162417--SC	IE5	93.7	25.6	ACS880-01-025A5-3	90.8
15	M3BL 160MLB 4	3GBL162427--SC	IE5	95.1	34.6	ACS880-01-035A-3	92.5
18.5	M3BL 160MLC 4	3GBL162437--SC	IE5	94.6	43.3	ACS880-01-043A-3	92.4
22	M3BL 180MLA 4	3GBL182417--SC	IE5	94.8	49.5	ACS880-01-050A-3	92.5
30	M3BL 200MLA 4	3GBL202417--SC	IE4	94.6	68.3	ACS880-01-069A-3	92.4
37	M3BL 200MLB 4	3GBL202427--SC	IE5	95.5	84.5	ACS880-01-085A-3	92.9
45	M3BL 225SMA 4	3GBL222217--SC	IE5	96.0	101	ACS880-01-103A-3	93.8
55	M3BL 225SMF 4	3GBL222267--SC	IE4	95.3	124	ACS880-01-123A-3	93.0

\* ACS880-04 drive module, protection IP 21.

\*\* Consult ABB for motor and drive dimensioning for applications with other load characteristics.

Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor efficiency with VSD supply $T_N = 100\%$ , $n_n = 100\%$	Current $I_n$ / A	ACS880 drives and motor package efficiency at nominal point (no overload**)	
						Drive type	Eff.
<b>1500 r/min (50 Hz)</b>			<b>Network: 400 V</b>				
5.5	M3AL 132SMA 4	3GAL132213--SC	IE5	93.7	11.7	ACS880-01-14A3-3	91.0
7.5	M3AL 132SMB 4	3GAL132223--SC	IE5	93.7	15.7	ACS880-01-17A7-3	91.1
11	M3AL 132SMC 4	3GAL132233--SC	IE5	94.2	23.8	ACS880-01-25A5-3	91.2
11	M3BL 160MLA 4	3GBL162413--SC	IE5	94.0	24.2	ACS880-01-25A5-3	91.1
15	M3BL 160MLB 4	3GBL162423--SC	IE5	94.8	31.3	ACS880-01-035A-3	92.3
18.5	M3BL 180MLA 4	3GBL182413--SC	IE4	94.3	40.3	ACS880-01-043A-3	92.2
22	M3BL 200MLF 4	3GBL202463--SC	IE5	95.7	48.1	ACS880-01-050A-3	93.3
30	M3BL 200MLA 4	3GBL202413--SC	IE4	95.3	66.1	ACS880-01-069A-3	93.0
37	M3BL 250SMF 4	3GBL252263--SC	IE5	95.5	83.0	ACS880-01-085A-3	92.9
45	M3BL 250SMG 4	3GBL252273--SC	IE4	95.6	98.9	ACS880-01-103A-3	93.4
55	M3BL 250SMA 4	3GBL252213--SC	IE4	95.6	119	ACS880-01-123A-3	93.3
75	M3BL 280SMA 4	3GBL282213--DC	IE4	96.1	166	ACS880-01-173A-3	93.6
90	M3BL 280SMB 4	3GBL282223--DC	IE5	96.5	199	ACS880-01-202A-3	93.8
110	M3BL 280SMC 4	3GBL282233--DC	IE5	96.7	241	ACS880-01-245A-3	94.2
110	M3BL 315SMA 4	3GBL312213--DC	IE5	96.8	243	ACS880-01-245A-3	94.3
132	M3BL 315SMB 4	3GBL312223--DC	IE5	96.8	290	ACS880-01-290A-3	94.3
160	M3BL 315SMC 4	3GBL312233--DC	IE5	97.1	343	ACS880-01-343A-3	94.7
200	M3BL 315MLA 4	3GBL312413--DC	IE5	97.2	428	ACS880-01-427A-3	94.6
250	M3BL 315LKA 4	3GBL312813--DC	IE5	97.1	552	ACS880-04-585A-3*	94.7
315	M3BL 315LKC 4	3GBL312833--DC	IE5	97.2	662	ACS880-04-650A-3*	94.9

\* ACS880-04 drive module, protection IP 21.

\*\* Consult ABB for motor and drive dimensioning for applications with other load characteristics.

Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor ef- ficiency with VSD supply $T_N = 100\%$ , $n_N = 100\%$	Current $I_n / A$	ACS880 drives and motor package effi- ciency at nominal point (no overload**)	
						Drive type	Eff.
<b>1000 r/min (33.3 Hz)</b>			<b>Network: 400 V</b>				
7.5	M3BL 160MLA 4	3GBL162412-SC	IE5	93.1	160	ACS880-01-17A7-3	90.6
11	M3BL 160MLB 4	3GBL162422-SC	IE5	93.7	177	ACS880-01-25A5-3	90.8
15	M3BL 200MLF 4	3GBL202462-SC	IE5	94.7	282	ACS880-01-035A-3	92.2
18.5	M3BL 200MLA 4	3GBL202412-SC	IE5	95.2	304	ACS880-01-043A-3	92.9
22	M3BL 200MLB 4	3GBL202422-SC	IE5	95.0	304	ACS880-01-050A-3	92.7
30	M3BL 250SMF 4	3GBL252262-SC	IE5	95.3	391	ACS880-01-069A-3	93.0
37	M3BL 250SMA 4	3GBL252212-SC	IE5	95.6	428	ACS880-01-085A-3	92.9
45	M3BL 280SMA 4	3GBL282212-DC	IE5	96.2	639	ACS880-01-103A-3	94.0
55	M3BL 280SMB 4	3GBL282222-DC	IE5	96.0	639	ACS880-01-123A-3	93.6
75	M3BL 280SMC 4	3GBL282232-DC	IE5	96.2	697	ACS880-01-173A-3	93.7
75	M3BL 315SMA 4	3GBL312212-DC	IE5	96.5	873	ACS880-01-173A-3	94.0
90	M3BL 315SMB 4	3GBL312222-DC	IE5	96.8	925	ACS880-01-202A-3	94.1
110	M3BL 315SMC 4	3GBL312232-DC	IE5	96.8	965	ACS880-01-245A-3	94.3
132	M3BL 315MLA 4	3GBL312412-DC	IE5	97.1	1116	ACS880-01-290A-3	94.6
160	M3BL 315LKA 4	3GBL312812-DC	IE5	97.1	1357	ACS880-01-343A-3	94.7
200	M3BL 315LKC 4	3GBL312832-DC	IE5	97.3	1533	ACS880-01-427A-3	94.7

\* ACS880-04 drive module, protection IP 21.

\*\* Consult ABB for motor and drive dimensioning for applications with other load characteristics.

# IE5 SynRM motors and Drive packages

## SynRM motors and ACS/H/Q580 drives package

Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor ef- ficiency with VSD supply	Current $I_n$ / A	ACS/H/Q580 drives and motor package efficiency at nominal point (no overload**)	
				$T_N = 100\%$ , $n_n = 100\%$		Drive type	Eff.
<b>3000 r/min (100 Hz)</b>			<b>Network: 400 V</b>				
5.5	M3AL 132SMA 4	3GAL132217--SC	IE5	92.8	12.1	ACS/H/Q580-01-12A7-4	88.9
7.5	M3AL 132SMB 4	3GAL132227--SC	IE5	93.1	16.5	ACS/H/Q580-01-018A-4	90.5
11	M3AL 132SMC 4	3GAL132237--SC	IE5	94.0	24.5	ACS/H/Q580-01-026A-4	91.2
15	M3AL 132SMD 4	3GAL132247--SC	IE5	94.1	32.9	ACS/H/Q580-01-039A-4	91.6
11	M3BL 160MLA 4	3GBL162417--SC	IE5	93.7	25.6	ACS/H/Q580-01-026A-4	91.5
15	M3BL 160MLB 4	3GBL162427--SC	IE5	95.1	34.6	ACS/H/Q580-01-039A-4	92.3
18.5	M3BL 160MLC 4	3GBL162437--SC	IE5	94.6	43.3	ACS/H/Q580-01-046A-4	91.9
22	M3BL 180MLA 4	3GBL182417--SC	IE5	94.8	49.5	ACS/H/Q580-01-062A-4	92.2
30	M3BL 200MLA 4	3GBL202417--SC	IE4	94.6	68.3	ACS/H/Q580-01-073A-4	92.1
37	M3BL 200MLB 4	3GBL202427--SC	IE5	95.5	84.5	ACS/H/Q580-01-088A-4	93.8
45	M3BL 225SMA 4	3GBL222217--SC	IE5	96.0	101	ACS/H/Q580-01-106A-4	93.7
55	M3BL 225SMF 4	3GBL222267--SC	IE4	95.3	124	ACS/H/Q580-01-145A-4	92.6

\* ACS/H/Q580-04 drive module, protection IP20.

\*\* Consult ABB for motor and drive dimensioning for applications with other load characteristics.

Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor ef- ficiency with VSD supply	Current $I_n$ / A	ACS/H/Q580 drives and motor package efficiency at nominal point (no overload**)	
				$T_N = 100\%$ , $n_n = 100\%$		Drive type	Eff.
<b>1500 r/min (50 Hz)</b>			<b>Network: 400 V</b>				
5.5	M3AL 132SMA 4	3GAL132213--SC	IE5	93.7	11.7	ACS/H/Q580-01-12A7-4	91.5
7.5	M3AL 132SMB 4	3GAL132223--SC	IE5	93.7	15.7	ACS/H/Q580-01-018A-4	91.1
11	M3AL 132SMC 4	3GAL132233--SC	IE5	94.2	23.8	ACS/H/Q580-01-026A-4	91.6
11	M3BL 160MLA 4	3GBL162413--SC	IE5	94.0	24.2	ACS/H/Q580-01-026A-4	92.1
15	M3BL 160MLB 4	3GBL162423--SC	IE5	94.8	31.3	ACS/H/Q580-01-039A-4	92.6
18.5	M3BL 180MLA 4	3GBL182413--SC	IE4	94.3	40.3	ACS/H/Q580-01-046A-4	92.1
22	M3BL 200MLF 4	3GBL202463--SC	IE5	95.7	48.1	ACS/H/Q580-01-062A-4	93.5
30	M3BL 200MLA 4	3GBL202413--SC	IE4	95.3	66.1	ACS/H/Q580-01-073A-4	93.1
37	M3BL 250SMF 4	3GBL252263--SC	IE5	95.5	83.0	ACS/H/Q580-01-088A-4	93.6
45	M3BL 250SMG 4	3GBL252273--SC	IE4	95.6	98.9	ACS/H/Q580-01-106A-4	93.9
55	M3BL 250SMA 4	3GBL252213--SC	IE4	95.6	119	ACS/H/Q580-01-145A-4	93.6
75	M3BL 280SMA 4	3GBL282213--DC	IE4	96.1	166	ACS/H/Q580-01-206A-4	93.9
90	M3BL 280SMB 4	3GBL282223--DC	IE5	96.5	199	ACS/H/Q580-01-206A-4	93.9
110	M3BL 280SMC 4	3GBL282233--DC	IE5	96.7	241	ACS/H/Q580-01-246A-4	94.7
110	M3BL 315SMA 4	3GBL312213--DC	IE5	96.8	243	ACS/H/Q580-01-246A-4	94.8
132	M3BL 315SMB 4	3GBL312223--DC	IE5	96.8	290	ACS/H/Q580-01-293A-4	94.3
160	M3BL 315SMC 4	3GBL312233--DC	IE5	97.1	343	ACS/H/Q580-01-363A-4	94.7
200	M3BL 315MLA 4	3GBL312413--DC	IE5	97.2	428	ACS/H/Q580-01-430A-4	94.7
250	M3BL 315LKA 4	3GBL312813--DC	IE5	97.1	552	ACS/H/Q580-04-585A-4*	94.5
315	M3BL 315LKC 4	3GBL312833--DC	IE5	97.2	662	ACS/H/Q580-04-650A-4*	94.6

\* ACS/H/Q580-04 drive module, protection IP20.

\*\* Consult ABB for motor and drive dimensioning for applications with other load characteristics.

Output kW	Type designation	Product code	IE class acc. to IEC TS 60034-30-2	Motor ef- ficiency with VSD supply $T_N = 100\%$ , $n_N = 100\%$	Current $I_n / A$	ACS/H/Q580 drives and motor package efficiency at nominal point (no overload**)	
						Drive type	Eff.
<b>1000 r/min (33 Hz)</b>			<b>Network: 400 V</b>				
7.5	M3BL 160MLA 4	3GBL162412-SC	IE5	93.1	16.5	ACx580-01-018A-4	91.0
11	M3BL 160MLB 4	3GBL162422-SC	IE5	93.7	24.1	ACx580-01-026A-4	91.3
15	M3BL 200MLF 4	3GBL202462-SC	IE5	94.7	32.4	ACx580-01-039A-4	92.5
18.5	M3BL 200MLA 4	3GBL202412-SC	IE5	95.2	39.9	ACx580-01-046A-4	92.7
22	M3BL 200MLB 4	3GBL202422-SC	IE5	95.0	47.0	ACx580-01-062A-4	92.9
30	M3BL 250SMF 4	3GBL252262-SC	IE5	95.3	67.2	ACx580-01-073A-4	92.6
37	M3BL 250SMA 4	3GBL252212-SC	IE5	95.6	80.5	ACx580-01-088A-4	93.4
45	M3BL 280SMA 4	3GBL282212-DC	IE5	96.2	98.6	ACx580-01-106A-4	94.0
55	M3BL 280SMB 4	3GBL282222-DC	IE5	96.0	119	ACx580-01-145A-4	93.8
75	M3BL 280SMC 4	3GBL282232-DC	IE5	96.2	160	ACx580-01-206A-4	94.1
75	M3BL 315SMA 4	3GBL312212-DC	IE5	96.5	164	ACx580-01-206A-4	94.2
90	M3BL 315SMB 4	3GBL312222-DC	IE5	96.8	199	ACx580-01-206A-4	94.2
110	M3BL 315SMC 4	3GBL312232-DC	IE5	96.8	241	ACx580-01-246A-4	94.4
132	M3BL 315MLA 4	3GBL312412-DC	IE5	97.1	278	ACx580-01-293A-4	94.6
160	M3BL 315LKA 4	3GBL312812-DC	IE5	97.1	341	ACx580-01-363A-4	94.7
200	M3BL 315LKC 4	3GBL312832-DC	IE5	97.3	416	ACx580-01-430A-4	94.7

\* ACS/H/Q580-04 drive module, protection IP20.

\*\* Consult ABB for motor and drive dimensioning for applications with other load characteristics.

# Variant codes

## IE5 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	132	160	180	200	225	250	280	315
<b>Administration</b>								
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	•	•	•	•	•	•	•	•
684 ABB Ability Smart sensor mounted	-	•	•	•	•	•	•	•
<b>Balancing</b>								
423 Balanced without key.	•	•	•	•	•	•	•	•
424 Full-key balancing	•	•	•	•	•	•	•	•
<b>Bearings and Lubrication</b>								
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.	-	•	•	•	•	•	•	•
194 ZZ bearings greased for life at both ends.	○	○	○	○	•	•	-	-
420 Bearing mounted PTC thermistors.	-	-	-	-	-	-	•	•
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	-	•	•	•	•	•	•	•
<b>Branch standard designs</b>								
177 Design for high ambient applications	-	•	•	•	•	•	-	-
178 Stainless steel / acid proof bolts.	•	•	•	•	•	•	•	•
204 Jacking bolts for foot mounted motors.	-	-	-	-	-	-	•	•
209 Non-standard voltage or frequency, (special winding).	•	•	•	•	•	•	•	•
217 Cast iron D-end shield (on aluminum motor).	•	-	-	-	-	-	-	-
425 Corrosion protected stator and rotor core.	-	•	•	•	•	•	•	•
<b>Cooling system</b>								
053 Metal fan cover.	•	○	○	○	○	○	○	○
068 Light alloy metal fan	•	•	•	•	•	•	•	•

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

Code/Variants	132	160	180	200	225	250	280	315
075 Cooling method IC418 (without fan).	●	-	-	-	-	-	-	-
183 Separate motor cooling (fan axial, N-end).	●	●	●	●	●	●	●	●
189 Separate motor cooling, IP44, 400V, 50Hz (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	-	-	-	-	-	-	●	●
<b>Coupling</b>								
035 Assembly of customer supplied coupling-half.	-	-	-	-	-	-	●	●
<b>Documentation</b>								
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).	-	●	●	●	●	●	●	●
<b>Drain holes</b>								
065 Plugged existing drain holes.	●	●	●	●	●	●	●	●
448 Draining holes with metal plugs.	-	-	-	-	-	-	●	●
<b>Earthing Bolt</b>								
067 External earthing bolt.	●	○	○	○	○	○	○	○
<b>Heating elements</b>								
450 Heating element, 100-120 V	●	●	●	●	●	●	●	●
451 Heating element, 200 - 240 V	●	●	●	●	●	●	●	●
<b>Insulation system</b>								
405 Special winding insulation for frequency converter supply.	-	●	●	●	●	●	●	●
<b>Mounting arrangements</b>								
008 IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3).	●	-	-	-	-	-	-	-
009 IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3).	●	●	●	●	●	●	●	●
047 IM 3601 flange mounted, IEC flange, from IM 3001 (B14 from B5).	●	-	-	-	-	-	-	-
048 IM 3001 flange mounted, IEC flange, from IM 3601 (B5 from B14).	●	-	-	-	-	-	-	-
066 Modified for specified mounting position differing from IM B3 (1001), IM B5 (3001), B14 (3601), IM B35 (2001), IM B34 (2101)	●	●	●	●	●	●	●	●
200 Flange ring holder.	●	-	-	-	-	-	-	-
236 Flange FT 165.	●	-	-	-	-	-	-	-
243 Flange ring FF 215.	●	-	-	-	-	-	-	-
244 Flange ring FT 215.	●	-	-	-	-	-	-	-
253 Flange ring FF 265.	●	-	-	-	-	-	-	-
254 Flange ring FT 265.	●	-	-	-	-	-	-	-
255 Flange FF 265.	●	-	-	-	-	-	-	-
305 Additional lifting lugs.	-	●	●	●	●	●	●	●
<b>Noise reduction</b>								
055 Noise reduction cover for foot mounted motor	-	-	-	-	-	-	●	●
<b>Painting</b>								
105 Paint thickness report.	-	●	●	●	●	●	●	●
114 Special paint color, standard grade	●	●	●	●	●	●	●	●
115 Painting system C4M acc. to ISO 12944-2: 2007.	-	●	●	●	●	●	●	●
168 Primer paint only.	-	●	●	●	●	●	●	●
710 Thermally sprayed zink metallizing with acrylic top coat	-	●	●	●	●	●	●	●
754 Painting system C5M acc. to ISO 12944-2:1998	-	●	●	●	●	●	●	●
<b>Protection</b>								
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.	●	●	●	●	●	●	●	●
401 Protective roof, horizontal motor.	-	●	●	●	●	●	●	●
403 Degree of protection IP56.	●	●	●	●	●	●	●	●
404 Degree of protection IP56, without fan and fan cover.	●	●	●	●	●	●	-	-
434 Degree of protection IP56, open deck.	-	-	-	-	-	-	●	●
783 Labyrinth sealing at D-end.	-	-	-	-	-	-	●	●
784 Gamma-seal at D-end.	●	●	●	●	○	○	-	-

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



Code/Variants	132	160	180	200	225	250	280	315
<b>Rating &amp; instruction plates</b>								
002 Restamping voltage, frequency and output, continuous duty.	•	•	•	•	•	•	•	•
004 Additional text on std rating plate (max 12 digits on free text line).	•	•	•	•	•	•	•	•
126 Tag plate	-	•	•	•	•	•	•	•
135 Mounting of additional identification plate, stainless.	•	•	•	•	•	•	•	•
138 Mounting of additional identification plate, aluminium.	•	-	-	-	-	-	-	-
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.	•	•	•	•	•	•	•	•
528 Rating plate sticker	-	•	•	•	•	•	•	•
<b>Shaft &amp; rotor</b>								
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)	•	•	•	•	•	•	-	-
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.	-	•	•	•	•	•	•	•
<b>Standards and Regulations</b>								
208 Fulfilling Underwriters Laboratories (UL), listed requirements	-	•	•	•	•	•	•	•
586 Fulfilling UK Conformity Assessment (UKCA) requirements.	•	•	•	•	•	•	•	•
823 WIMES 3.03i6 Compliant Design for VSD operation	•	•	•	•	•	•	•	•
<b>Stator winding temperature sensors</b>								
120 KTY 84-130 (1 per phase) in stator winding.	-	•	•	•	•	•	•	•
121 Bimetal detectors, break type (NCC), (3 in series), 130 °C, in stator winding	•	•	•	•	•	•	•	•
122 Bimetal detectors, break type (NCC), (3 in series), 150 °C, in stator winding	•	•	•	•	•	•	•	•
123 Bimetal detectors, break type (NCC), (3 in series), 170 °C, in stator winding	•	•	•	•	•	•	•	•
124 Bimetal detectors, break type (NCC), (3 in series), 140 °C, in stator winding	-	•	•	•	•	•	•	•
125 Bimetal detectors, break type (NCC), (2x3 in series), 150 °C, in stator winding	•	•	•	•	•	•	•	•
127 Bimetal detectors, break type (NCC), (3 in series, 130 °C & 3 in series, 150 °C), in stator winding	•	•	•	•	•	•	•	•
321 Bimetal detectors, closing type (NO), (3 in parallel), 130°C, in stator winding.	•	-	-	-	-	-	-	-
322 Bimetal detectors, closing type (NO), (3 in parallel), 150°C, in stator winding.	•	-	-	-	-	-	-	-
325 Bimetal detectors, closing type (NO), (2x3 in parallel), 150°C, in stator winding.	•	-	-	-	-	-	-	-
327 Bimetal detectors, closing type (NO), (3 in parallel, 130°C & 3 in parallel, 150°C), in stator winding.	•	-	-	-	-	-	-	-
435 PTC - thermistors (3 in series), 130 °C, in stator winding	•	•	•	•	•	•	•	•
436 PTC - thermistors (3 in series), 150 °C, in stator winding	•	○	○	○	○	○	○	○
437 PTC - thermistors (3 in series), 170 °C, in stator winding	•	•	•	•	•	•	•	•
438 PTC - thermistors (3 in series), 190 °C, in stator winding	-	-	-	-	-	-	•	•
439 PTC - thermistors (2x3 in series), 150 °C, in stator winding	•	•	•	•	•	•	•	•
440 PTC - thermistors (3 in series, 110°C & 3 in series, 130°C), in stator winding.	•	-	-	-	-	-	-	-
441 PTC - thermistors (3 in series, 130 °C & 3 in series, 150 °C), in stator winding	•	•	•	•	•	•	•	•
442 PTC - thermistors (3 in series, 150 °C & 3 in series, 170 °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	-	•	•	•	•	•	•	•
<b>Terminal box</b>								
019 Larger than standard terminal box.	-	-	-	-	-	-	•	•
020 Detached 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.	•	•	•	•	•	•	•	•
277 Cable sealing end unit, size small for C-opening	-	-	-	-	-	-	•	-

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

Code/Variants	132	160	180	200	225	250	280	315
278 Cable sealing end unit, size medium for D-opening	-	-	-	-	-	-	-	●
279 Cable sealing end unit, size large for D-opening	-	-	-	-	-	-	-	●
292 Adapter C-C	-	-	-	-	-	-	●	-
293 Adapter D-D	-	-	-	-	-	-	-	●
294 Adapter E-D	-	-	-	-	-	-	-	●
295 Adapter E-2D	-	-	-	-	-	-	-	●
375 Standard plastic cable gland	●	-	-	-	-	-	-	-
376 Two standard plastic cable glands	●	-	-	-	-	-	-	-
380 Separate terminal box for temperature detectors, std. material	-	●	●	●	●	●	●	●
413 Extended cable connection, no terminal box.	-	-	-	-	-	-	●	●
418 Separate terminal box for auxiliaries, standard material.	-	●	●	●	●	●	●	●
447 Top mounted separate terminal box for monitoring equipment.	-	-	-	-	-	-	●	●
466 Terminal box at N-end.	-	-	-	-	-	-	●	●
468 Cable entry from D-end.	-	-	-	-	-	-	●	●
469 Cable entry from N-end.	-	●	●	●	●	●	●	●
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	-	●	●	●	●	●	●	●
569 Separate terminal box for brakes	-	-	-	-	-	-	●	●
730 Prepared for NPT cable glands.	-	-	-	-	-	-	●	●
731 Two standard metal cable glands.	●	●	●	●	●	●	●	●
740 Prepared for PG cable glands.	-	●	●	●	●	●	-	-
742 Protective cover for accessory terminal block in main terminal box.	-	-	-	-	-	-	●	●
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	-	-	-	-	-	-	●	●
<b>Testing</b>								
148 Routine test report.	●	●	●	●	●	●	●	●
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.	-	●	●	●	●	●	●	●
<b>Variable speed drives</b>								
182 Mounting of non-listed pulse tacho.	●	●	●	●	●	●	●	●
429 Separate motor cooling (fan top, N-end) and 1024 pulse tacho (Leine & Linde 861) mounted.	-	-	-	-	-	-	●	●
470 Prepared for hollow shaft pulse tacho (L&L equivalent).	-	●	●	●	●	●	●	●
472 1024 pulse tacho (L&L 861007455-1024).	-	●	●	●	●	●	●	●
473 2048 pulse tacho (L&L 861007455-2048).	-	●	●	●	●	●	●	●
474 Separate motor cooling (axial fan, N-end) and prepared for hollow shaft tacho (L&L equivalent)	-	●	●	●	●	●	●	●
476 Separate motor cooling (axial fan, N-end) and 1024 pulse tacho (L&L 861007455-1024)	-	●	●	●	●	●	●	●
477 Separate motor cooling (axial fan, N-end) and 2048 pulse tacho (L&L 861007455-2048)	-	●	●	●	●	●	●	●
478 Separate motor cooling (fan on top, N-end) and prepared for hollow shaft tacho (L&L equivalent)	-	-	-	-	-	-	●	●
479 Mounting of other type of pulse tacho with shaft extension, tacho not included.	-	-	-	-	-	-	●	●
486 Separate motor cooling (fan top, N-end) and prepared for DC-tacho.	-	-	-	-	-	-	●	●
510 Separate motor cooling (fan top, N-end) and 2048 pulse tacho (Leine & Linde 861) mounted.	-	-	-	-	-	-	●	●
570 Prepared for hollow shaft pulse tacho (L&L 503).	-	●	●	●	●	●	-	-
572 1024 pulse tacho (L&L 503).	-	●	●	●	●	●	-	-
573 2048 pulse tacho (L&L 503).	-	●	●	●	●	●	-	-
582 1024 pulse tacho, GHK912-GBR-1024, BEI IDEACOD	-	-	-	-	-	-	●	●
583 2048 pulse tacho, GHK912-GBR-2048, BEI IDEACOD	-	-	-	-	-	-	●	●
588 Shaft grounding device	●	●	●	●	●	●	-	-
658 Special tacho mounted, price category 1	-	-	-	-	-	-	●	●
659 Special tacho mounted, price category 2	-	-	-	-	-	-	●	●
660 Special tacho mounted, price category 3	-	-	-	-	-	-	●	●
661 1024 Pulse tacho mounted, Hohner series 59, 11-30V	●	-	-	-	-	-	-	-

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

<b>Code/Variants</b>	<b>132</b>	<b>160</b>	<b>180</b>	<b>200</b>	<b>225</b>	<b>250</b>	<b>280</b>	<b>315</b>
662 2048 Pulse tacho mounted, Hohner series 59, 11-30V	●	-	-	-	-	-	-	-
701 Insulated bearing at N-end.	-	●	●	●	●	●	○	○
702 Insulated bearings at both ends	●	●	●	●	●	●	-	-
704 EMC cable entry.	●	●	●	●	●	●	●	●

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

# Mechanical design

## Motor frame and drain holes

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

### Motor frame

Motor size 132 have aluminum alloy stator frame with integrated aluminum feet and terminal box. Motor sizes 160 and above have cast iron frame and feet and a removable terminal box. Integrated feet provide rigid mounting and minimize vibration.

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

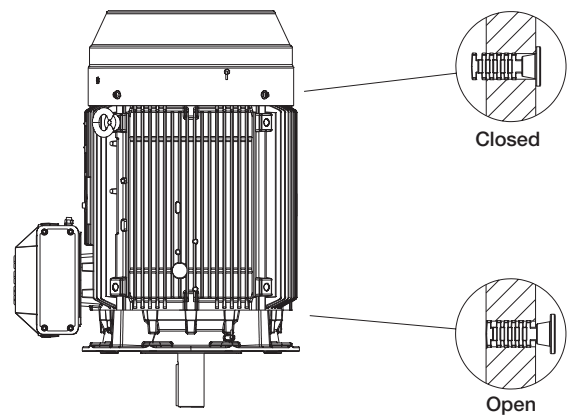
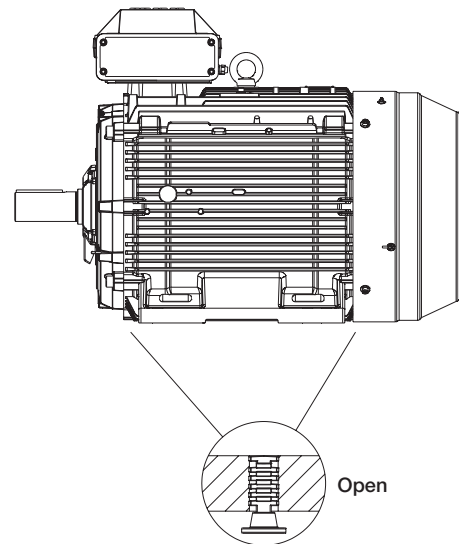
### Drain holes

Motors that will be operated in very humid or wet environments, and especially under intermittent duty, should be provided with drain holes. The IM designation, such as IM 3031, determines the intended mounting arrangement for the motor.

Motors are fitted with drain holes and closable plugs. The plugs are open on delivery. When mounting the motors, ensure that the drain holes face downwards.

In case of vertical mounting, the upper plug must be hammered home completely. In very dusty environments, both plugs should be hammered home.

When mounting differs from foot-mounted IM B3 arrangement, use variant code 066 when ordering. (See variant code 065 under Drain holes and variant code 066 under Mounting arrangements in the Variant codes section.)



01

# 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

Synchronous reluctance motors are normally fitted with single-row deep-groove 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.

When there are high axial forces, angular-contact ball bearings should be used. This option is available on request. When ordering a motor with an angular-contact ball bearing, specify also the method of mounting and the direction and magnitude of axial force. See Variant codes for special bearings.

Standard motor with deep-groove ball bearings			
Motor size	$n_N$ r/min	Deep-groove ball bearings	
		D-end	N-end
132	1500, 3000	6308-2Z/C3	6206-2Z/C3
160	1000 - 3000	6309-2Z/C3	6209-2Z/C3
180	1500 - 3000	6310-2Z/C3	6209-2Z/C3
200	1000 - 3000	6312-2Z/C3	6210-2Z/C3
225	3000	6313/C3	6210/C3
250	1000 - 1500	6315/C3	6213/C3
280	1000 - 1500	6316/C3	6316/C3*
315	1000 - 1500	6319/C3	6316/C3*

\* Insulated bearing at N-end as standard.

Motor with roller bearings, variant code 037		
Motor size	$n_N$ r/min	Roller bearings D-end
132	1500, 3000	NU 308
160	1000 - 3000	NU 309 ECP
180	1500 - 3000	NU 310 ECP
200	1000 - 3000	NU 312 ECP
225	3000	NU 313 ECP
250	1000 - 1500	NU 315 ECP
280	1000 - 1500	NU 316/C3
315	1000 - 1500	NU 319/C3

### 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

These tables present the standard and alternative sizes and types of seals per motor size.

Standard designs			
Motor size	$n_N$ r/min	Standard design Axial seal	
		D-end	N-end
132	1500, 3000	VA40	Labyrinth seal
160	1000 - 3000	RB45	RB45
180	1500 - 3000	RB50	RB45
200	1000 - 3000	RB60	RB50
225	3000	RB65	RB50
250	1000 - 1500	RB75	RB65
280	1000 - 1500	VS80	VS80
315 SM	1000 - 1500	VS95	VS80
315 LK	1000 - 1500	Labyrinth seal	VS80

Alternative designs in motor sizes 132 – 250		
Motor size	$n_N$ r/min	Alternative design, D-end
		Radial seal (DIN 3760), variant code 072
132	1500, 3000	40x62x7
160	1000 - 3000	45x62x8
180	1500 - 3000	50x68x8
200	1000 - 3000	60x80x8
225	3000	65x85x10
250	1000 - 1500	75x95x10

Alternative designs in motor sizes 280 – 315			
Motor size	$n_N$ r/min	Alternative design 1	
		D-end	N-end
280	1000 - 1500	Labyrinth seal	Labyrinth seal
315 SM, ML	1000 - 1500	Labyrinth seal	Labyrinth seal
315 LK	1000 - 1500	(Labyrinth seal)	Labyrinth seal



Motor size	n <sub>N</sub> r/min	Alternative design 2	
		D-end	N-end
280	1000 - 1500	Radial seal 80×110×10	Radial seal 80×110×10
315 SM, ML	1000 - 1500	Radial seal 95×125×10	Radial seal 80×110×10
315 LK	1000 - 1500	(Labyrinth seal)	Radial seal 80×110×10

# 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 280 to 315  $\geq 200,000$  hours.

## Lubrication

On delivery, motors in frame size 225 and above are prelubricated with high-quality grease. Before first start-up, see instructions for relubrication and recommended grease in the Manual for low voltage motors delivered together with the motor, or see the lubrication plate on the motor.

## 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 250 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 with relubrication nipples

In frame sizes 280 – 315, the bearing system allows the use of a valve disc to ease lubrication. Motors are lubricated while running.

The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1 – 2 hours after regreasing. This ensures that the construction is tight and bearings remain dust- and dirt-free. A grease-collection method can be used optionally.

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

## Lubrication intervals in duty hours for ball bearings

Frame size	Amount of grease, g/bearing	Interval hours at		
		3000 r/min	1500 r/min	1000 r/min
<b>Ball bearings</b>				
132-200	greased for life			
225	50	6500	-	-
250	60	-	11 500	15 000
280	40	-	9600	14 000
315	55	-	7600	11 800

## Lubrication intervals in duty hours for roller bearings

Frame size	Amount of grease, g/bearing	Interval hours at		
		3000 r/min	1500 r/min	1000 r/min
<b>Roller bearings</b>				
132	On request	-	-	-
160	25	6000	10 500	12 000
180	30	4500	9000	-
200	40	4000	8500	11 500
225	50	3000	-	-
250	60	-	5500	7500
280	40	-	5250	7000
315	55	-	3800	5900

## Grease lifetime

Grease lifetime information is relevant for motors equipped with bearings greased for life, which means standard synchronous reluctance motors in frame sizes 160 – 200.

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.

**Grease lifetime L10 in deep groove ball bearings of type 2Z, horizontally mounted motors in continuous duty**

Ambient temperature and grease lifetime							
Motor size	Speed r/min	25 °C	40 °C	50 °C	60 °C	70 °C	80 °C
132	3000	40 000	31 000	20 000	12 000	6 000	3 000
132	1500	40 000	40 000	40 000	24 000	13 000	7 000
160	3000	40 000	40 000	40 000	26 000	14 000	8 000
160	1000 - 1500	40 000	40 000	40 000	40 000	40 000	37 000
180	3000	38 000	38 000	38 000	38 000	23 000	13 000
180	1500	40 000	40 000	40 000	32 000	28 000	15 000
200	3000	27 000	27 000	27 000	24 000	14 000	8 000
200	1000 - 1500	40 000	40 000	40 000	40 000	40 000	30 000

# Mechanical design

## Radial forces

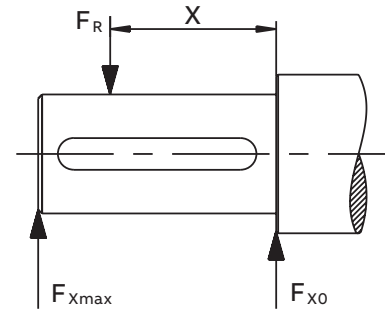
### Permissible loading on the shaft

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.

E = length of the shaft extension in the standard version.



### 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_{X_0}\$ (N)	\$F_{X_{max}}\$ (N)	\$F_{X_0}\$ (N)	\$F_{X_{max}}\$ (N)	\$F_{X_0}\$ (N)	\$F_{X_{max}}\$ (N)	\$F_{X_0}\$ (N)	\$F_{X_{max}}\$ (N)
132	3000	80	2600	2100	2600	2100	-	-	-	-
132	1500	80	2600	2100	2600	2100	-	-	-	-
160	3000	110	5050	3900	4350	3350	6700	4300	5700	4300
160	1500	110	5400	4300	4600	3700	7550	4300	6400	4300
160	1000	110	5400	4300	4600	3700	7780	4300	6500	4300
180	3000	110	6060	4960	5280 <sup>1)</sup>	4305 <sup>1)</sup>	7600	5500	6560	5500
180	1500	110	4800	3940	4020	3300	7280	5500	6140	5500
200	3000	110	8300	6900	7200 <sup>2)</sup>	6000 <sup>2)</sup>	10 700	8900	9200	7650
200	1500	110	8900	7400	7600	6350	12 000	9550	10 150	8500
200	1000	110	8960	7480	7600	6340	12 480	9550	10 520	8780
225	3000	110	6100	5185	5155	4340	13 000	10 700	11 200	9455
250	3000	140	7700	6250	6500	5250	17 100	10 900	14 900	10 900
250	1500	140	8700	7000	7300	5900	19 800	13 800	17 000	13 800
250	1000	140	8900	7200	7355	5955	21 200	13 800	18 000	13 800
280	1500	140	9200	7800	7300	6200	25 100	9200	20 300	9200
280	1000	140	10 600	8900	8400	7000	28 300	9200	23 000	9200
315 SM_	1500	170	11 400	9400	9000	7450	32 500	9600	26 600	9600
315 SM_	1000	170	13 000	9600	10 300	8500	37 000	9600	30 000	9600
315 ML_	1500	170	11 500	9700	9100	7650	32 700	13 600	26 500	13 600
315 ML_	1000	170	13 200	11 100	10 400	8800	36 900	13 600	29 900	13 600
315 LK_	1500	170	11 500	10 000	9100	7850	33 100	13 300	26 800	13 300
315 LK_	1000	170	13 200	11 400	10 400	9000	37 300	13 300	30 300	13 300

<sup>1)</sup> The maximum lifetime of the grease is 38 000 h, see Grease lifetime.

<sup>2)</sup> The maximum lifetime of the grease is 27 000 h, see Grease lifetime.

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

$$F_R = F_{X_0} - \frac{X}{E} (F_{X_0} - F_{X_{max}})$$

# Mechanical design

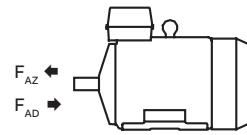
## Axial forces

01 Mounting arrangement IM B3

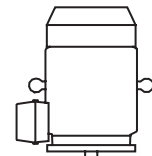
02 Mounting arrangement IM V1

The following tables present permissible axial forces on the shaft in 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<sub>AD</sub>, it is assumed that the D-bearing is locked with a locking ring.



01



02

### Permissible axial forces, motor sizes 132 – 315

Motor size	Poles	Length of shaft extension E (mm)	Mounting arrangement IM B3				Mounting arrangement IM V1			
			Ball bearings		Ball bearings		Ball bearings		Ball bearings	
			20,000 h		40,000 h		20,000 h		40,000 h	
			F <sub>AD</sub> (N)	F <sub>AZ</sub> (N)	F <sub>AD</sub> (N)	F <sub>AZ</sub> (N)	F <sub>AD</sub> (N)	F <sub>AZ</sub> (N)	F <sub>AD</sub> (N)	F <sub>AZ</sub> (N)
132	3000	80	2220	1620	1740	1140	2435	1480	1950	995
132	1500	80	2840	2240	2205	1605	3150	2035	2515	1400
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 <sup>1)</sup>	4600 <sup>1)</sup>	5920	5515	5060 <sup>1)</sup>	4255 <sup>1)</sup>
180	1500	110	4360	4360	3540	3540	5080	3860	4240	3020
200	3000	110	5000	7350	5000 <sup>2)</sup>	6150 <sup>2)</sup>	5000	7050	5000 <sup>2)</sup>	5800 <sup>2)</sup>
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
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	7900	5900	6100	4100	10 000	4500	8200	2700
280	1000	140	9100	7100	7000	5000	11 600	5400	9500	3300
315 SM_	1500	170	9300	7300	7100	5100	12 000	5500	9900	3300
315 SM_	1000	170	10 700	8700	8200	6200	14 300	6300	11 800	3700
315 ML_	1500	170	9200	7200	7000	5000	12 400	5000	10 300	2800
315 ML_	1000	170	10 600	8600	8100	6100	14 900	5800	12 300	3200
315 LK_	1500	170	9000	7000	6900	4900	13 600	3800	11 500	1650
315 LK_	1000	170	10 300	8300	7800	5800	16 500	4100	14 000	1500

<sup>1)</sup> The maximum lifetime of the grease is 38 000 h, see Grease lifetime.

<sup>2)</sup> The maximum lifetime of the grease is 27 000 h, see Grease lifetime.

# Terminal box

## Standard terminal box

### Degree of protection and mounting options

The degree of protection for the standard terminal box is IP55. By default, terminal boxes are mounted on top of the motor at D-end and can be turned 4\*90°. The terminal box can also be mounted on the left or right side of the motor (see Mounting arrangements).

### Cable entries

Motor sizes 160 to 250 come with connection flanges with tapped cable entries and can be provided with cable glands as an option. In sizes 280 to 315 SM and 315 ML the standard terminal box has a flange with cable glands, and 315 LK has cable sealing end units. The standard flange material is siluminum. See the table below for details on standard terminal boxes.

### Cable type and terminations

If no cable type is specified in the order, it will be a PVCinsulated non-armored cable, and its termination parts are determined as shown in the table below.

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

### Ordering

To ensure the delivery of desired terminations for the motor, state the cable type, quantity, size and outer diameter when ordering. Non-standard designs of terminal boxes, such as non-standard size, or higher degree of protection, are available as options.

See section Variant codes for all options available.

### Standard terminal box connections

Motor size	Speed r/min	Terminal box type	Size of flange opening	Type of through holes	Size of through holes	Max. connectable core cross-section mm <sup>2</sup> /phase	Number and size of terminal bolts	Method of connection
132	1500, 3000	Integrated	-	Knock-out	2x(M40+M32+M12)	1x35	6xM5, 6xM6	Terminal lugs
160	1000-3000	63	B	Threaded	2xM40x1.5	1x35	6xM6	Terminal lugs
180	1500-3000	63	B	Threaded	2xM40x1.5	1x35	6xM6	Terminal lugs
200	1500-3000	160	C	Threaded	2xM63x1.5	1x70	6xM10	Terminal lugs
225	3000	160	C	Threaded	2xM63x1.5	1x70	6xM10	Terminal lugs
250	1000-3000	160	C	Threaded	2xM63x1.5	1x70	6xM10	Terminal lugs
280	1000-1500	210	C	Threaded*	2xM63x1.5	2x150	6xM12	Terminal lugs
315 SM, ML	1000-1500	370	D	Threaded*	2xM63x1.5	2x240	6xM12	Terminal lugs
315 LKA, LKC	1000-1500	750**	E		2xM75x1.5	4x240	6xM12	Terminal lugs

\* With cable glands of the same size

\*\* With adapter E-D and medium size end unit

### Auxiliary cable entries

132	1500, 3000				2xM12
160-250	1000-3000				2xM20x1.5
280-315	1000-1500				2xM20x1.5



<b>Motor size</b>	<b>Earthing on frame</b>	<b>Earthing in main terminal box</b>
132	M5	M5
160 - 200	clamp	M6
250	clamp	M6
280-315	M10	2xM10

Standard delivery if no other information is provided.

Note: For other network voltages and/or side-mounted motors, contact your ABB sales office.

# Terminal box

## Terminal boxes and boards

01 Integrated terminal box for motor size 132. Knock-out openings for cable entries.

02 Terminal box for motor sizes 160 – 250. Connection flanges with tapped cable entries.

03 Terminal board for 160 – 250.

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

05 Terminal board for motor sizes 280 - 315, except LKC.

06 Terminal board for 315 LKC.

07 Terminal box for motor sizes 315 LKC.

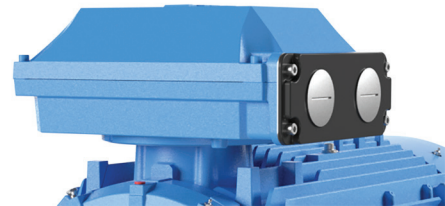
The pictures below show standard terminal boxes and the corresponding terminal boards for various motor sizes.

### Motor size 132



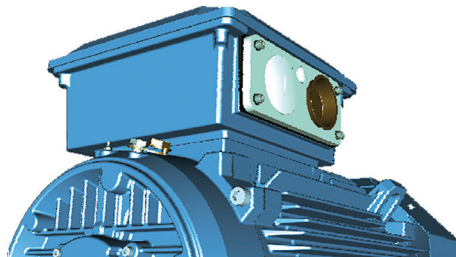
01

### Motor sizes 280 – 315

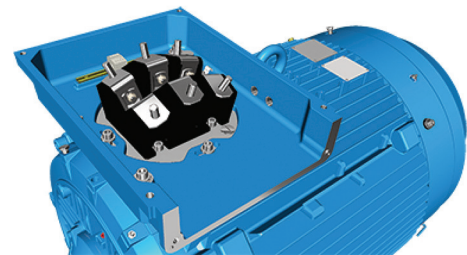


04

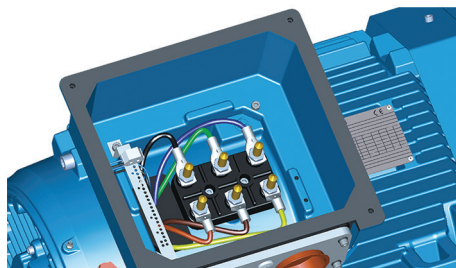
### Motor sizes 160 – 250



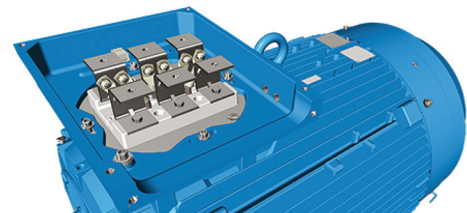
02



05



03



06



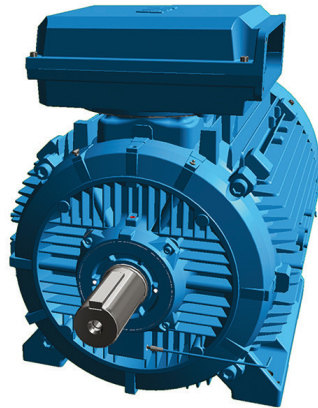
07

# Terminal box

## Terminal box alternatives

01 Main terminal box.

02 Adapters, Flange with glands; cable sealing end units.



01

### Optional adapters

There is a broad selection of cable termination accessories available to allow termination of one or several cables. The most common ones are explained below.

### How to order?

- Check first that the terminal box itself allows mounting of the desired cable and cores (refer to motor type and terminal box type cross reference on previous page)
- If very large cables are used it might be necessary to use a larger terminal box than standard. Select the right cable gland(s) or cable sealing end unit(s) that match outer diameter of the cable(s)
- Select appropriate adapter or flange
- Note that turning the terminal box to a non-standard position might limit the use of some adapters.

02

### Main terminal box and maximum single core cross-section

The terminal boxes are named according to their current-carrying capacity, from 120 to 1200. You can select one size larger than standard terminal box if a larger single cross-section is needed. The standard sizes of the main terminal box are listed in the following table. Check also the capacity of the cable entry to make sure that the cables fit. A larger terminal box can be ordered with variant code 019.




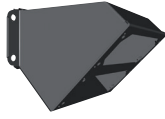
Standard terminal box	Size of opening	Max single cross-section mm <sup>2</sup> /phase
120	B	1 x 70
210	C	2 x 240
370	D	2 x 300
750	E	4 x 500
1200		

### Ordering example for special cable entry and auxiliary terminal box

Motor Cables	250 kW, 1500 rpm, 400 V 50 Hz 2 pieces, outer diameter 58 mm, single core cross section 185 mm <sup>2</sup> clamping device needed, cables coming from below
Needed one terminal box for anticondensation heaters and another for temperature detectors, material must be cast iron.	
Motor	M3BL 315 MLA, 1500 rpm, B3
Adapter	D-D - variant code 293
Cable sealing end unit	Variant code 278
Clamping	Variant code 231
Auxiliaries	Variant codes 380, 567, 568

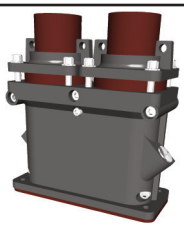
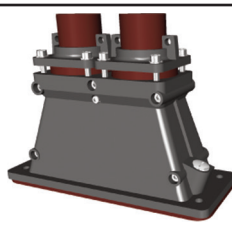
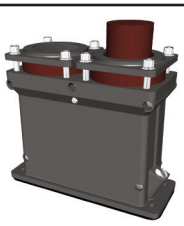
# Optional adapters

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 - 315 and can also be used to allow the mounting of several cable sealing end units or gland plates.

Adapter				
Variant code	292	293	294	295
Suited for motor sizes	280	315 SM, ML	315 LKA, LKC	315 LKA, LKC
Opening to terminal box	C	D	E	E
Flange or opening for end unit	C	D	D	2 x D
Material	Steel	Steel	Steel	Steel
Notes			Included in type 750 terminal box when 750 is the standard size.	Only possible on type 1200 terminal box.

## Cable sealing end units

As an alternative to flanges and cable glands, cable sealing end units can be used. These allow more space for spreading the cores for easy termination. Cable sealing end units have rubber-sealed entries for one of the two main cables. In addition, there are two plugged M20 holes for auxiliary cables.

	Small	Medium	Large
			
End unit			
Variant code	277	278	279
Suited for motor sizes	280	315 SM, ML	315 SM, ML
Opening to terminal box	C	D	D
Cable outer diameter	1 - 2 cables, 48 - 60 mm	1 - 2 cables, 48 - 60 mm	1 - 2 cables, 60 - 80 mm
Cable entry for auxiliary cable	2×M20 plugged holes	2 x M20 plugged holes	2 x M20 plugged holes
Additional optional variants	EMC cable gland (704)	EMC cable gland (704)	EMC cable gland (704)

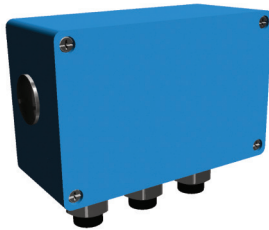
## Auxiliary terminal box

You can equip motors from frame size 160 upward with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box material for motor sizes 280 - 315 is aluminum and for 160 - 250 cast iron. For frame sizes 280 - 315, cast iron as box material is also available as an option.

Connection terminals are of a spring-loaded type for quick and easy connection. These are suitable for up to 2.5 mm<sup>2</sup> wires. Auxiliary terminal boxes for frame sizes 280 – 315 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 size is M20 for both aluminum and cast iron, and the number of entries depends on the terminal box type and the number of selected auxiliaries.

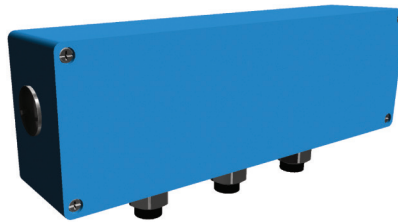
### Related variant codes

380	Separate terminal box for temperature detectors, standard material
418	Separate terminal box for auxiliaries, standard material
567	Separate terminal box material: cast iron
568	Separate terminal box for heating elements, standard material
569	Separate terminal box for brake



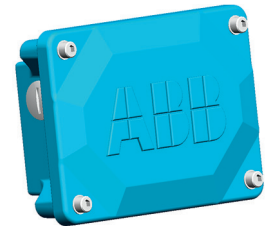
Small auxiliary aluminum terminal box for motor sizes 280 - 315 (variant codes 418, 568, 380, 569)

The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 125 mm, max 12 strips. Earthing size M4.



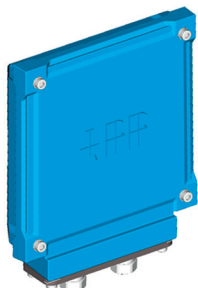
Large auxiliary aluminum terminal box for motor sizes 280 - 315.

The size of terminal box ordered with these codes depends on the number of accessories ordered. 80 x 250 mm, max 30 strips. Earthing size M4.



Auxiliary cast iron terminal box

Frame size for motor sizes 160 - 250 (variant code 418): 119 x 170 mm, max. 18 strips. No earthing.



Frame size for motor sizes 280 - 315 (variant code 567): 211 x 188 mm, max 30 strips. Earthing size M6.



Small auxiliary aluminum terminal box for motor sizes 71-132 (variant code: 418) 80 x 75 mm, max 8 strips. Earthing size M4

# Terminal box

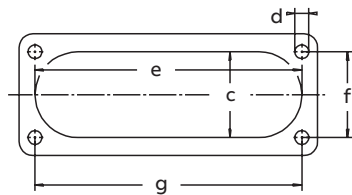
## Terminal box dimensions

01 Terminal box type 63 and 160.

02 Terminal box type 750 + adapter.

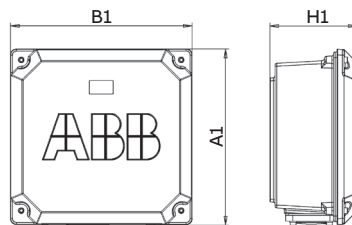
The terminal box dimensions presented on this page apply to cast-iron motors in sizes 160 – 315. For dimensions of integrated terminal boxes in aluminum motors, size 132, see the following Dimension drawings pages.

### Dimensions for terminal box inlets

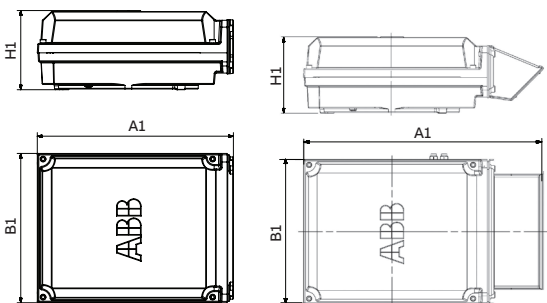


Flange opening	c mm	e mm	f mm	g mm	d thread type
B	71	194	62	193	M8
C	62	193	62	193	M8
D	100	300	80	292	M10
E	115	370	100	360	M12

### Frame dimensions



01



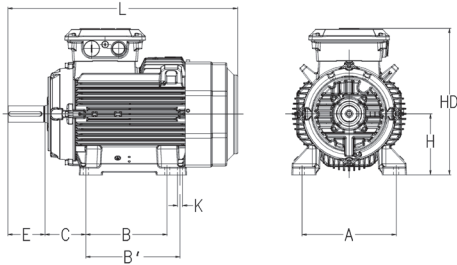
02

Terminal box types acc. to current capacity	A1	B1	H1
<b>Box types for 132</b>			
Terminal box integrated in frame			
<b>Box types for 160 - 250</b>			
63	248	248	109
160	291	302	154
<b>Box types for 280 - 315</b>			
210	416	306	177
370	451	347	200
750, top-mounted	542	413	219
750, side-mounted	525	413	219

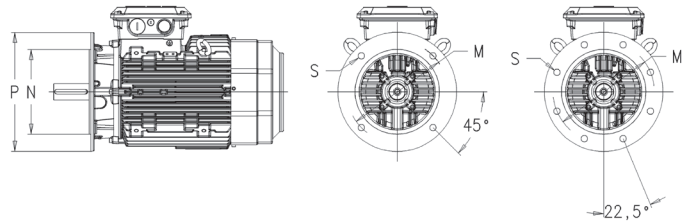
# Dimension drawings

## Synchronous reluctance (SynRM) motors

Foot-mounted motor IM 1001, IM B3



Flange-mounted motor IM 3001, IM B5



IM1001, IMB3 and IM3001, IMB5

IM1001, IMB3

IM B5 (IM3001)

IM B14 (IM 3601), IM 3602

Motor size	Speed r/min	D	GA	F	E	L max	A	B	B1	C	HD max	K	M	N	P	S	T	M	N	P	S	T
132 SMA-D	3000	38	41	10	80	487	216	140	178	89	109.5	12	265	230	300	14.5	4	165	130	200	M10	3.5
132 SMA-B	1500	38	41	10	80	550	216	140	178	89	321	12	265	230	300	14.5	4	165	130	200	M10	3.5
132 SMC	1500	38	41	10	80	590	216	140	178	89	321	12	265	230	300	14.5	4	165	130	200	M10	3.5
160	3000	42	45	12	110	584	254	210	254	108	421	14.5	300	250	350	19	5	300	250	350	19	5
160	1500-1000	42	45	12	110	681	254	210	254	108	421	14.5	300	250	350	19	5	300	250	350	19	5
180	3000-1500	48	51.5	14	110	726	279	241	279	121	461	14.5	300	250	350	19	5	300	250	350	19	5
200	3000-1000	55	59	16	110	821	318	267	305	133	528	18.5	350	300	400	19	5	350	300	400	19	5
225	3000	55	59	16	110	879	356	286	311	149	573	18.5	400	350	450	19	5	400	350	450	19	5
250	1500-1000	65	69	18	140	884	406	311	349	168	626	24	500	450	550	19	5	500	450	550	19	5
280	1500-1000	75	79.5	20	140	1088	457	368	419	190	762	24	500	450	550	23	5	500	450	550	23	5
315 SM_	1500-1000	80	85	22	170	1204	508	406	457	216	852	28	600	550	660	23	6	600	550	660	23	6
315 ML_	1500-1000	90	95	25	170	1315	508	457	508	216	852	28	600	550	660	23	6	600	550	660	23	6
315 LK_	1500-1000	90	95	25	170	1521	508	508	560	216	880	28	600	550	660	23	6	600	550	660	23	6

The table gives the main dimension in mm. For detailed drawings please see our web pages [www.abb.com/motors&generators](http://www.abb.com/motors&generators).

# Motors in brief

## Synchronous reluctance motors, 132 – 315

Motor size		132	160	180	200	225	250	280	315	
Stator and end shields	Material	Die-cast aluminum alloy	Cast iron							
	Paint color shade	Munsell blue 8B 4.5/3.25								
	Corrosion class	C3	Painting, C3							
Bearings	D-end	6308-2Z/C3	6309-2Z/C3	6310-2Z/C3	6312-2Z/C3	6313/C3	6315/C3	6316/C3	6319/C3	
	N-end	6206-2Z/C3	6209-2Z/C3	6209-2Z/C3	6210-2Z/C3	6210/C3	6213/C3	6316/C3*	6316/C3*	
Axially locked bearings	Inner bearing cover	Locked at D-end								
Bearing seals	D-end	V-ring	Gamma-ring					V-ring	V-ring or Labyrinth seal	
	N-end	Labyrinth seal	Gamma-ring					V-ring		
Lubrication		Permanently lubricated shielded bearings, wide-temperature-range grease	Regreasable bearings, regreasing nipples M6x1							
Measuring nipples for condition monitoring of the bearings		Not included	Included							
Rating plate	Material	Aluminum	Stainless steel							
Terminal box	Frame and cover	Die-cast aluminum alloy, integrated in stator	Cast iron							
	Corrosion class	C3	Surface Treatment, C3							
	Cover screws	Zinc-electroplated steel								
Connections	Cable entries	2x(M40, M32, M12) / 2x(M25, M20)	2x(M40x1.5, M20x1.5)	2x(M63x1.5, M20x1.5)						
	Terminals	6 terminals with lugs	6 terminals for connection with cable lugs (not included)							
	Cable glands	Integrated knock-out openings; no cable glands	Cable flange included, glands as option							
Fan	Material	Glass-fiber-reinforced polypropylene								
Fan cover	Material	Polypropylene	Steel							
	Paint color shade	Munsell blue 8B 4.5/3.25								
	Corrosion class	-	C3							
Stator winding	Material	Copper								
	Insulation	Insulation class F. Temperature rise class B unless otherwise stated.								
	Winding protection	Optional	3 PTC thermistors, 150 °C					3 PTC thermistors, 155 °C		
Rotor	Material	Pressure die-cast aluminum								
Balancing method		Half-key balancing								
Keyway		Closed keyway							Open keyway	
Drain holes		Drain holes with closable plastic plugs, open on delivery								
Enclosure		IP 55, higher protection on request								
Cooling method		IC 411								

\* Insulated bearing at N-end as standard.

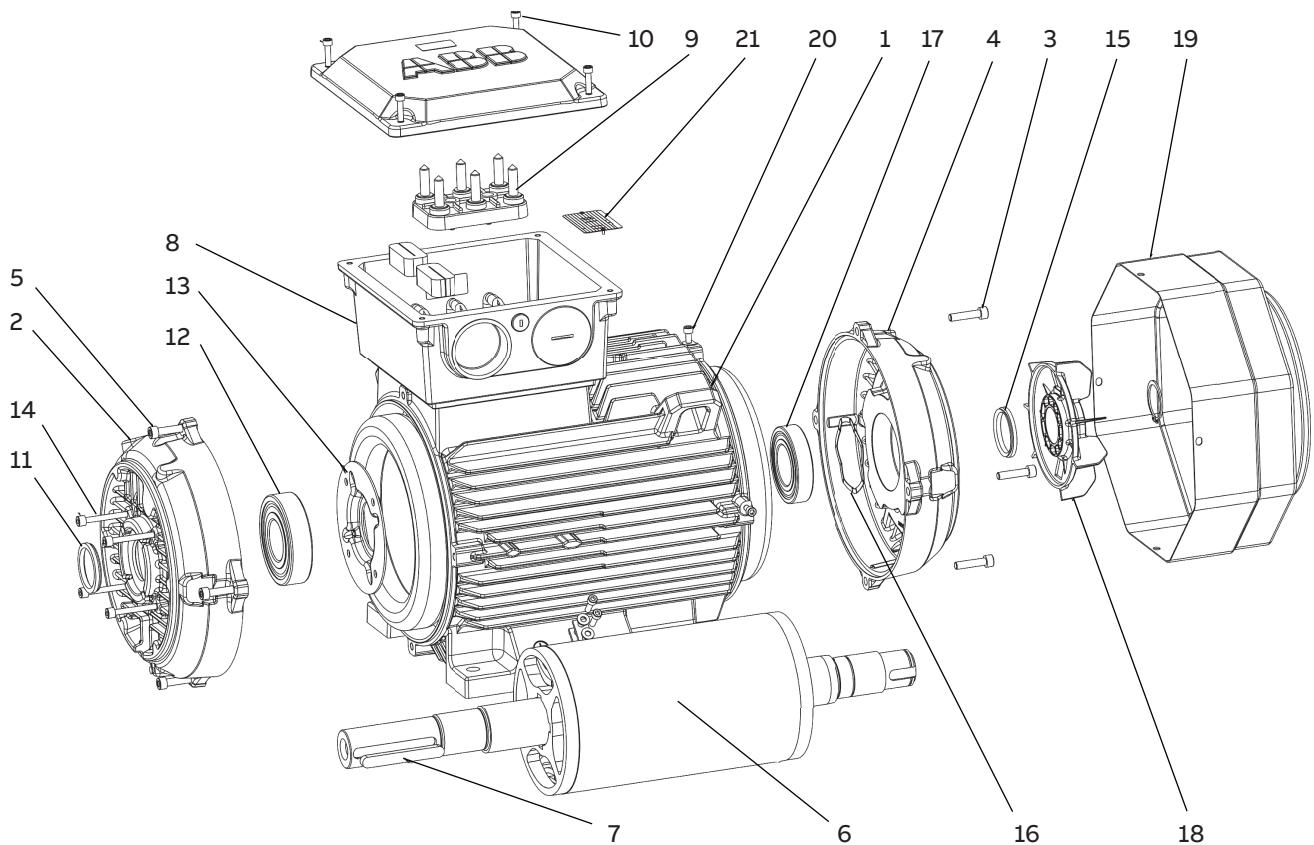
\*\* For detailed information on connections, see Terminal box alternatives section.

\*\*\* Terminals for connection with terminal lugs (lugs not included in the delivery).



# Motor construction

## Exploded view, frame size 160



- 1 Stator frame
- 2 End shield, D-end
- 3 Screws for end shield, N-end
- 4 End shield, N-end
- 5 Screws for end shield, D-end
- 6 Rotor with shaft
- 7 Key, D-end

- 8 Terminal box
- 9 Terminal board
- 10 Screws for terminal box cover
- 11 Seal, D-end
- 12 Bearing, D-end
- 13 Inner bearing cover, D-end
- 14 Screws for bearing cover

- 15 Seal, N-end
- 16 Wave spring
- 17 Bearing, N-end
- 18 Fan
- 19 Fan cover
- 20 Screws for fan cover
- 21 Rating plate

# Total product offering

Motors, 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
- Motors for heavy electric vehicles

## 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.



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