M3000 Motors for Hazardous Areas

ABB Low Voltage Flameproof Motors

Extract with dust ignition proof motors only; see complete catalogue BA/M3000 Ex-motors GB 04-2002 for other protection types and general information.

Making you more competitive

ABB has been manufacturing motors for over 100 years. Our products are designed to be reliable, efficient and cost effective, and we can supply motors for practically any application. A full range of services is available through our worldwide service organization, with the latest eBusiness systems providing round-the-clock access and easy ordering. The global reach of our central stock system enables us to deliver fast – no matter where our customers are located.

M3000 motors

Customized to fit the individual user's needs, the motors in ABB's M3000 range are designed to meet the tough demands of modern industry. All M3000 motors comply with eff1, the EU's highest efficiency class – which translates into cost savings and better environmental compatibility. Reliable, high quality products that are designed to last, ABB's M3000 motors offer years of trouble-free operation, even in critical environments.

Industrial^{IT}

As a key element of its business strategy, ABB has committed to a broad program of product development and positioning under the Industrial^{IT} umbrella. This initiative is geared towards increasing integration of ABB products as the 'building blocks' of larger solutions, while incorporating functionality that will allow multiple products to interact seamlessly as components of real-time automation and information systems.

Motors and generators represent one of the fundamental building blocks in the Industrial^{IT} architecture.

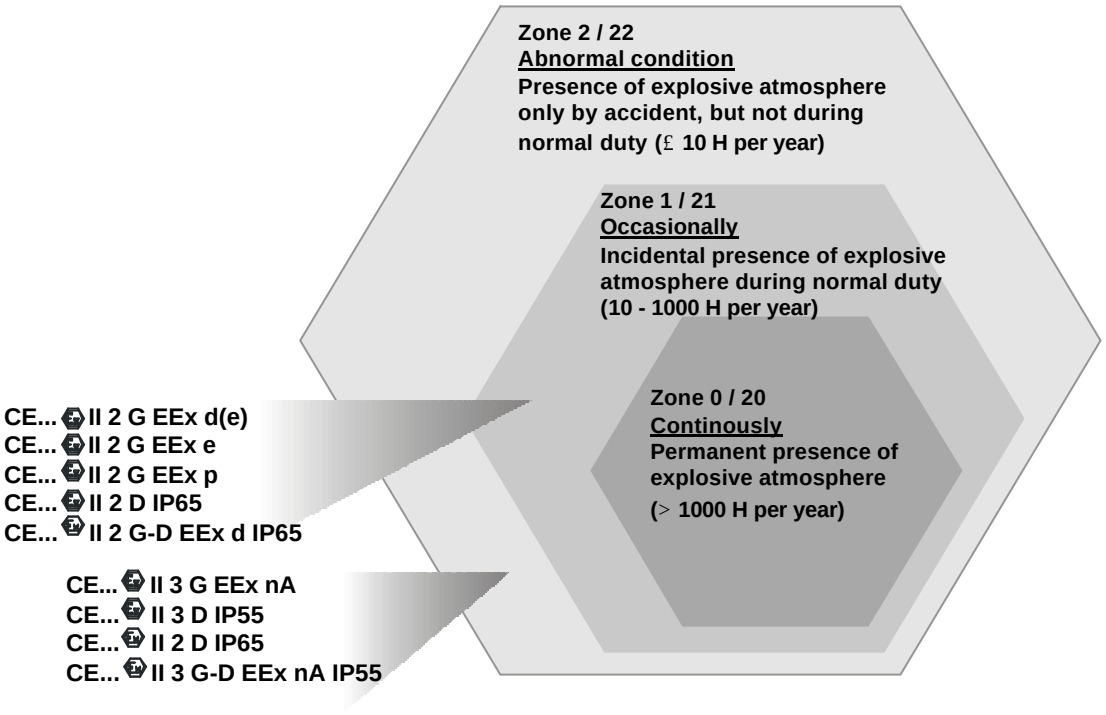
ABB (www.abb.com) is a global leader in power and automation technologies that enable utility and industrial customers to improve performance while lowering their environmental impact. ABB has 155,000 employees in more than 100 countries.

Totally enclosed squirrel cage three phase motors for hazardous areas

Contents

Hazardous areas

Hazardous areas worldwide are classified by zone, according to the risk posed by explosive gas or dust in the atmosphere.



Classification of hazardous locations

The definition of areas according to the presence of atmosphere are set up in EN 1127-1 or IEC 60079-0.

Explosive atmosphere	**Permanent presence**	**Incidental presence** (normal operation conditions)	**Accidental presence** (abnormal operation conditions)
IEC (International) CENELEC (Europe)	**Zone 0** (gas) **Zone 20** (dust)	**Zone 1** (gas) **Zone 21** (dust)	**Zone 2** (gas) **Zone 22** (dust)
Note: In certain countries EEx d and EEx e motors are also used in Zone 2.			

July 2003; all equipment both electrical and non-electrical put on the market in hazardous areas shall comply with:

European Directive 94/9/EC (ATEX)

Motors in accordance with ATEX directive comply with:

- Low Voltage Directive 73/23/EEC amended by 93/68/EEC (Voltage supply less than 1000V)
- EMC Directive 89/336/EEC amended by 92/31/EEC and 93/68/EEC
- Machinery Directive 98/37/EEC (Certificate of Incorporation)

Key words of ATEX Directive:

- **Free movement in the EU territory** is ensured for any products complying with ATEX directive.
- **EHSR**s: Essential Health and Safety Requirements needed for products used in potentially explosive atmospheres with detailed demands of manufacturer.
- **1st of July 2003**: The European Union has decided not to extend the transition period for the new standard relating to equipment for use in potentially explosive atmospheres, ATEX, beyond 1st of July 2003.
- **Article 14**: Previous Directives 76/117/EEC, 79/198/EEC and 82/130/EEC will expire on 1st of July 2003.
- **All national standards** which are in conflict with the directive will be withdrawn.

In addition to the above, all ABB's motor production units are certified to ISO 9001 and ISO 14000.

Marking temperatures, gas groups and hazardous areas

To ensure equipment can be safety used in potentially explosive atmospheres, the hazardous areas where the equipment is installed must be known. Temperature class of equipment must be compared with the spontaneous ignition temperature of the gas mixtures concerned and its gas group must be known in specific cases (e.g. flame proof protection).

Categories or classification

The ATEX Directive has introduced the concept of "Categories" which is a way of expressing the capability of equipment respecting the EHSR needs for versus the Zone where the equipment is installed.

Category 1	according to Annex 1 of ATEX used in Zone 0 or Zone 20
Category 2	according to Annex 1 of ATEX used in Zone 1 or Zone 21
Category 3	according to Annex 1 of ATEX used in Zone 2 or Zone 22

Classification

	Category equipment	Inflammable substances	Level of protection	Fault protection	Comparison with present practice and IEC
Equipment group I (mines)	**M1**	Methane, dust	Very high level	2 types of protection or 2 independent faults	Group I
	M2	Methane, dust	High level	1 type of protection Normal operation	Group I
Equipment group II (surface)	**1**	Gas, vapours, mist, dust	Very high level	2 types of protection or 2 independent faults	Group II Z0 (gas) / Z20 (dust)
	2	Gas, vapours, mist, dust	High level	1 type of protection Habitual frequent malfunction	Group II Z1 (gas) / Z21 (dust)
	3	Gas, vapours, mist, dust	Normal	Required level of protection	Group II Z2 (gas) / Z22 (dust)

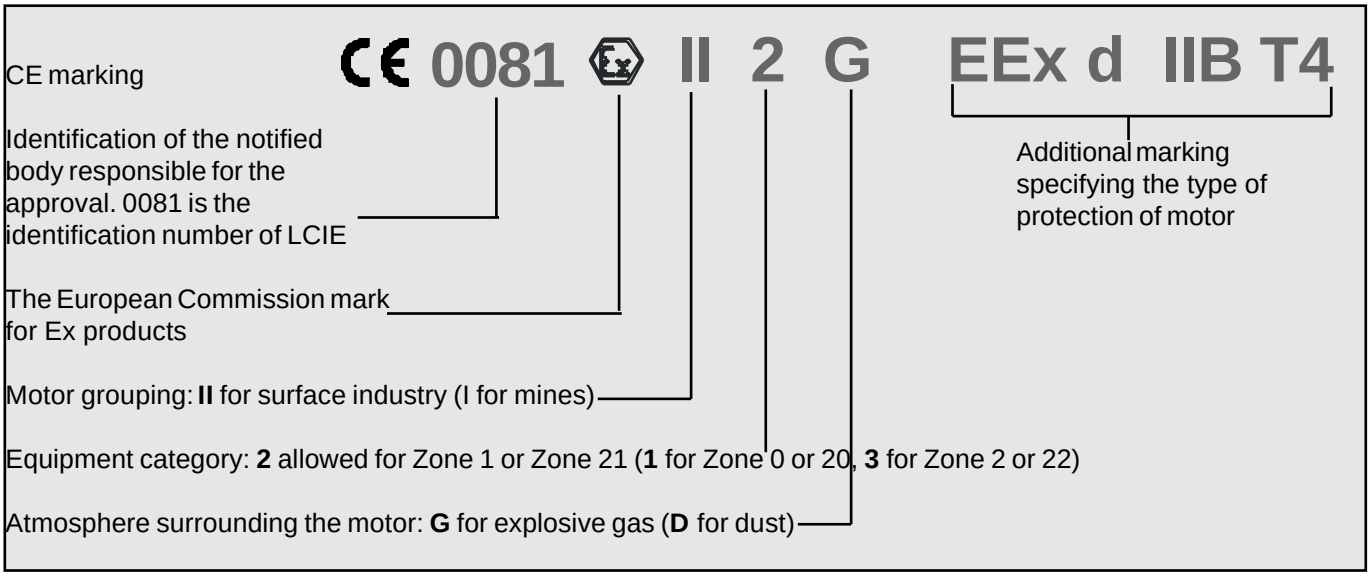
Temperature classes

Temperature class	Ignition temperature for the gas/vapor °C	Max. permitted temperature equipment °C
T1	> 450	450
T2	> 300 < 450	300
T3	> 200 < 300	200
T4	> 135 < 200	135
T5	> 100 < 135	100
T6	> 85 < 100	85

Grouping of electrical apparatus

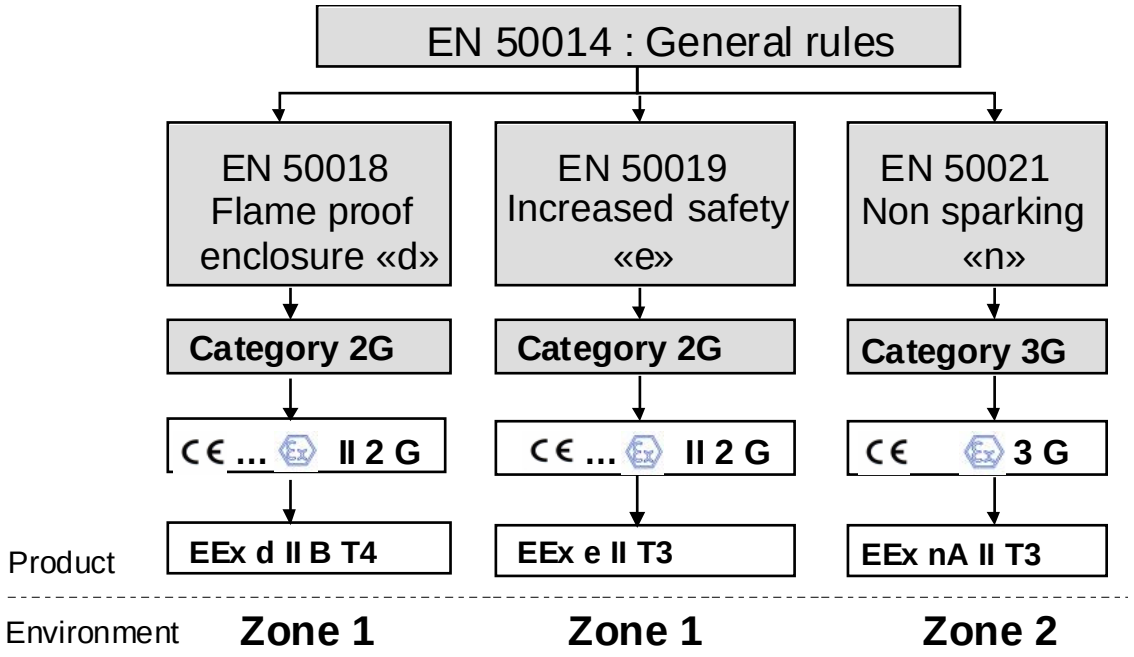
Group I	Apparatus for coal mines susceptible to firedamp
Group II	Apparatus for explosive atmospheres other than mines; surface industries
IIA, IIB, IIC	Group II is subdivided for EEx d and EEx i -equipment according to the severity of the environment. IIC is the highest rating; a motor from one of the higher categories can also be used in a lower category environment.

Marking of equipment

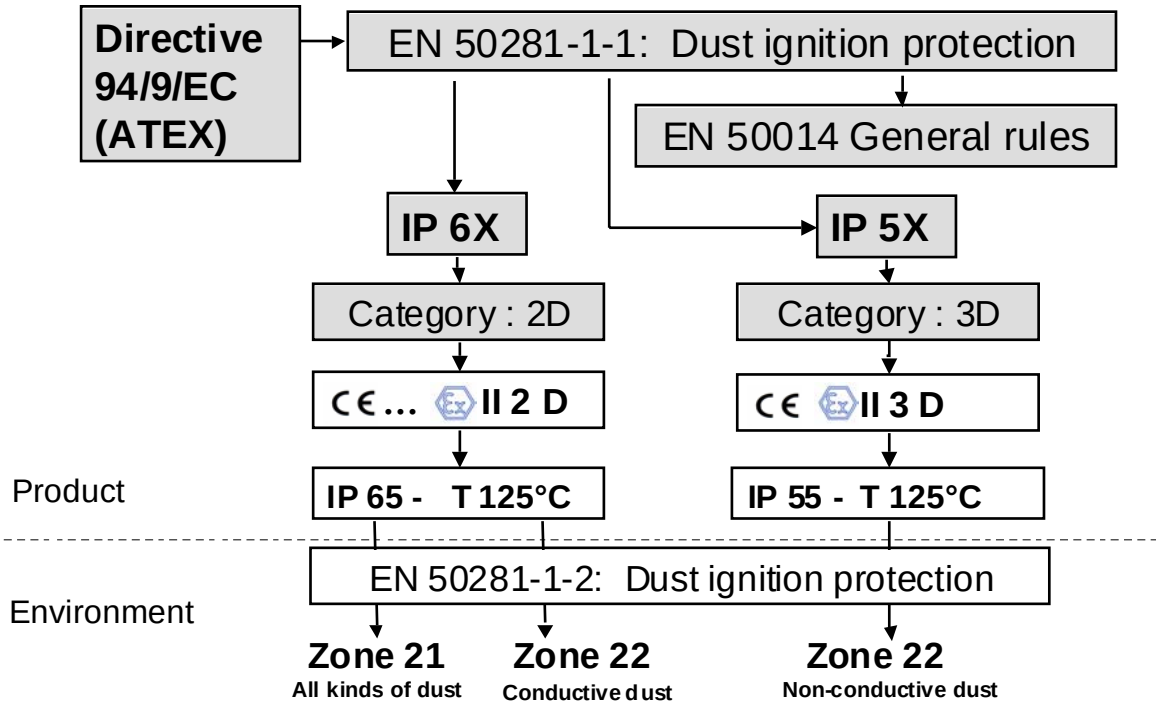


Selection of products for hazardous areas

EN Standard for Group II: Gas environments



EN Standard for Group II: Dust environments



Dust Ignition protection in hazardous areas

Combustible dusts is hazardous as it can form potentially explosive atmospheres when dispersed in the air. Furthermore, layers of combustible dust may ignite and act as ignition source for an explosive atmosphere.

Hazardous areas with dust can be found in a variety of industries such as:

- agriculture
- chemicals
- plastics
- stock holding

Selection and installation of electrical equipment
To ensure equipment can be safely used in hazardous areas with dust, the following procedure should be considered before selecting a product:

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

2. Characteristics of the dust:
- Is the dust electrically conductive or non-conductive?

3. Ignition temperature of the dust:
- T_{Cl}: Ignition temperature of dust in a "cloud" or
- T_{5mm}: Ignition temperature of a 5 mm dust layer

Selection and installation of product: EN 50 281-1-2

Equipment category	Category 1 (Zone 21)	Category 2 (Zone 21 and conductive dust)	Category 3 (Zone 22 and non-conductve dust)
Minimum protection for equipment	not applicable	IP 6X	IP 5X

Marking temperature

Type of dust	Ignition temperature	Maximum surface temperature of motor	Marking temperature of equipment T°C
Cloud	T_{Cl}	2/3 x T_{Cl}	T°C ≤ 2/3 x T_{Cl}
Layer up to 5 mm	T_{5mm}	T_{5mm} - 75 K	T°C ≤ (T_{5mm} - 75 K)

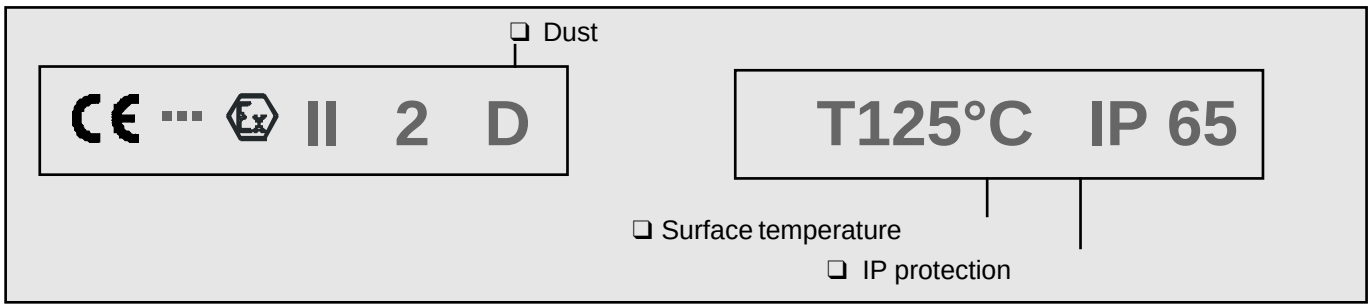
T_{5mm} is the ignition temperature of 5 mm layer of dust

Note: In case of dust layer above 5 mm; please consult ABB.

Substances (examples)

Dust	Wheat	Barley	Corn	Turniprape	Sunflower	Sugar	Lignite	Sulphur
T_{Cl} (cloud)	420°C	450°C	400°C	480°C	490°C	350°C	450°C	190°C
T_{5mm} (5mm)	200°C	205°C	250°C	230°C	220°C	220°C	200°C	220°C

Marking of equipment



General about hazardous areas

Standards

Motors for hazardous areas comply with the following international standards:
- IEC publications 60079-0 (2000-06) and 60079-15 (2001-02); 61241-1-1 (1999-06)
- European standards (latest edition) EN 50014, EN 50016, EN 50018, EN 50019, EN 50021 and EN 50281-1-1
- British standards BS 5000 Part 16

Preamble

In hazardous areas, it is the utmost importance to ensure the safe use of electrical apparatus. To this end, many countries have regulations concerning both the design and use of such apparatus. These regulations are becoming increasingly harmonized within the framework of IEC recommendations and European Standards.

The hazard may be due to an explosive atmosphere composed of a mixture of gas, vapors or dusts with air. This chapter only deals with safety in explosive gas atmospheres for which European Standards exist.

Flameproof enclosure EEx d and EEx de

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

Work on assembly devices of enclosure component parts is only permitted using prescribed tools. Cable entries must meet the requirements of this type of protection.

The temperature of the motor's external enclosure should not exceed the self-ignition temperature of the explosive atmosphere of the installation area during normal operation. For this reason, rated output depends on this rated maximum temperature for the considered area.

No motor device outside the flameproof enclosure (e.g., ventilation) shall be a potential source of sparks, arcs or dangerous overheating.

Variants combining two types of protection usually combine ”d” and ”e” protection. The most commonly used and recognized by the CENELEC European Standards is the EEx de variant. The motor is designed with an EEx d flameproof enclosure, while the terminal box features an EEx e increased safety protection. Such design combines the superior safety degree of the ”d” type of protection with the less stringent electrical connection requirements of increased safety motors.

Motors featuring dual protection are seldom encountered - such as an increased safety motor with a flameproof enclosure designated EEx e + EEx d in European Standards.

Alleinschutz – thermistors as sole protection (optional)

The flameproof motors from ABB, frame sizes 80 to 400, have been certified for thermistors as sole protection against overload. This construction, "Alleinschutz", is available as an option, see variant codes.

"Alleinschutz“ is a term that defines the certification of flameproof motor and protection device together. The certificate confirms that thermistors and relays will switch off the motor in case of overheating before the temperature of the motor's external enclosure exceeds the temperature marking stamped on the rating plate.

Each motor ordered with thermistors as sole protection will be tested, with locked rotor, up to the point where the thermistors trigger the relay to turn off the motor. At the triggering temperature, the motor has to be within the certified temperature class.

The relay is included in the certificate, which means that only approved relays can be used for "Alleinschutz“.

Please note that sizes 315 to 400 require special technical solutions, consult ABB.

Increased safety design, EEx e

The design of this motor type prevents the occurrence of sparks, arcs or hot spots in service (including starting and locked rotor situation), that could reach the self-ignition temperature of the surrounding, potentially explosive atmosphere, in all inner and outer parts of the machine.

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

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

Temperature rise limits are to be considered for two operating aspects; one for normal operating conditions and the other under accidental stalling conditions.

Temperature rise limits under normal operating conditions

The expected electrical lifespan of a motor depends on its temperature rise for a given insulation class, and on the motor winding temperature, in operation, which is not homogeneous with hot spots appearing.

For these reasons, a safety margin of 10 K is allowed for between windings temperature rise at rated output, as measured by the change of resistance method, and the maximum temperature rise permitted by the winding insulation class.

Temperature rise limits during short circuit under accidental stalling conditions

Should the machine stall while in operation, a short-circuit current nearly equal to the starting current will develop, and stator and rotor winding temperatures will rise rapidly (see figure 1).

To prevent this temperature value from exceeding the temperature level below which the apparatus should not cause the spontaneous ignition of an explosive atmosphere, protection devices must trip within a specified time (t_E). This tripping time depends on the short-circuit current level or the short-circuit current to rated current ratio (I_A/I_N). Figures 2 and 3 show, for commonly used protection devices, the limiting ratio between short-circuit current inrush I_A/I_N and rotor stalling time t_E, according to the EN and VIK.

This type of protection is inappropriate for commutator machines or brake-motors which, by principle, are capable of producing arcs, sparks or hot spots.

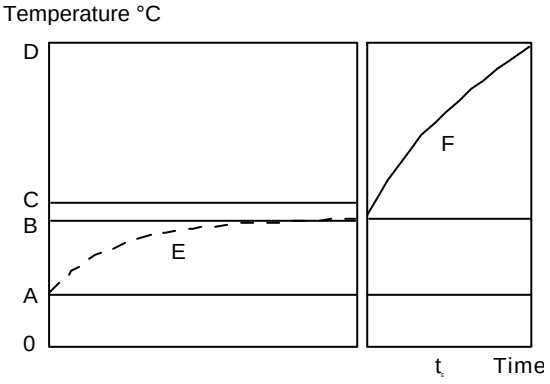


Figure 1.
O = temperature 0°C
A = Max. ambient temperature, reference 40°C
B = Temperature at rated load
C = Max temperature as permitted by the insul. class
D = Max limit temperature as set by the nature of the potentially explosive atmosphere
E = Temperature-rise curve of motor at rated output
F = Temp. rise curve under stalled rotor conditions
t_E = stalled rotor time

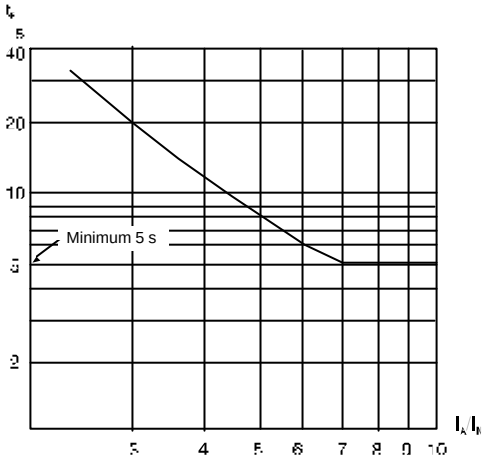


Figure 2. Min. value of time t_E as a function of I_A/I_N ***acc. to EN 50019.***

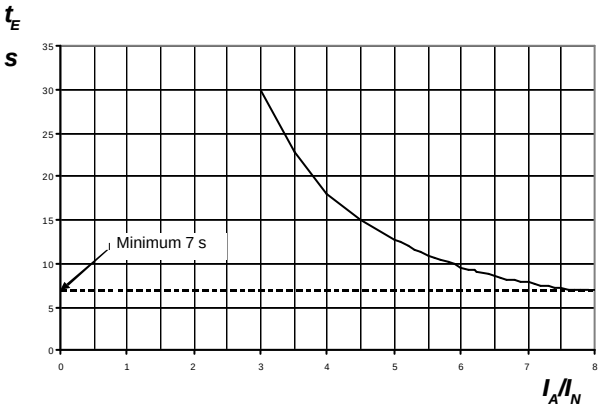


Figure 3. Min. value of time t_E as a function of I_A/I_N ***acc. to VIK.***

Non-sparking design, EEx nA, Ex nA, Ex N

This type of protection is allowed to be used in the hazardous area corresponding to zone 2.

This design is also known as 'Non-sparking' type as the motor must be designed in such a way that no sparks can occur in normal operation, and used within the ratings specified by the manufacturer, which excludes thermal requirements due to starting or accidental stalling.

Yet, EHRS's (Essential Health and Safety Requirements) stated in ATEX Directive for products installed in zone 2 have introduced new requirements on the motor design compared to previous technical report IEC 79-15 (1987) used for Zone 2. These new requirements make the motor safer against the risk of spark during the start-up.

However, along with the ATEX -directive, the national standards will be withdrawn and supersided by the ATEX directive 94/9/EC and the EN standards. Thus the new British standard for non-sparking is BS-EN 50021.

EEx nA motors are not flameproof motors. They have no flamepath, and thus the enclosure groups A, B and C have no relevance. The letter "A" stands for non-sparking equipment according to EN 50021.

After 1st of July, 2003 it will not be allowed to put on the market any motor according to IEC 79-15 in hazardous area corresponding to zone 2 in Europe.

The requirements of IEC 60079-15 are identical to the requirements of EN 50021, which proves that although CENELEC and IEC operate at two different levels, their action has a strong mutual impact in the electrotechnical field around the world.

Dual certification

EEx nA motors in cast iron frame can also be used for Dust -applications. Following combinations are possible:

CI sizes 71..315	EEx nA II T3 for zone 2	DIP T125°C, IP55 for zone 22
CI sizes 160..315	EEx nA II T3 for zone 2	DIP T125°C, IP65 for zone 21

These features are possible due to the IP protection. The gases penetrate this protection, and thus the inside surface temperature class is T3 (200°C). The ingress of dust, however, is prevented and the dust determines the outside surface temperature class: T 125°C.

Testing and certificates

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

Motors are defined and classified according to the potentially explosive atmospheres present at the installation site, described on page 4.

Depending on the nature of the atmosphere, it is the responsibility of the user to determine which group and which maximum surface temperature should be specified for the motor installation.

The motors are rated and certified for ambient temperature between -20°C and +40°C according to standards.

For ambient temperature below -20°C and above +40°C certificates are available for some motors, please contact ABB.

ABB's motors conform to the stringent standards set by CENELEC (European Committee for Electrotechnical Standardization), and are approved by testing laboratories (ExNB: Notified Body). The EU member countries have a common standard for motors for hazardous environments; Euronorm

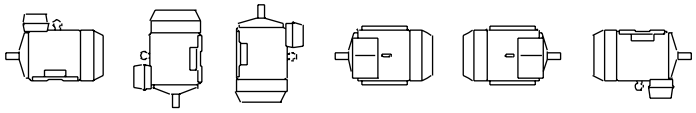
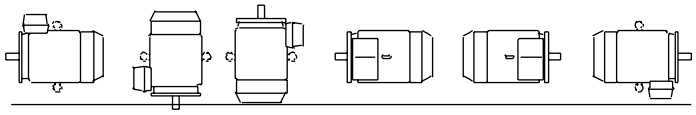
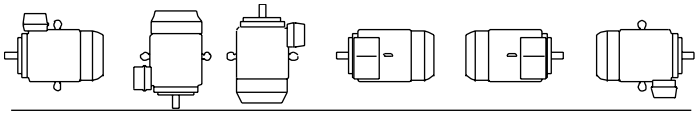
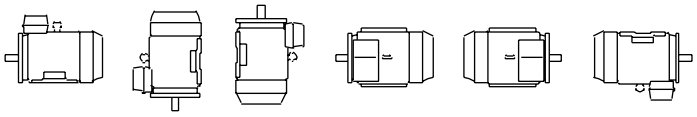
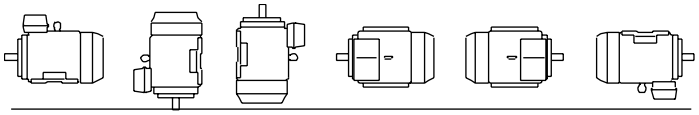
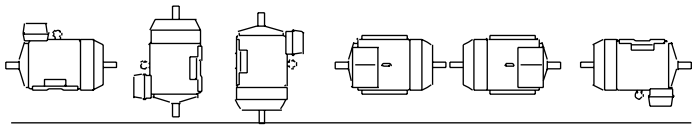
EN 50014: General rules
EN 50016: Pressurised motor EEx p
EN 50018: Flame proof motor EEx d
EN 50019: Increased safety motor EEx e
EN 50021: Non-sparking motor EEx nA
EN 500281-1: Dust ignition proof motor DIP

Motors can be certified by any of the Notified Bodies "ExNB" of EU member countries. These motors are therefore acceptable in all EU countries and most other countries.

General Technical Specification

Mechanical and electrical design

Mounting arrangements

	CodeI/CodeII						Product code pos. 12
Foot-mounted motor.	IM B3 IM1001	IM V5 IM1011	IM V6 IM1031	IM B6 IM1051	IM B7 IM1061	IM B8 IM1071	A = foot-mounted, term.box top R = foot-mounted, term.box RHS L = foot-mounted, term.box LHS
							
Flange-mounted motor, large flange	IM B5 IM3001	IM V1 IM3011	IM V3 IM3031	*) IM3051	*) IM3061	*) IM3071	B = flange mounted, large flange
							
Flange-mounted motor, small flange	IM B14 IM3601	IM V18 IM3611	IM V19 IM3631	*) IM3651	*) IM3661	*) IM3671	C = flange mounted, small flange
							
Foot- and flange-mounted motor with feet, large flange	IM B35 IM2001	IM V15 IM2011	IM V36 IM2031	*) IM2051	*) IM2061	*) IM2071	H = foot/flange-mounted, term.box top S = foot/flange-mounted, term.box RHS T = foot/flange-mounted, term.box LHS
							
Foot- and flange-mounted motor with feet, small flange	IM B34 IM2101	IM2111	IM2131	IM2151	IM2161	IM2171	J = foot/flange-mounted, small flange
							
Foot-mounted motor, shaft with free extensions	IM1002	IM1012	IM1032	IM1052	IM1062	IM1072	
							

*) Not stated in IEC 60034-7.

Voltage and frequency

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

The motors can operate continuously at the rated output, with a long-term voltage deviation of 5 % from the specified value or range of values, and at the rated frequency without exceeding the temperature class stamped on the rating plate. The temperature rise of the winding may increase by 10 K, but without exceeding the insulation temperature class stamped on the rating plate. Voltage deviations of up to 10 % are permissible for short periods only.

Protection against corrosion

Special attention has been paid to the finish of ABB's motors. All parts are treated by the method most appropriate to each material, giving reliable anti-corrosion protection under severe environmental conditions.

The color is blue, Munsel color code: 8B, 4.5/3.25 (NCS4822-B05G the closest shade in other standards). Specific details of paint types are available on request.

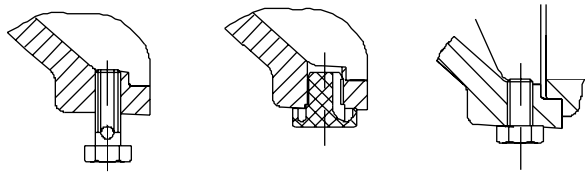
Drain holes

Non-sparking, Increased Safety and dust ignition proof motors are fitted with drain holes and plugs according to the table below.

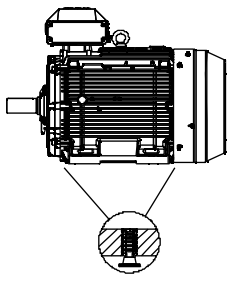
Flameproof motors are not as standard fitted with drain holes, but can be on request, see variant codes.

Type of protection	Frame material	Frame size	Drain holes
Non-sparking, increased safety	Aluminium	90- 250	closed
	Cast iron	71 - 132	optional
		160 - 400	open
Flameproof	Cast iron	80-400	not included, optional
Dust ignition proof	Aluminium	90-250	not included
Dust ignition proof, category 2D	Cast iron	80-315	not included, optional
Dust ignition proof, category 3D	Cast iron	80-132	optional
		160-400	open

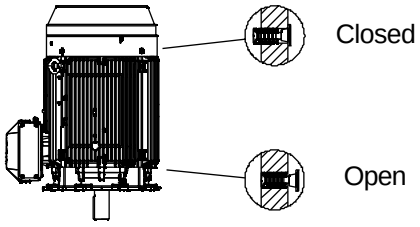
Motor sizes 71 to 250:



Motor sizes 160 to 400:



Open



Bearings

ABB policy is to have reliability as a vital issue in bearing design as well as in bearing lubrication systems. That is why we, as standard, follow the L1 -principle (meaning that 99 per cent of the bearings achieve or exceed the calculated bearing lifetime). The lubrication intervals can also be calculated according to L10 -principle which means that 90 per cent of the motors are sure to make the interval time. L10 -values, which are normally doubled compare to L1 -values, are available from ABB at request.

Motors with permanently greased bearings
Cast iron motors up to frame size 132 and aluminium motors up to frame size 180 are normally fitted with permanently greased bearings of type Z or 2Z. The exception is DIP motors with aluminium frame sizes 90-250, which are fitted with 2RS bearings because higher protection is required.

Guidelines for bearing life time acc. to L_1 principle:

Aluminium motors
- 2 and 2/4 pole motors, 10 000 - 20 000 duty hours [1)]
- 4 to 8 pole motors, 20 000 - 40 000 duty hours [1)]

Cast iron motors
- 2 and 2/4 pole motors, 20 000 duty hours [1)]
- 4 to 8 pole motors, 40 000 duty hours [1)]

[1)] depending on application and load conditions.

Motors fitted with grease nipples
Cast iron motors from frame size 160 and aluminium motors from frame size 200 and above (DIP motors with aluminium frame excluded), are as standard fitted with regreasable bearings. Cast iron motors sizes 160 to 250 are also available as stocked option with bearings greased for life.

Lubricate the motor when operating.

For motors with lubrication systems we recommend not to exceed lubrication interval of two years in any case.

Lubrication

Lubricate the motor when operational. If a grease outlet plug is fitted, temporarily remove when lubricating, or permanently with auto lubrication. If the motor is fitted with a lubrication plate, use values given, or use the values given in the table beside. These values are according to L1 -principle, which is the ABB standard for all motors.

The effectiveness of the motor lubrication should be checked by measuring the surface temperature of bearing endshields during normal operating conditions. If the measured temperature is +80°C or above, the relubrication intervals must be shortened; i.e. the relubrication interval should be halved for every 15K increase in bearing temperature. If this is not possible ABB recommends the use of lubricants suitable for high operating temperature conditions. These lubricants allow a normal relubrication interval and 15K increase in bearing temperature conditions.

Formula to change the L1 values roughly to L10 values:

L10 = 2.5 x L1

Lubrication intervals acc. to L1 principle

Frame size	Amount of grease g	3600 r/min	3000 r/min	1800 r/min	1500 r/min	1000 r/min	500-750 r/min
Ball bearings: lubrication intervals in duty hours							
112	12	10700	13000	18100	20900	25200	27700
132	15	9300	11300	17300	19000	22900	26400
160	26	7000	9300	14300	17300	20900	24000
180	30	5800	8100	13600	15700	19900	22900
200	40	3800	5800	10700	13000	17300	20900
225	46	3100	5000	10200	12400	16500	19900
250	60	2500	4000	9000	11500	15000	18000
280	67	2000	3500	8000	10500	14000	17000
315	90	2000	3500	6500	8500	12500	16000
355	120	1200	2000	4200	6000	10000	13000
400	120	1200	2000	4200	6000	10000	13000
Roller bearings: lubrication intervals in duty hours							
160	26	4600	6400	11300	14300	18100	21900
180	30	3400	5300	10700	13000	16500	19900
200	40	2100	3800	8100	10700	15000	18100
225	46	1500	3000	7300	9800	13600	17300
250	60	1300	2200	6300	8500	13000	16000
280	67	1000	2000	5700	7600	12000	15000
315	90	1000	2000	4000	6000	9000	13000
355	120	400	1000	2300	4000	7000	10000
400	120	400	1000	2300	4000	7000	10000

Standard bearing types

The motors are normally fitted with single-row deep groove ball bearings as listed in the table below.

For special bearings, please see the variant codes.

Motor size	Poles	Flameproof motors Bearing D-end	Flameproof motors Bearing N-end	Increased safety motors Bearing D-end	Increased safety motors Bearing N-end	Non-sparking motors Bearing D-end	Non-sparking motors Bearing N-end
Aluminium motors							
90	2-8			6305-2Z/C3	6204-2Z/C3	6305-2Z/C3	6204-2Z/C3
100	2-8			6306-2Z/C3	6205-2Z/C3	6306-2Z/C3	6205-2Z/C3
112	2-8			6206-2Z/C3	6205-2Z/C3	6206-2Z/C3	6205-2Z/C3
132	2-8			6208-2Z/C3	6206-2Z/C3	6208-2Z/C3	6206-2Z/C3
160	2-8			6309-2Z/C3	6209-2Z/C3	6309-2Z/C3	6209-2Z/C3
180	2-8			6310-2Z/C3	6209-2Z/C3	6310-2Z/C3	6209-2Z/C3
200	2-8			6312/C3	6210/C3	6312/C3	6210/C3
225	2-8			6313/C3	6212/C3	6313/C3	6212/C3
250	2-8			6315/C3	6213/C3	6315/C3	6213/C3
Cast iron motors							
71	2-8					6202-2RS/C3	6202-2RS/C3
80	2-8	6204-2Z/C3	6204-2Z/C3	6204-2Z/C3	6204-2Z/C3	6204-2RS/C3	6204-2RS/C3
90	2-8	6205-2Z/C3	6205-2Z/C3	6205-2Z/C3	6205-2Z/C3	6205-2RS/C3	6205-2RS/C3
100	2-8	6206-2Z/C3	6206-2Z/C3	6206-2Z/C3	6206-2Z/C3	6206-2RS/C3	6206-2RS/C3
112	2-8	6206-2Z/C3	6206-2Z/C3	6206-2Z/C3	6206-2Z/C3	6207-2RS/C3	6206-2RS/C3
132	2-8	6208-2Z/C3	6208-2Z/C3	6208-2Z/C3	6208-2Z/C3	6208-2RS/C3	6207-2RS/C3
160	2	6309M/C3 [1)]	6309M/C3 [1)]	6309M/C3	6309M/C3	6309M/C3 [1)]	6309M/C3 [1)]
	4-8	6309/C3 [1)]	6309/C3 [1)]	6309/C3	6309/C3	6309/C3 [1)]	6309/C3 [1)]
180	2	6310M/C3 [1)]	6309M/C3 [1)]	6310M/C3	6309M/C3	6310M/C3 [1)]	6309M/C3 [1)]
	4-8	6310/C3 [1)]	6309/C3 [1)]	6310/C3	6309/C3	6310/C3 [1)]	6309/C3 [1)]
200	2	6312M/C3 [1)]	6310M/C3 [1)]	6312M/C3	6310M/C3	6312M/C3 [1)]	6310M/C3 [1)]
	4-8	6312/C3 [1)]	6310/C3 [1)]	6312/C3	6310/C3	6312/C3 [1)]	6310/C3 [1)]
225	2	6313M/C3 [1)]	6312M/C3 [1)]	6313M/C3	6312M/C3	6313M/C3 [1)]	6312M/C3 [1)]
	4-8	6313/C3 [1)]	6312/C3 [1)]	6313/C3	6312/C3	6313/C3 [1)]	6312/C3 [1)]
250	2	6315M/C3 [1)]	6313M/C3 [1)]	6315M/C3	6313M/C3	6315M/C3 [1)]	6313M/C3 [1)]
	4-8	6315/C3 [1)]	6313/C3 [1)]	6315/C3	6313/C3	6315/C3 [1)]	6313/C3 [1)]
280	2	6316/C3	6316/C3	6316/C3	6316/C3	6316/C3	6316/C3
	4-8	6316/C3	6316/C3	6316/C3	6316/C3	6316/C3	6316/C3
315	2	6316/C3	6316/C3	6316/C3	6316/C3	6316/C3	6316/C3
	4-8	6319/C3	6316/C3	6319/C3	6316/C3	6319/C3	6316/C3
355	2	6319M/C4	6319M/C4	6319M/C4	6319M/C4	6319M/C4	6319M/C4
	4-8	6322/C3	6319/C3	6322/C3	6319/C3	6322/C3	6319/C3
400	2	6319M/C4	6319M/C4	6319M/C4	6319M/C4	6319M/C4	6319M/C4
	4-8	6322/C3	6319/C3	6322/C3	6319/C3	6322/C3	6319/C3

[1)] Motors also available as standard with bearings greased for life.

Motor size	Poles	Dust ignition protection Category 2 D Bearing D-end	Dust ignition protection Category 2 D Bearing N-end	Category 3 D Bearing D-end	Category 3 D Bearing N-end
Aluminium motors					
90	2-8	6305 2RSC3	6204 2RSC3	6305 2RSC3	6204 2RSC3
100	2-8	6306 2RSC3	6205 2RSC3	6306 2RSC3	6205 2RSC3
112	2-8	6206 2RSC3	6205 2RSC3	6206 2RSC3	6205 2RSC3
132	2-8	6208 2RSC3	6206 2RSC3	6208 2RSC3	6206 2RSC3
160	2-8	6309 2RSC3	6209 2RSC3	6309 2RSC3	6209 2RSC3
180	2-8	6310 2RSC3	6209 2RSC3	6310 2RSC3	6209 2RSC3
200	2-8	6213 2RSC3	6211 2RSC3	6213 2RSC3	6211 2RSC3
225	2-8	6214 2RSC3	6214 2RSC3	6214 2RSC3	6214 2RSC3
250	2-8	6214 2RSC3	6214 2RSC3	6214 2RSC3	6214 2RSC3
Cast iron motors					
71	2-8	–	–	6202-2RS/C3	6202-2RS/C3
80	2-8	6204-2RSC3	6202-2RSC3	6204-2RS/C3	6204-2RS/C3
90	2-8	6205-2RSC3	6205-2RSC3	6205-2RS/C3	6205-2RS/C3
100	2-8	6206-2RSC3	6206-2RSC3	6206-2RS/C3	6206-2RS/C3
112	2-8	6206-2RSC3	6206-2RSC3	6207-2RS/C3	6207-2RS/C3
132	2-8	6208-2RSC3	6208-2RSC3	6208-2RS/C3	6208-2RS/C3
160	2	6309M/C3 [1)]	6309M/C3 [1)]	6309M/C3 [1)]	6309M/C3 [1)]
	4-8	6309/C3 [1)]	6309/C3 [1)]	6309/C3 [1)]	6309/C3 [1)]
180	2	6310M/C3 [1)]	6309M/C3 [1)]	6310M/C3 [1)]	6309M/C3 [1)]
	4-8	6310/C3 [1)]	6309/C3 [1)]	6310/C3 [1)]	6309/C3 [1)]
200	2	6312M/C3 [1)]	6310M/C3 [1)]	6312M/C3 [1)]	6310M/C3 [1)]
	4-8	6312/C3 [1)]	6310/C3 [1)]	6312/C3 [1)]	6310/C3 [1)]
225	2	6313M/C3 [1)]	6312M/C3 [1)]	6313M/C3 [1)]	6312M/C3 [1)]
	4-8	6313/C3 [1)]	6312/C3 [1)]	6313/C3 [1)]	6312/C3 [1)]
250	2	6315M/C3 [1)]	6313M/C3 [1)]	6315M/C3 [1)]	6313M/C3 [1)]
	4-8	6315/C3 [1)]	6313/C3 [1)]	6315/C3 [1)]	6313/C3 [1)]
280	2	6316/C3	6316/C3	6316/C3	6316/C3
	4-8	6316/C3	6316/C3	6316/C3	6316/C3
315	2	6316/C3	6316/C3	6316/C3	6316/C3
	4-8	6319/C3	6316/C3	6319/C3	6316/C3
355	2	6319M/C4	6319M/C4	6319M/C4	6319M/C4
	4-8	6322/C3	6319/C3	6322/C3	6319/C3
400	2	6319M/C4	6319M/C4	6319M/C4	6319M/C4
	4-8	6322/C3	6319/C3	6322/C3	6319/C3

[1)] Motors also available as standard with bearings greased for life.

Transport locking

Motors with roller bearings or an angular contact ball bearing are fitted with a transport lock before despatch to prevent damage to the bearings during transport. When the transport lock is fitted, the motor is provided with a warning sign.

Locking may also be fitted in other cases where the transport handling could be damaging.

Axially-locked bearings

The table shows which motors are axially locked in the bearing seat, by an inner bearing cover.

See also variant code 042.

Aluminium motors

Motor size	Foot-mounted motors	Flange-mounted motors	
		Large flange	Small flange
90-100	D-end	D-end	D-end
112-132	[1]	D-end	D-end
160-180	D-end	D-end	
200-250	N-end	N-end	

[1] A spring washer at the N-end locks the rotor at the D-end. DIP motors locked at D-end

Cast iron motors

Motor size	Foot-mounted motors	Flange-mounted motors
Non-sparking and Increased safety motors:		
71-132	On request	On request
160-180	D-end	D-end
200-400	D-end	D-end
Flameproof motors:		
80-400	D-end	D-end

Permissible loadings on the shaft end

The following tables give the permissible radial and axial forces in Newton, assuming only radial or axial force is applied. Permissible loads of simultaneous radial and axial forces will be supplied on request.

The bearing life, L_{10}, is calculated according to ISO 281 standard theory, which also takes the purity of the grease into consideration. An adequate lubrication is a necessary prerequisite for the table below.

The values are based on normal conditions at 50 Hz. At 60 Hz the values must be reduced by 10 %. For two-speed motors, the values must be based on the higher speed.

Motors are foot-mounted IM B3 version with force directed sideways. In some cases the strength of the shaft affects the permissible forces.

If flameproof motors EEx d or EEx de sizes 160 and above are subject to high radial forces (e.g. belt drive) they should be fitted with roller bearings. Permissible radial forces for IIB and IIC are available from ABB on request.

Please note that motors type EEx d or EEx de IIB and IIC in size 250 and above with roller bearings require detailed information about power transmission; please consult ABB.

Aluminium Motors

Permissible axial force FA and radial force FR (acc. to L_{10}-principle)

			Ball bearings Basic design with deep groove ball bearings				Alternative design with 63-series bearings				Roller bearings Alternative design with roller bearings			
			25,000 hrs		40,000 hrs		25,000 hrs		40,000 hrs		25,000 hrs		40,000 hrs	
Motor size	No of poles	Rotor weight FGR N	FA N	FR N	FA N	FR N	FA N	FR N	FA N	FR N	FA N	FR N	FA N	FR N
90[2) 3)]	2		1835	1200	1625	1200								
	4		2055	1200	1805	1200								
	6		2210	1200	1930	1200								
	8		2285	1200	1985	1200								
100[2) 3)]	2		2370	1800	2100	1800								
	4		2645	1800	2330	1800								
	6		2830	1800	2480	1800								
	8		2925	1800	2555	1800								
112 M[2)]	2	64	1500	1420	1320	1280	2230	1700	1970	1700				
	4	84	1600	1410	1390	1250	2410	1700	2110	1700				
	6	85	1730	1510	1500	1340	2590	1700	2260	1700				
	8	89	1750	1530	1510	1360	2680	1700	2320	1700				
112 MB[2)]	2	85	1530	1470	1340	1330	2250	1700	1990	1700				
	4	106	1600	1430	1390	1260	2410	1700	2110	1700				
	6	107	1720	1520	1490	1340	2590	1700	2250	1700				
	8	107	1760	1560	1520	1370	2680	1700	2320	1700				
132 SA[2)]	2	89	2570	2360	2260	2140	3460	3180	3070	2870				
132 SB[2)]	2	101	2570	2360	2260	2130	3460	3170	3070	2870				
132 SC[2)]	2	143	2520	2430	2210	2200	3410	3200	3020	2960				
132 S[2)]	4	138	2770	2440	2440	2180	3770	3200	3320	2990				
132 M[2)]	4	160	2750	2410	2420	2150	3750	3200	3290	2950				
132 MB[2)]	4	211	2680	2440	2340	2170	3670	3200	3220	3000				
132 S[2)]	6	140	2950	2560	2580	2270	4020	3200	3520	3120				
132 MA[2)]	6	165	2940	2530	2570	2250	4010	3200	3500	3100				
132 MB[2)]	6	197	2910	2500	2550	2220	3980	3200	3480	3070				
132 MC[2)]	6	214	2830	2510	2460	2220	3900	3200	3400	3090				
132 S[2)]	8	165	3040	2630	2650	2330	4150	3200	3610	3200				
132 M[2)]	8	197	3020	2590	2630	2300	4130	3200	3590	3170				
132 MB[2)]	8	214	2940	2630	2560	2330	4050	3200	3520	3200				
160 MA[2)]	2	211	4730	3500	4220	3500					3050	3500	2720	3500
	8	280	5240	3500	4640	3500					3400	3500	3100	3500
160 M[2)]	2	227	4730	3500	4220	3500					3060	3500	2710	3500
	4	270	5230	3500	4640	3500					3370	3500	3000	3500
	6	320	5220	3500	4630	3500					3330	3500	2970	3500
	8	320	5220	3500	4630	3500					3330	3500	2970	3500
160 L[2)]	2	277	5240	3500	4650	3500					3350	3500	2980	3500
	4	338	5220	3500	4630	3500					3330	3500	2970	3500
	6	374	5050	3500	4470	3500					3150	3500	2760	3500
	8	445	4720	3500	4740	3500					3590	3500	3170	3500
160 LB[2)]	2	296	5240	3500	4650	3500					3350	3500	2980	3500
	4	374	5050	3500	4470	3500					3150	3500	2760	3500
	6	445	4720	3500	4740	3500					3590	3500	3170	3500
	8	445	4720	3500	4740	3500					3590	3500	3170	3500
180 M[2)]	2	332	4660	5550	4250	5110					2820	5900	2420	5900
	4	451	4950	5710	4500	5200					3120	5900	2660	5900
180 L[2)]	4	522	4870	5670	4390	5150					3030	5900	2560	5900
	6	571	5200	5900	4710	5500					3360	5900	2870	5900
	8	561	5370	5900	4850	5570					3540	5900	3010	5900
180 LB[2)]	2	382	4660	5550	4250	5110					2820	5900	2420	5900
	4	602	4870	5670	4390	5150					3030	5900	2560	5900
	6	610	5200	5900	4710	5500					3360	5900	2870	5900
	8	606	5370	5900	4850	5570					3540	5900	3010	5900

[1)]

Method of mounting	Direction of force	Permissible axial force
Horizontal	Horizontal	FA acc. to table
Vertical	Downwards	FA – rotor weight FGR^2)
Vertical	Upwards	FA + rotor weight FGR^2)

[2)] For motor sizes 90 to 180, axial tension in the direction of the shaft is assumend. The specified values take the weight of the rotor and the effects of the spring washer at the N-end into consideration.

[3)] Basic design with 63-series bearings at the D-end.

Permissible axial force FA and radial force FR - continued

Motor size	No of poles	Rotor weight FGR N	Ball bearings: Basic design with deep groove ball bearings 25,000 hrs FA N	25,000 hrs FR N	40,000 hrs FA N	40,000 hrs FR N	Alternative design with 63-series bearings 25,000 hrs FA N	25,000 hrs FR N	40,000 hrs FA N	40,000 hrs FR N	Roller bearings: Alternative design with roller bearings 25,000 hrs FA N	25,000 hrs FR N	40,000 hrs FA N	40,000 hrs FR N
200 MLB[3]	2	559	1570	4060	1340	3590					1570	7790	1340	7790
	4	746	1670	4360	1400	3810					1670	7790	1400	7790
	6	785	1800	4540	1510	3940					1800	7790	1510	7790
	8	883	1780	4670	1470	4030					1780	7790	1470	7790
200 MLC[3]	2	579	1560	4050	1330	3590					1560	7790	1330	7790
	6	873	1670	4430	1380	3820					1670	7790	1380	7790
225 SMA[3]	4	746	2490	4930	2130	4320					2490	8300	2130	8300
	8	893	2790	5420	2380	4700					2790	8300	2380	8300
225 SMB[3]	2	697	2200	4530	1890	4010					2200	8900	1890	8900
	4	814	2440	4870	2070	4260					2440	8300	2070	8300
	6	691	2570	5080	2170	4400					2570	8300	2170	8300
	8	971	2720	5350	2310	4630					2720	8300	2310	8300
225 SMC[3]	2	765	2170	4510	1860	3990					2170	8900	1860	8900
	4	942	2360	4840	1980	4230					2360	8300	1980	8300
	6	1090	2465	5020	2065	4340					2460	8300	2060	8300
	8	1110	2580	5230	2160	4500					2580	8300	2160	8300
250 SMA[3]	2	824	2620	5620	2250	4980					2620	9100	2250	9100
	4	971	2970	6200	2530	5440					2970	11550	2530	11550
	6	1235	3100	6430	2630	5590					3100	11550	2630	11550
	8	1255	3230	6650	2740	5760					3230	11550	2740	11550
250 SMB[3]	2	942	2570	5610	2210	4960					2570	9100	2210	9100
	4	1175	2860	6140	2410	5380					2860	11550	2410	11550
	6	1430	2985	6400	2500	5560					2980	11550	2500	11550
	8	1450	3080	6590	2570	5700					3080	11550	2570	11550

[1]

Method of mounting	Direction of force	Permissible axial force
Horizontal	Horizontal	FA acc. to table
Vertical	Downwards	FA – rotor weight FGR[2])
Vertical	Upwards	FA + rotor weight FGR[2])

[2] For motor sizes 90 to 180, axial tension in the direction of the shaft is assumend. The specified values take the weight of the rotor and the effects of the spring washer at the N-end into consideration.

[3] Basic design with 63-series bearings at the D-end.

Cast iron Motors

Permissible radial forces (acc. to L_{10}-principle) - Motor sizes 71 - 132 *)

Non-sparking, Increased safety, dust ignition proof

Motor size	Poles	Length of shaft extension E (mm)	Ball bearings 20,000 hrs X_0(N)	X_{max}(N)
71	2	30	415	335
	4	30	415	335
	6	30	415	340
80	2	40	670	545
	4	40	890	725
	6	40	970	830
90 S	2	50	795	625
	4	50	995	780
	6	50	1135	880
90 L	2	50	780	635
	4	50	985	790
	6	50	1120	905
100	2	60	1090	875
	4	60	1360	1095
	6	60	1560	1250
112	2	60	1410	1120
	4	60	1735	1400
	6	60	2000	1620
132 S	2	80	1700	1330
	4	80	2130	1660
	6	80	2495	1935
132 M	2	80	1675	1345
	4	80	2130	1675
	6	80	2450	1960

Flameproof

Motor size	Poles	Length of shaft extension E (mm)	Ball bearings 20,000 hrs X_0(N)	X_{max}(N)
80	2	40	650	520
	4	40	830	680
	6	40	900	730
	8	40	900	730
90	2	50	720	575
	4	50	910	780
	6	50	1025	820
	8	50	1025	820
100, 112	2	60	1090	860
	4	60	1280	1025
	6	60	1460	1155
	8	60	1460	1155
132	2	80	1700	1380
	4	80	2020	1610
	6	80	2270	1805
	8	80	2270	1805

*) Values for frequency converter driven motors on request.

Permissible radial forces (acc. to L_{10}-principle)

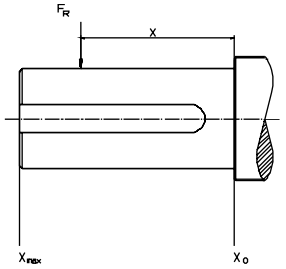
Increased safety, non-sparking and dust ignition proof motors, sizes 160-400

Motor size	Poles	Length of shaft extension E (mm)	Ball bearings 20,000 hrs X_0 (N)	Ball bearings 20,000 hrs X_{max} (N)	Ball bearings 40,000 hrs X_0 (N)	Ball bearings 40,000 hrs X_{max} (N)	Roller bearings 20,000 hrs X_0 (N)	Roller bearings 20,000 hrs X_{max} (N)	Roller bearings 40,000 hrs X_0 (N)	Roller bearings 40,000 hrs X_{max} (N)
160	2	110	3100	2100	2450	2000	7750	2100	6300	2100
	4	110	3900	2100	3100	2100	8800	2100	7750	2100
	6	110	4500	2100	3550	2100	8800	2100	8750	2100
	8	110	4950	2100	3900	2100	8800	2100	8800	2100
180	2	110	3550	2900	2800	2300	8350	3050	6800	3050
	4	110	4500	3050	3550	2900	9900	3050	8350	3050
	6	110	5150	3050	4100	3050	9900	3050	9450	3050
	8	110	5650	3050	4500	3050	9900	3050	9900	3050
200 ML_	2	110	4800	3950	3800	3150	11700	4550	9500	4550
	4	110	6050	4550	4800	3950	14400	4550	11700	4550
	6	110	6950	4550	5500	4550	16250	4550	13200	4550
	8	110	7650	4550	6050	4550	17700	4550	14400	4550
225 SM_	2	110	5450	4500	4350	3550	14300	4550	11650	4550
	4	140	6900	4650	5450	4400	17650	4650	14300	4650
	6	140	7900	4650	6250	4650	19900	4650	16200	4650
	8	140	8700	4650	6900	4650	21700	4650	17650	4650
250 SM_	2	140	6750	4100	5350	4100	18950	4100	15400	4100
	4	140	8550	5800	6750	5450	23350	5800	18950	5800
	6	140	9800	5800	7750	5800	26400	5800	21400	5800
	8	140	10750	5800	8550	5800	28750	5800	23350	5800
280 SM_	2	140	7300	6000	5800	4900	20400	6000	16500	6000
	4	140	9200	7800	7300	6200	25100	9200	20300	9200
	6	140	10600	8900	8400	7000	28300	9200	23000	9200
	8	140	11700	9200	9200	7800	30900	9200	25100	9200
315 SM_	2	140	7300	6000	5800	4950	20300	6000	16500	6000
	4	170	11400	9400	9000	7450	32500	9600	26600	9600
	6	170	13000	9600	10300	8500	37000	9600	30000	9600
	8	170	14400	9600	11400	9400	40300	9600	32700	9600
315 ML_	2	140	7400	5850	5850	5050	20600	5850	16700	5850
	4	170	11500	9700	9100	7650	32700	13600	26500	13600
	6	170	13200	11100	10400	8800	36900	13600	29900	13600
	8	170	14500	12200	11500	9700	40200	13600	32600	13600
355 S_	2	140	9000	7900	6200	5300	26600	10100	21800	10100
	4	210	15200	12500	12000	9850	45000	22300	36700	22300
	6	210	17300	14200	13700	11300	51000	22300	41500	22300
	8	210	19000	15600	15200	12400	55500	22200	45200	22200
355 SM_	2	140	9000	7900	6100	5300	26700	8900	21800	8900
	4	210	15200	12500	12000	9850	45000	21400	36700	21300
	6	210	17300	14300	13700	11300	51000	21100	41500	21100
	8	210	19000	15700	15200	12400	55500	21700	45200	21700
355 ML_	2	140	9100	7100	6100	5400	26900	7100	21800	7100
	4	210	15200	12800	12000	10100	45500	19500	36700	19500
	6	210	17300	14600	13700	11500	51000	19000	41500	19000
	8	210	19300	16200	15200	12700	55500	19500	45200	19500
400 M_	2	140	9100	7100	6100	5400	26900	7100	21800	7100
	4	210	15200	12800	12000	10100	45500	19500	36700	19500
	6	210	17300	14600	13700	11500	51000	19000	41500	19000
	8	210	19300	16200	15200	12700	55500	19500	45200	19500
400 LK_	2	140	8900	3000	5700	3000	27000	3000	22000	3000
	4	210	15000	13000	11700	10100	46000	15000	37000	15000
	6	210	17200	13700	13600	11700	52000	13700	42000	13700
	8	210	19200	15000	15000	12900	55500	15000	46000	15000

If the radial force is applied between points X_0 and X_{max}, the permissible force F_R can be calculated from the following formula:

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

E = length of shaft extension in basic version



Permissible radial forces (acc. to L_{10}-principle)

Flameproof motors EEx d, EEx de IIB/IIC - sizes 160-250

Motor size	Poles	Length of shaft extension E (mm)	Ball bearings 20.000 hrs X_0 (N)	Ball bearings 20.000 hrs X_{max} (N)	Roller bearings 20.000 hrs X_0 (N)	Roller bearings 20.000 hrs X_{max} (N)
160	2	110	3020	1900	6700	1600
	4	110	3780	1900	6700	1600
	6	110	4360	1900	6700	1600
	8	110	4810	1900	6700	1600
180	2	110	3420	2780	7500	2400
	4	110	4260	2800	7500	2400
	6	110	4910	2800	7500	2400
	8	110	5440	2800	7500	2400
200 ML_	2	110	4580	3780	11460	4200
	4	110	5770	4750	14100	4200
	6	110	6590	5000	15000	4200
	8	110	7000	5000	15000	4200
225 SM_	2	110	5170	3700	9300	3000
	4	140	6520	2800	9300	2200
	6	140	7000	2800	9300	2200
	8	140	7000	2800	9300	2200
250 SM_	2	140	3200	2900		
	4	140	3000	2800		
	6	140	3000	2800		
	8	140	3000	2800		

Flameproof motors EEx d, EEx de IIB - sizes 280-315

Motor size	Poles	Length of shaft extension E (mm)	Ball bearings 20.000 hrs X_0 (N)	Ball bearings 20.000 hrs X_{max} (N)	Roller bearings 20.000 hrs X_0 (N)	Roller bearings 20.000 hrs X_{max} (N)
280 SM_	2	140	7300	6000	20400	6000
	4	140	9200	7800	25100	9200
	6	140	10600	8900	28300	9200
	8	140	11700	9200	30900	9200
315 SM_	2	140	7300	6000	20300	6000
	4	170	11400	9400	32500	9600
	6	170	13000	9600	37000	9600
	8	170	14400	9600	40000	9600
315 ML_	2	140	7400	5850	20600	5850
	4	170	11500	9700	32700	13500
	6	170	13200	11100	36900	13500
	8	170	14500	12200	40200	13500

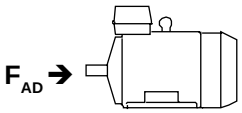
Values for sizes 355 and 400 values available on request.

If the radial force is applied between points X_0 and X_1,
the permissible force F_R can be calculated from the following formula:

$$F_R = F_{X0} - \frac{X}{0.5 \times E}(F_{X0} - F_{X1}) \text{ , } 0 \le X \le 0.5 \times E$$

Permissible axial forces (acc. to L_{10}-principle)

Mounting arrangement IM B3



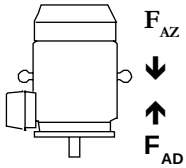
Motor size	20.000 hrs								40.000 hrs							
	2-pole		4-pole		6-pole		8-pole		2-pole		4-pole		6-pole		8-pole	
	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N
71	270	270	350	350	440	440	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
80	400	400	510	510	590	590	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
90	450	450	560	560	640	640	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
100	620	620	780	780	890	890	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
112	810	810	1020	1020	1170	1170	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
132 S_	980	980	1220	1220	1400	1400	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
132 M_	980	980	1210	1210	1400	1400	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
160	2550	1890	3310	2650	3890*	3230	4360*	3700	1960	1300	2520	1860	2960	2300	3310	2650
180	2930	2270	3810	3150	4480*	3810	5030*	4370	2240	1580	2890	2230	3390	2700	3810	3140
200	3900	2940	5080	4120	5930*	4970	6650*	5700	2990	2030	3870	2910	4510	3550	5050	4090
225	4370	3250	5680	4570	6640*	5530	7450*	6340	3350	2240	4330	3220	5050	3930	5650	4540
250	5650	3340	7260	4950	8420*	6100	9400*	7100	4400	2100	5610	3300	6460	4160	7200	4900
280	7300	5300	8000	6000	9000	7000	10000	8000	5750	3750	6200	4200	6900	4900	7700	5700
315	7000	5000	9000	7000	10600	8600	11600	9600	5600	3600	6900	4900	7900	5900	8900	6900
355 2)	10500	3500	13500	6500	15300	8300	16800	9800	8750	1750	10800	3800	12000	5000	13300	6300
400 M_ 2)	10500	3500	13500	6500	15300	8300	16800	9800	8750	1750	10800	3800	12000	5000	13300	6300
400 LK_ 2)	10100	3200	13000	6000	15000	8000	16500	9500	8350	1350	10200	3250	11800	4800	13000	6000

1) On request

2) The values for sizes 355 and 400 are valid for non-sparking and increased safety M2BA motors. Values for flameproof motors M2JA and M2KA are available on request.

* Axial forces FAD assume locked D-bearing by means of locking ring.

Mounting arrangement IM V1



Motor size	20.000 hrs								40.000 hrs							
	2-pole		4-pole		6-pole		8-pole		2-pole		4-pole		6-pole		8-pole	
	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N	F_{AD} N	F_{AZ} N
71	290	260	380	330	460	420	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
80	430	390	540	490	620	560	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
90	480	420	610	520	700	600	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
100	680	580	880	740	990	840	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
112	890	760	1140	950	1280	1100	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
132 S_	1100	910	1390	1120	1580	1300	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
132 M_	1100	910	1430	1080	1680	1260	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
160	2900	1660	3820	2320	4400*	2900	4880*	3370	2300	1060	3020	1530	3460	1960	3820	2310
180	3370	1970	4510	2680	5200*	3350	5740*	3910	2680	1280	3590	1760	4110	2260	4510	2680
200	4560	2500	5940	3550	6950*	4310	7670*	5040	3650	1590	4720	2330	5510	2880	6060	3420
225	5240	2670	6770	3850	7910*	4700	8740*	5500	4210	1640	5410	2490	6300	3100	6930	3690
250	6700	2630	8590	4080	10100*	5000	11100*	6000	5450	1380	6920	2410	8130	3040	8890	3780
280	8500	4300	9500	4600	11000	5500	12200	6600	6950	2700	7700	2800	8900	3350	9750	4200
315 SM_	9000	3700	11600	5400	13500	6200	14500	7500	7450	2100	9450	3200	10900	3650	11900	4650
315 ML_	9600	3400	12400	5000	14800	5600	16200	7000	8100	1850	10100	2850	12200	3150	13200	4150
355 S_ 2)	14100	1600	18500	3800	21200	5000	23000	6800	12200	1)	15700	10000	18000	1750	19400	3100
355 SM_ 2)	14900	800	19200	3100	22200	4100	24000	5800	13000	1)	16400	1)	18900	850	20300	2100
355 ML_ 2)	15000	1)	19800	1700	23100	2500	25000	4300	13100	1)	17000	1)	19800	1)	21300	1)
400 M_ 2)	15000	1)	19800	1700	23100	2500	25000	4300	13100	1)	17000	1)	19800	1)	21300	1)
400 LK_ 2)	17300	1)	21800	1)	24300	1000	26200	2500	15400	1)	18900	1)	21100	1)	22500	1)

1) On request

2) The values for sizes 355 and 400 are valid for non-sparking and increased safety M2BA motors. Values for flameproof motors M2JA and M2KA are available on request.

* Axial forces FAD assume locked D-bearing by means of locking ring.

Flameproof motors EEx d and EEx de

Range

Range	Standards	Motor sizes	Output
Flameproof EEx d IIB/IIC T1 - T6	EN 50014, 50018	80 - 400	0.55 - 630 kW
Flameproof EEx de IIB/IIC T1 - T6	EN 50014, 50018, 50019	80 - 400	0.55 - 630 kW

Terminal box, general

Terminal boxes are mounted on the top of the basic versions of flameproof motors. The terminal box of motor sizes 80 to 250 can be turned 4 x 90°, in motor sizes 160 to 180 of type EEx de and sizes 280 to 400 2x 180° after the delivery; to allow cable entry from either side of the motor. In motor sizes 160 to 180 (EEx de) as an easy option and in sizes 280 to 400 the position of terminal box has to be defined when ordering by 4 x 90°.

The terminal box can be equipped with cable glands or from motor size 280 with cable boxes in motor type EEx de. Terminations are suitable for Cu- and Al-cables. For a horizontal mounted motor the cable entry is normally located on the right-hand side, seen from D-end, for other positions see variant codes.
Protection class is IP 55.

Flameproof terminal box (EEx d-motor)

The flameproof terminal box complies with the requirements of this enclosure type and effectively stops the transmission of an internal explosion to the surrounding, potentially explosive atmosphere.

To maintain the integrity of this enclosure, connections must be made in accordance with the safety standards applicable to this type of terminal box. Furthermore, sealing must be selected corresponding to the type of supply cable used.

Cable entries

Unless otherwise specified, motors are delivered **without** cable glands with threaded cable entries for flameproof cable gland according to the table below. In frame sizes 100 to 400, the terminal box has two main cable entries with metric thread, one plugged with a flameproof metal plug. The auxiliary cable entry is also with metric thread, plugged with a flameproof metal plug. NPT threads are available on request. During the transition period from NPT to metric threads please check when ordering.

Metric threads (as standard)

Motor size	**Main cable entries** Thread	Metal plug	Outer cable sheath, mm	**Auxiliary cable entries** (heaters, thermistors etc.) Thread	Metal plug	Outher cable sheath, mm
80 - 90	1 x M25 x1.5	–	12 - 20.5	1 x M20 x 1.5	1 x M20 x 1.5	8.5 - 16
100 - 132	2 x M32 x1.5	1 x M32	12 - 21	1 x M20 x 1.5	1 x M20 x 1.5	8.5 - 16
160 - 180	2 x M40 x1.5	1 x M40	16 - 27.5	2 x M20 x 1.5	2 x M20 x 1.5	8.5 - 16
200 - 250	2 x M50 x1.5	1 x M50	21 - 34	2 x M20 x 1.5	2 x M20 x 1.5	8.5 - 16
280	2 x M63 x1.5	1 x M63	33 - 48	2 x M20 x 1.5	2 x M20 x 1.5	8.5 - 16
315	2 x M75 x1.5	1 x M75	47 - 65	2 x M20 x 1.5	2 x M20 x 1.5	8.5 - 16
355 - 400	2 x M75 x1.5	1 x M75	47 - 65	2 x M20 x 1.5	2 x M20 x 1.5	8.5 - 16

NPT threads as option, variant code 730 = Prepared for NPT cable glands

Motor size	**Main cable entries** Thread	NPT plug	Max. possible thread size	**Auxiliary cable entries** (heaters, thermistors etc.) Thread	NPT plug
80-112	1x3/4"	–	1 or 2x1"	1x3/4"	1x3/4"
132	2x3/4"	1x3/4"	1 or 2x1"	1x3/4"	1x3/4"
160-180	2x1 1/4"	1x1 1/4"	1 or 2x1 1/2"	2x3/4"	2x3/4"
200-250	2x1 1/2"	1x1 1/2"	1 or 2x2"	2x3/4"	2x3/4"
280	2x2"	1x2"	1 or 2x3"	1x3/4"	1x3/4"
315	2x3"	1x3"	1 or 2x3"	1x3/4"	1x3/4"
355-400	2x3"	1x3"	1 or 2x4"	1x3/4"	1x3/4"

Supply of cable glands (EEx d)

Cable glands are either fitted to the motor, or delivered loose to avoid damage during transport. For ordering, see variant codes. Other types are available on request.

Unless otherwise specified when ordering cable glands, and when data on the cables have not been provided when ordering, the cable glands listed below will be delivered. The unused opening is closed with a flameproof metal plug.

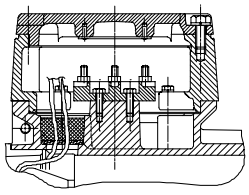
Variant code: 733 Standard cable gland EEx d IIB, non-armoured cable
735 Standard cable gland EEx d IIC, non-armoured cable

Motor size	Main cable entries					Auxiliary cable entries (heaters, thermistors etc.)				
	Thread	Gland	Closing plug	Outer cable diameter, mm IIB	IIC	Thread	Gland	Outer cable diameter, mm IIB	IIC	
80 - 90	1xM25 x 1.5	1xM25	–	12 - 20.5	11 - 20	1xM20 x 1.5	1xM20	8.5 - 16	7 - 15	
100 - 132	2xM32 x 1.5	1xM32	1xM32	12 - 21	16 - 27.5	1xM20 x 1.5	2xM20	8.5 - 16	7 - 15	
160 - 180	2xM40 x 1.5	1xM40	1xM40	16 - 27.5	22 - 33	2xM20 x 1.5	2xM20	8.5 - 16	7 - 15	
200 - 250	2xM50 x 1.5	1xM50	1xM50	21 - 34	30 - 44	2xM20 x 1.5	2xM20	8.5 - 16	7 - 15	
280	2xM63 x 1.5	1xM63	1xM63	33 - 48	40 - 57	2xM20 x 1.5	2xM20	8.5 - 16	7 - 15	
315 - 400	2xM75 x 1.5	1xM75	1xM75	47 - 65	56 - 68	2xM20 x 1.5	2xM20	8.5 - 16	7 - 15	

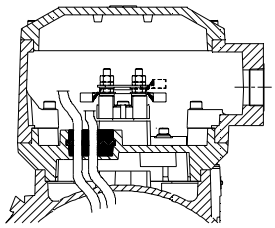
Variant code: 732 Standard cable gland EEx d IIB, armoured cable
734 Standard cable gland EEx d IIC, armoured cable

Motor size	Main cable entries							Auxiliary cable entries (heaters, thermistors etc.)					
	Thread	Gland	Closing plug	Inner cable sheath mm IIB	IIC	Outer cable sheath mm IIB	IIC	Thread	Gland	Inner cable sheath mm IIB	IIC	Outer cable sheath mm IIB	IIC
80 - 90	1xM25 x 1.5	1xM25	–	12-20.5	11-20	16-27.5	18-27.5	1xM20 x 1.5	1xM20	8.5-16	7-15	12-21	13-21
100 - 132	2xM32 x 1.5	1xM32	1xM32	12-21	16-27.5	16-27.5	23.5-33.5	1xM20 x 1.5	1xM20	8.5-16	7-15	12-21	13-21
160 - 180	2xM40 x 1.5	1xM40	1xM40	16-27.5	22-33	21-34	29-40.5	2xM20 x 1.5	2xM20	8.5-16	7-15	12-21	13-21
200 - 250	2xM50 x 1.5	1xM50	1xM50	21-34	30-44	27-41	40-53	2xM20 x 1.5	2xM20	8.5-16	7-15	12-21	13-21
280	2xM63 x 1.5	1xM63	1xM63	33-48	40-57	40-56	51-66	2xM20 x 1.5	2xM20	8.5-16	7-15	12-21	13-21
315 - 400	2xM75 x 1.5	1xM75	1xM75	47-65	56-68	54-74	64-78	2xM20 x 1.5	2xM20	8.5-16	7-15	12-21	13-21

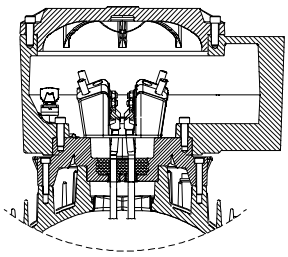
Examples of terminal boxes:



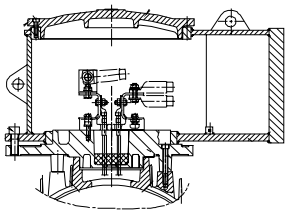
Terminal box for motors sizes 80 - 132



Terminal box for motors sizes 200 - 250



Terminal box for motors sizes 280 - 315



Terminal box for motors sizes 355 - 400

Increased safety terminal box (EEx de-motors)

As an alternative, an increased safety terminal box can be delivered with a flameproof motor enclosure. The certificate of approval for the flameproof motors also covers this application, referred to as EEx de.

The increased safety terminal box complies with the requirements of this type of enclosure and prevents all ignition sources such as sparks, excessive overheating etc. The features of the terminal box are: no self-loosening terminals, compliance with creepage distances and clearances specified in standards and cable gland with cable clamping.

Cable entries

Motor sizes 80 to 132 are delivered **without** cable glands but are delivered with threaded cable entries suitable for the following cable glands as standard. Motor sizes 160 to 400 are delivered **with** cable glands according to the table below as standard.

In frame sizes 100 to 132 the terminal box has two main cable entries with metric thread, one plugged with a metal plug. In frame sizes 160 to 250 the terminal box has also two main cable entries with metric threads; both are equipped with cable glands of a closed type. In frame sizes 280 to 400 the terminal box has two main metric cable glands, one equipped with a cable gland, one with a metal plug.

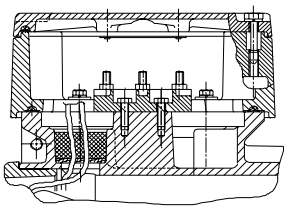
Motor size	**Main cable entries**				**Auxiliary cable entries** (heaters, thermistors etc.)			
	Thread	Cable gland	Metal plug	Outer cable sheath, mm	Thread	Cable gland	Metal plug	Outher cable sheath, mm
80 - 90	1 x M25 x1.5	–	–	10 - 16	1 x M20 x 1.5	–	1 x M20 x 1.5	8 - 14
100 - 132	2 x M32 x1.5	–	1xM32	14 - 21	1 x M20 x 1.5	–	1 x M20 x 1.5	8 - 14
160 - 180	2 x M40 x1.5	2xM40x1.5	–	18 - 27	2 x M20 x 1.5	2 x M20 x 1.5	–	8 - 14
200 - 250	2 x M50 x1.5	2xM50x1.5	–	26 - 35	2 x M20 x 1.5	2 x M20 x 1.5	–	8 - 14
280	2 x M63 x1.5	1 x M63	1 x M63	32 - 49	2 x M20 x 1.5	2 x M20 x 1.5	–	8 - 14
315	2 x M63 x1.5	1 x M63	1 x M63	32 - 49	2 x M20 x 1.5	2 x M20 x 1.5	–	8 - 14
355 - 400	See tables on next pages.							

Supply of cable glands (EEx de)

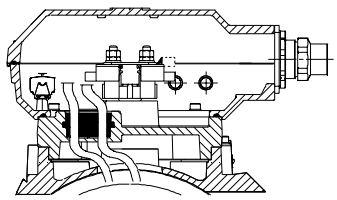
Cable glands are either fitted to the motor, or delivered loose to avoid damage during transport. For ordering, see variant codes.

Unless otherwise specified when ordering cable glands, and when data on the cables have not been provided when ordering, the cable glands listed on the next page will be delivered. Other types are available on request.

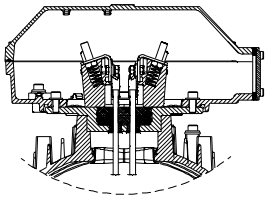
Examples of terminal boxes:



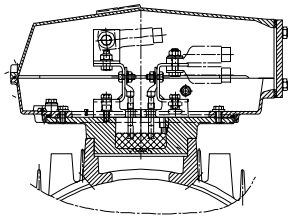
Terminal box for motors sizes 80 - 132



Terminal box for motors sizes 160 - 250



Terminal box for motors sizes 280 - 315



Terminal box for motors sizes 355 - 400

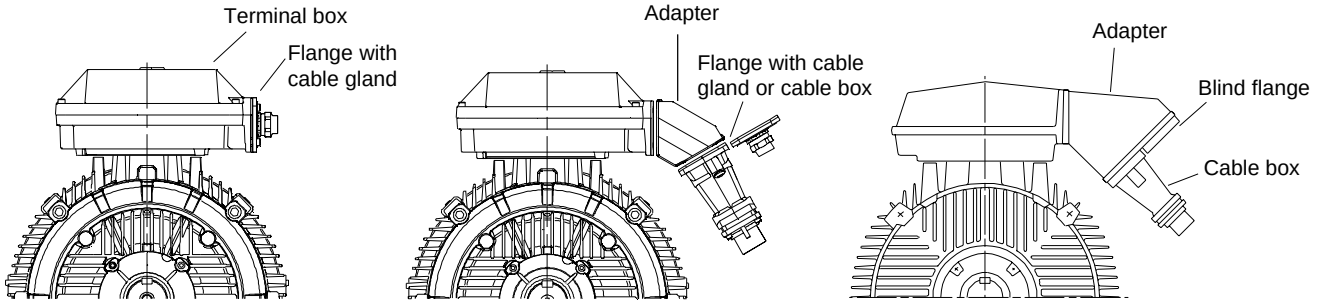
Flameproof motors sizes 280-400

Motors (EEx de) with top-mounted terminal box

Motor size	Flange or adapter	Cable box or cable gland	**Gland thread**	Cable diameter	Max. connection cable area mm^2	Terminal bolt size	Voltage/ frequency code
3000 r/min (2 poles)							
280	3GZF 294 730-749	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x150	M12	
315	3GZF 294 730-753	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x240	M12	
355 S	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	D
	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	E
355 SM_	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	
355 ML_	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
400 M_	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
400 LK_	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
1500 r/min (4 poles)							
280	3GZF 294 730-749	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x150	M12	
315	3GZF 294 730-753	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x240	M12	
355 S	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	D
	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	E
355 SM_	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	
355 ML_	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
400 M_	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
400 LKA	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	D
	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	E
400 LKB, LKC	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
1000 r/min (6 poles)							
280	3GZF 294 730-749	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x150	M12	
315	3GZF 294 730-753	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x240	M12	
355 S, SMA	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	
355 SMB	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	D
	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	E
355 ML_	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	
400 M	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	D
	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	E
400 MA, MB	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
400 LKA	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	
400 LKB, LKC	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	D
	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	E
750 r/min (8 poles)							
280	3GZF 294 730-749	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x150	M12	
315	3GZF 294 730-753	2x 3GZF 294 730-613	**2x M63x1.5**	2x Ø32-49	2x240	M12	
355 S, SMA	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	
355 MLA	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	
355 MLC	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	D
	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	E
400 M	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	D
400 MA	MPMM-ZL1	3GZF 294 730-301		2x Ø48-60	4x240	M12	D
	-	3GZF 294 730-301		2x Ø48-60	2x240	M12	E
400 LK_	MPMM-ZL1	LNPB 3328		2x Ø60-80	4x240	M12	

Voltage/frequency codes:
D - 380-420 VΔ 50 Hz, 660-690 VY 50 Hz, 440-480 VΔ 60 Hz
E - 500 VΔ 50 Hz, 575 VΔ 60 Hz

Examples:



Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW 400V 50Hz	Output kW 440V 60Hz	Type designation	Product code	Speed r/min	Efficiency Full load 100%	Efficiency 3/4-load 75%	Power factor cos φ 100%	Current I_N A	Current I_s/I_N	Torque T_N Nm	Torque T_s/T_N	Torque T_{max}/T_N	Moment of inertia J=1/4 GD² kgm²	Weight EEx d kg	Weight EEx de kg	Sound pressure level L_p dB(A)
3000 r/min = 2 poles				**400 V 50 Hz** [1]									**Basic design**			
0.75	**0.9**	**M2JA/KA 80 LS**	3GJA/KA 081 310-••B	2905	75.5	79.3	0.70	2.2	8.2	2.5	4.0	3.5	0.0009	24	24	59
1.1	**1.3**	**M2JA/KA 80 L**	3GJA/KA 081 320-••B	2850	78.3	77.5	0.82	2.6	6.4	3.7	2.5	2.9	0.0009	24	24	59
1.5	**1.75**	**M2JA/KA 90 S**	3GJA/KA 091 110-••B	2880	80.1	81.9	0.86	3.3	6.7	5	2.3	2.8	0.0019	32	32	65
2.2	**2.5**	**M2JA/KA 90 L**	3GJA/KA 091 510-••B	2880	83.0	84.0	0.88	4.6	7.6	7.3	2.7	3.3	0.0024	37	37	65
3	**3.5**	**M2JA/KA 100 L**	3GJA/KA 101 510-••B	2910	84.8	84.5	0.88	6.1	7.7	9.8	2.6	3.4	0.0041	45	45	66
4	**4.6**	**M2JA/KA 112 M**	3GJA/KA 111 310-••B	2900	84.8	86.2	0.90	7.7	7.2	13.2	2.4	3.1	0.005	46	46	67
5.5	**6.3**	**M2JA/KA 132 SA**	3GJA/KA 131 110-••B	2855	84.5	84.8	0.89	10.6	6.5	18.4	3.2	3.5	0.014	69	69	69
7.5	**8.6** [2]	**M2JA/KA 132 SB**	3GJA/KA 131 120-••B	2855	86.3	87.0	0.90	14.7	8.5	25	3.4	3.5	0.016	79	79	69
11	**12.5**	**M3JP/KP 160 MLA**	3GJP/KP 161 410-••G	2936	91.2	91.1	0.87	20	7.2	36	2.9	3.3	0.039	153	147	71
15	**17**	**M3JP/KP 160 MLB**	3GJP/KP 161 420-••G	2934	91.6	91.5	0.88	28	7.5	49	3.1	3.5	0.047	162	156	71
18.5	**21**	**M3JP/KP 160 MLC**	3GJP/KP 161 430-••G	2934	92.4	92.5	0.90	33	7.5	60	2.8	3.4	0.054	173	167	71
22	**25**	**M3JP/KP 180 MLA**	3GJP/KP 181 410-••G	2938	92.6	92.7	0.90	39	6.9	72	2.5	3.1	0.077	200	194	71
30	**35**	**M3JP/KP 200 MLA**	3GJP/KP 201 410-••G	2946	94.0	94.1	0.88	54	7.4	97	3.0	3.2	0.15	310	290	74
37	**43**	**M3JP/KP 200 MLC**	3GJP/KP 201 430-••G	2948	94.1	94.0	0.89	65	7.6	120	2.9	3.2	0.19	340	320	77
45	**52**	**M3JP/KP 225 SMB**	3GJP/KP 221 220-••G	2968	94.7	94.6	0.87	79	7.2	145	2.7	3.0	0.26	400	380	76
55	**63**	**M3JP/KP 250 SMA**	3GJP/KP 251 210-••G	2970	94.6	94.3	0.88	96	7.7	177	2.4	3.1	0.49	460	440	75
75	**90**	**M3JP/KP 280 SMA**	3GJP/KP 281 210-••G	2978	94.8	94.3	0.88	131	7.6	240	2.1	3.0	0.8	725	645	77
90	**105**	**M3JP/KP 280 SMB**	3GJP/KP 281 220-••G	2976	95.1	94.8	0.90	152	7.4	289	2.1	2.9	0.9	765	685	77
110	**125**	**M3JP/KP 315 SMA**	3GJP/KP 311 210-••G	2982	95.1	94.4	0.86	194	7.6	352	2.0	3.0	1.2	980	900	78
132	**155**	**M3JP/KP 315 SMB**	3GJP/KP 311 220-••G	2982	95.4	94.9	0.88	228	7.4	423	2.2	3.0	1.4	1040	960	78
160	**185**	**M3JP/KP 315 SMC**	3GJP/KP 311 230-••G	2981	96.1	95.6	0.89	269	7.5	513	2.3	3.0	1.7	1125	1045	78
200	**230**	**M3JP/KP 315 MLA**	3GJP/KP 311 410-••G	2980	96.3	95.9	0.90	336	7.7	641	2.6	3.0	2.1	1290	1210	78
250	**285**	**M2JA/KA 355 S**	3GJA/KA 351 100-••A	2980	96.1	95.7	0.92	410	6.6	801	1.3	3.0	3.8	1550	1550	83
315	**360**	**M2JA/KA 355 SMA**	3GJA/KA 351 210-••A	2978	96.6	96.4	0.92	510	7.7	1010	1.3	3.3	4.8	1750	1750	83
400	**450**	**M2JA/KA 355 MLA**	3GJA/KA 351 410-••A	2982	96.6	96.4	0.92	655	7.7	1281	1.6	3.3	6	2150	2150	83
450	**500** [2]	**M2JA/KA 355 MLC**	3GJA/KA 351 430-••A	2977	96.6	96.4	0.92	730	7.8	1444	1.2	3.2	6	2150	2150	83
400	**450**	**M2JA/KA 400 M**	3GJA/KA 401 300-••A	2982	96.6	96.4	0.92	655	7.7	1281	1.6	3.3	6	2200	2200	83
450	**500** [2]	**M2JA/KA 400 MA**	3GJA/KA 401 310-••A	2977	96.6	96.4	0.92	730	7.8	1444	1.2	3.2	6	2200	2200	83
500	**0** [2]	**M2JA/KA 400 LKA**	3GJA/KA 401 510-••A	2980	96.6	96.5	0.93	795	7.0	1602	0.8	2.8	7.5	2850	2850	85
560	**0** [2]	**M2JA/KA 400 LKB**	3GJA/KA 401 520-••A	2983	96.7	96.5	0.92	910	7.3	1793	0.7	3.4	8.5	2900	2900	85
3000 r/min = 2 poles				**400 V 50 Hz** [1]									**High-output design**			
22	**25**	**M3JP/KP 160 MLD**	3GJP/KP 161 440-••G	2929	91.4	91.3	0.90	39	7.4	72	2.8	3.4	0.059	179	173	77
30	**34**	**M3JP/KP 180 MLB**	3GJP/KP 181 420-••G	2944	92.8	92.7	0.88	54	7.5	97	2.8	3.5	0.092	216	210	78
55	**63**	**M3JP/KP 225 SMC**	3GJP/KP 221 230-••G	2965	94.3	94.0	0.88	96	7.1	177	2.6	3.0	0.29	420	400	80
75	**86**	**M3JP/KP 250 SMB**	3GJP/KP 251 220-••G	2969	95.1	95.0	0.89	129	7.9	241	2.6	3.2	0.57	500	480	80
110	**125**	**M3JP/KP 280 SMC**	3GJP/KP 281 230-••G	2978	95.7	95.3	0.90	185	7.9	353	2.4	3.0	1.15	825	745	77

[1] Motors are certified for the voltages 380-400-415 V 50 Hz according to IEC 60034-1. Values above are given for 400 V 50 Hz; data for other voltages on request.

[2] Temperature rise class F

Detailed data for 440 V 60 Hz on request.

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Data for other voltages and frequencies; and for surface temperature T5 on request.

2- and 4-pole Cenelec motors sizes 160-250 can be used at ambient 50°C in temperature rise max. 75 K (cl. F); for more information contact us.

The two bullets in the product code indicate choice of mounting arrangement (see ordering information), voltage and frequency (below).

S	D	A [a]	B [a]	E	F [b]	X
380 VY 50 Hz	380 VΔ 50 Hz	380 VY 50 Hz	380 VΔ 50 Hz	500 VΔ 50 Hz	500 VY 50 Hz	Other rated voltage, connection
400 VY 50 Hz	400 VΔ 50 Hz	220 VΔ 50 Hz	660 VY 50 Hz	575 VΔ 60 Hz		or frequency, max. 690 V
415 VY 50 Hz	415 VΔ 50 Hz					
220 VΔ 50 Hz	660 VY 50 Hz	**G [a]**	**H [a]**	**T [b]**	**U [b]**	
230 VΔ 50 Hz	690 VY 50 Hz	415 VY 50 Hz	415 VΔ 50 Hz	660 VΔ 50 Hz	690 VΔ 50 Hz	
440 VY 60 Hz	440 VΔ 60 Hz					

[a] On request for motor sizes 315-400. [b] On request for motor sizes 355-400.

Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW 400V 50Hz	Output kW 440V 60Hz	Type designation	Product code	Speed r/min	Efficiency Full load 100%	Efficiency 3/4-load 75%	Power factor cos φ 100%	Current I_N A	Current I_s/I_N	Torque T_N Nm	Torque T_s/T_N	Torque T_{max}/T_N	Moment of inertia J=1/4 GD² kgm²	Weight EEx d kg	Weight EEx de kg	Sound pressure level L_P dB(A)
1500 r/min = 4 poles				**400 V 50 Hz [1]**									**Basic design**			
0.55	**0.65**	**M2JA/KA 80 LS**	3GJA/KA 082 310-••B	1440	76.2	76.9	0.62	1.7	6.1	3.6	3.2	3.4	0.002	24	24	45
0.75	**0.9**	**M2JA/KA 80 L**	3GJA/KA 082 320-••B	1405	77.0	78.1	0.77	2	5.2	5	2.7	2.9	0.002	24	24	45
1.1	**1.3**	**M2JA/KA 90 S**	3GJA/KA 092 110-••B	1420	76.0	77.3	0.79	2.7	4.3	7.4	2.0	2.5	0.0032	32	32	54
1.5	**1.75**	**M2JA/KA 90 L**	3GJA/KA 092 510-••B	1420	77.8	77.4	0.78	3.5	4.9	10.1	2.6	3.0	0.0043	36	36	54
2.2	**2.5**	**M2JA/KA 100 LA**	3GJA/KA 102 510-••B	1435	81.2	80.8	0.81	4.8	6.3	14.6	2.4	2.4	0.0069	44	44	52
3	**3.5**	**M2JA/KA 100 LB**	3GJA/KA 102 520-••B	1435	82.7	80.8	0.80	6.5	6.7	20	2.7	2.9	0.0082	47	47	52
4	**4.6** [2]	**M2JA/KA 112 M**	3GJA/KA 112 310-••B	1440	82.8	83.0	0.80	9.5	6.3	27	3.0	3.1	0.01	51	51	60
5.5	**6.3**	**M2JA/KA 132 S**	3GJA/KA 132 110-••B	1450	86.1	84.7	0.84	11.3	7.2	36.1	2.2	3.0	0.031	79	79	59
7.5	**8.6** [2]	**M2JA/KA 132 M**	3GJA/KA 132 310-••B	1450	86.0	86.4	0.85	15.5	7.9	49.3	2.6	3.4	0.038	82	82	59
11	**12.5**	**M3JP/KP 160 MLC**	3GJP/KP 162 430-••G	1470	91.3	91.3	0.82	22.5	7.7	71	3.1	3.6	0.09	172	166	62
15	**17**	**M3JP/KP 160 MLE**	3GJP/KP 162 450-••G	1467	92.0	92.0	0.83	30	7.6	98	3.1	3.6	0.121	195	189	67
18.5	**21**	**M3JP/KP 180 MLA**	3GJP/KP 182 410-••G	1474	92.5	92.6	0.82	36	7.3	120	2.7	3.2	0.176	212	206	62
22	**25**	**M3JP/KP 180 MLB**	3GJP/KP 182 420-••G	1471	92.6	92.7	0.82	42	7.1	143	2.6	3.0	0.191	220	214	62
30	**35**	**M3JP/KP 200 MLB**	3GJP/KP 202 420-••G	1475	93.5	93.6	0.84	56	7.4	194	3.3	3.0	0.34	340	320	61
37	**42**	**M3JP/KP 225 SMB**	3GJP/KP 222 220-••G	1480	93.6	93.4	0.84	69	7.7	239	3.1	3.1	0.42	390	370	67
45	**52**	**M3JP/KP 225 SMC**	3GJP/KP 222 230-••G	1477	94.4	94.4	0.86	81	7.4	291	3.1	3.0	0.49	425	405	67
55	**63**	**M3JP/KP 250 SMA**	3GJP/KP 252 210-••G	1479	94.6	94.7	0.83	101	6.9	355	2.5	3.1	0.72	450	430	66
75	**88**	**M3JP/KP 280 SMA**	3GJP/KP 282 210-••G	1484	94.9	94.8	0.85	135	6.9	483	2.5	2.8	1.25	725	645	68
90	**105**	**M3JP/KP 280 SMB**	3GJP/KP 282 220-••G	1483	95.2	95.2	0.86	159	7.2	580	2.5	2.7	1.5	765	685	68
110	**125**	**M3JP/KP 315 SMA**	3GJP/KP 312 210-••G	1487	95.6	95.4	0.86	193	7.2	706	2.0	2.5	2.3	1000	920	70
132	**150**	**M3JP/KP 315 SMB**	3GJP/KP 312 220-••G	1487	95.8	95.6	0.86	232	7.1	848	2.3	2.7	2.6	1060	980	70
160	**185**	**M3JP/KP 315 SMC**	3GJP/KP 312 230-••G	1487	96.0	95.9	0.85	287	7.2	1028	2.4	2.9	2.9	1100	1020	70
200	**230**	**M3JP/KP 315 MLA**	3GJP/KP 312 410-••G	1486	96.2	96.2	0.86	351	7.2	1285	2.5	2.9	3.5	1260	1180	70
250	**285**	**M2JA/KA 355 S**	3GJA/KA 352 100-••A	1487	96.5	96.4	0.87	430	7.2	1606	2.3	2.7	6.5	1550	1550	80
315	**360**	**M2JA/KA 355 SMA**	3GJA/KA 352 210-••A	1488	96.7	96.6	0.87	545	7.6	2022	2.5	2.9	8.2	1800	1800	80
355	**400**	**M2JA/KA 355 SMB**	3GJA/KA 352 220-••A	1486	96.7	96.7	0.87	610	6.8	2281	2.2	2.6	8.2	1800	1800	80
400	**450**	**M2JA/KA 355 MLA**	3GJA/KA 352 410-••A	1489	96.8	96.8	0.87	685	6.9	2565	1.6	2.8	10	2100	2100	80
450	**500** [2]	**M2JA/KA 355 MLB**	3GJA/KA 352 420-••A	1489	96.8	96.8	0.87	770	7.6	2886	1.5	3.0	10	2100	2100	80
500	**560**	**M2JA/KA 355 MLC**	3GJA/KA 352 430-••A	1489	96.8	96.8	0.88	845	7.6	3207	1.3	2.9	10.5	2100	2100	83
400	**450**	**M2JA/KA 400 M**	3GJA/KA 402 300-••A	1489	96.8	96.8	0.87	685	6.9	2565	1.6	2.8	10	2150	2150	80
450	**500** [2]	**M2JA/KA 400 MA**	3GJA/KA 402 310-••A	1489	96.8	96.8	0.87	770	7.6	2886	1.5	3.0	10	2150	2150	80
500	**560**	**M2JA/KA 400 MB**	3GJA/KA 402 320-••A	1489	96.8	96.8	0.88	845	7.6	3207	1.3	2.9	10.5	2150	2150	83
560	**630**	**M2JA/KA 400 LKA**	3GJA/KA 402 510-••A	1489	96.9	96.9	0.90	925	6.6	3591	1.1	2.6	14	3050	3050	85
630	**710**	**M2JA/KA 400 LKB**	3GJA/KA 402 520-••A	1489	96.9	96.8	0.87	1080	6.9	4040	1.2	2.8	15	3150	3150	85
1500 r/min = 4 poles				**400 V 50 Hz [1]**									**High-output design**			
18.5	**21**	**M3JP/KP 160 MLF**	3GJP/KP 162 460-••G	1466	92.0	92.0	0.82	36.5	8	120	3.2	3.6	0.121	195	189	68
30	**34** [2]	**M3JP/KP 180 MLC**	3GJP/KP 182 430-••G	1473	92.3	92.3	0.80	59	7.8	194	3.1	3.4	0.239	239	233	66
37	**42**	**M3JP/KP 200 MLC**	3GJP/KP 202 430-••G	1475	93.3	93.3	0.82	70	7.5	239	3.5	3.2	0.34	340	320	73
55	**63**	**M3JP/KP 225 SMD**	3GJP/KP 222 240-••G	1476	94.0	93.9	0.85	100	7.6	356	3.3	3.1	0.49	425	405	74
75	**86**	**M3JP/KP 250 SMB**	3GJP/KP 252 220-••G	1476	94.7	94.9	0.86	133	7.2	485	2.7	3.2	0.88	505	485	73
110	**125**	**M3JP/KP 280 SMC**	3GJP/KP 282 230-••G	1485	95.6	95.5	0.86	195	7.6	707	3.0	3.0	1.85	825	745	68

[1] Motors are certified for the voltages 380-400-415 V 50 Hz according to IEC 60034-1. Values above are given for 400 V 50 Hz; data for other voltages on request.

[2] Temperature rise class F

Detailed data for 440 V 60 Hz on request.

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Data for other voltages and frequencies; and for surface temperature T5 on request.

2- and 4-pole Cenelec motors sizes 160-250 can be used at ambient 50°C in temperature rise max. 75 K (cl. F); for more information contact us.

Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4

ATEX Certified

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW 400V 50Hz	Output kW 440V 60Hz	Type designation	Product code	Speed r/min	Efficiency Full load 100%	Efficiency 3/4-load 75%	Power factor cos φ 100%	Current I_N A	Current I_s/I_N	Torque T_N Nm	Torque T_s/T_N	Torque T_{max}/T_N	Moment of inertia J=1/4 GD² kgm²	Weight EEx d kg	Weight EEx de	Sound pressure level L_p dB(A)
1000 r/min = 6 poles				**400 V 50 Hz** [1]									**Basic design**			
0.37	**0.45**	**M2JA/KA 80 LS**	3GJA/KA 083 310-••B	945	66.8	64.0	0.50	1.7	4.2	3.7	4.3	4.4	0.002	24	24	42
0.55	**0.65**	**M2JA/KA 80 L**	3GJA/KA 083 320-••B	910	67.0	69.2	0.62	2	3.8	5.7	2.8	2.9	0.002	24	24	42
0.75	**0.9**	**M2JA/KA 90 S**	3GJA/KA 093 110-••B	930	69.1	69.6	0.67	2.4	3.7	7.7	2.1	2.3	0.0032	32	32	44
1.1	**1.3**	**M2JA/KA 90 L**	3GJA/KA 093 510-••B	930	72.8	70.9	0.69	3.3	4.3	11.3	2.4	2.7	0.0043	37	37	44
1.5	**1.75**	**M2JA/KA 100 L**	3GJA/KA 103 510-••B	950	78.0	77.5	0.71	4.2	4.9	15.1	1.8	2.4	0.0082	47	47	47
2.2	**2.5**	**M2JA/KA 112 M**	3GJA/KA 113 310-••B	950	78.2	79.9	0.71	5.9	4.8	22.1	2.3	2.5	0.01	51	51	50
3	**3.5**	**M2JA/KA 132 S**	3GJA/KA 133 110-••B	960	83.6	81.1	0.75	7.1	6.4	29.8	2.4	3.1	0.031	79	79	61
4	**4.6**	**M2JA/KA 132 MA**	3GJA/KA 133 310-••B	960	84.8	85.2	0.78	8.9	7.1	40	2.6	2.8	0.038	82	82	61
5.5	**6.3**	**M2JA/KA 132 MB**	3GJA/KA 133 320-••B	955	84.8	85.7	0.78	12.2	6.9	55	2.8	2.8	0.045	96	96	61
7.5	**8.6**	**M3JP/KP 160 MLA**	3GJP/KP 163 410-••G	965	88.6	89.3	0.80	15.5	6.5	74	1.9	3.0	0.088	166	160	57
11	**12.5**	**M3JP/KP 160 MLB**	3GJP/KP 163 420-••G	965	89.2	89.9	0.79	23	7.1	109	2.1	3.3	0.106	179	173	65
15	**17**	**M3JP/KP 180 MLB**	3GJP/KP 183 420-••G	972	91.1	91.3	0.80	31	7.0	147	1.9	3.3	0.221	239	233	67
18.5	**21**	**M3JP/KP 200 MLA**	3GJP/KP 203 410-••G	983	91.3	91.4	0.80	37	7.1	180	3.2	3.1	0.37	300	280	66
22	**25**	**M3JP/KP 200 MLB**	3GJP/KP 203 420-••G	983	91.6	91.6	0.81	43	7.5	214	3.2	3.2	0.43	320	300	61
30	**34**	**M3JP/KP 225 SMB**	3GJP/KP 223 220-••G	985	92.8	92.8	0.81	58	7.4	291	3.4	3.0	0.64	385	365	61
37	**42**	**M3JP/KP 250 SMA**	3GJP/KP 253 210-••G	987	93.4	93.4	0.81	71	7.2	358	3.2	2.9	1.16	455	435	66
45	**55**	**M3JP/KP 280 SMA**	3GJP/KP 283 210-••G	990	94.4	94.3	0.84	82	7.0	434	2.5	2.5	1.85	705	625	66
55	**63**	**M3JP/KP 280 SMB**	3GJP/KP 283 220-••G	990	94.6	94.6	0.84	101	7.0	531	2.7	2.6	2.2	745	665	66
75	**86**	**M3JP/KP 315 SMA**	3GJP/KP 313 210-••G	992	95.0	94.7	0.82	141	7.4	722	2.4	2.8	3.2	930	850	70
90	**105**	**M3JP/KP 315 SMB**	3GJP/KP 313 220-••G	992	95.5	95.3	0.84	163	7.5	866	2.4	2.8	4.1	1030	950	70
110	**125**	**M3JP/KP 315 SMC**	3GJP/KP 313 230-••G	991	95.6	95.5	0.83	202	7.4	1060	2.5	2.9	4.9	1100	1020	70
132	**150**	**M3JP/KP 315 MLA**	3GJP/KP 313 410-••G	991	95.8	95.7	0.83	240	7.5	1272	2.7	3.0	5.8	1250	1170	68
160	**195**	**M2JA/KA 355 S**	3GJA/KA 353 100-••A	992	95.9	95.7	0.85	280	6.8	1540	1.8	2.7	10.4	1550	1550	75
200	**230**	**M2JA/KA 355 SMA**	3GJA/KA 353 210-••A	992	95.9	95.7	0.85	355	7.1	1925	2.0	2.7	12.5	1800	1800	75
250	**300**	**M2JA/KA 355 SMB**	3GJA/KA 353 220-••A	992	96.0	95.8	0.84	450	7.5	2407	2.2	2.8	12.5	1800	1800	75
315	**360**	**M2JA/KA 355 MLA**	3GJA/KA 353 410-••A	991	96.2	96.1	0.84	565	7.3	3036	2.0	3.0	14.6	2100	2100	75
355	**400**	**M2JA/KA 355 MLC**	3GJA/KA 353 430-••A	991	96.4	96.3	0.84	635	7.6	3421	1.5	3.0	15.8	2100	2100	78
250	**300**	**M2JA/KA 400 M**	3GJA/KA 403 300-••A	992	96.0	95.8	0.84	450	7.5	2407	2.2	2.8	12.5	2000	2000	75
315	**360**	**M2JA/KA 400 MA**	3GJA/KA 403 310-••A	991	96.2	96.1	0.84	565	7.3	3036	2.0	3.0	14.6	2150	2150	75
355	**400**	**M2JA/KA 400 MB**	3GJA/KA 403 320-••A	991	96.4	96.3	0.84	635	7.6	3421	1.5	3.0	15.8	2150	2150	78
400	**450**	**M2JA/KA 400 LKA**	3GJA/KA 403 510-••A	992	96.5	96.4	0.85	700	6.4	3851	1.2	2.7	16.5	2800	2800	80
450	**510**	**M2JA/KA 400 LKB**	3GJA/KA 403 520-••A	993	96.5	96.4	0.85	790	6.8	4328	1.3	2.8	19	3050	3050	80
500	**560** [2]	**M2JA/KA 400 LKC**	3GJA/KA 403 530-••A	992	96.5	96.4	0.85	880	6.8	4813	1.3	2.8	19	3050	3050	80
1000 r/min = 6 poles				**400 V 50 Hz** [1]									**High-output design**			
30	**34**	**M3JP/KP 200 MLC**	3GJP/KP 203 430-••G	983	91.6	91.5	0.80	60	7.5	292	3.5	3.4	0.49	340	320	65
37	**42**	**M3JP/KP 225 SMC**	3GJP/KP 223 230-••G	983	92.8	92.9	0.83	70	7.1	359	3.2	2.8	0.75	415	395	64
45	**52**	**M3JP/KP 250 SMB**	3GJP/KP 253 220-••G	986	93.7	93.7	0.82	85	7.2	436	3.3	2.8	1.49	500	480	65
75	**86**	**M3JP/KP 280 SMC**	3GJP/KP 283 230-••G	990	95.1	95.2	0.84	137	7.3	723	2.8	2.7	2.85	825	745	66

[1] Motors are certified for the voltages 380-400-415 V 50 Hz according to IEC 60034-1. Values above are given for 400 V 50 Hz; data for other voltages on request.

Detailed data for 440 V 60 Hz on request.

[2] Temperature rise class F

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Data for other voltages and frequencies, and for surface temperature T5 on request.

The two bullets in the product code indicate choice of mounting arrangement (see ordering information), voltage and frequency (below).

S	D	A [a]	B [a]	E	F [b]	X
380 VY 50 Hz	380 VΔ 50 Hz	380 VY 50 Hz	380 VΔ 50 Hz	500 VΔ 50 Hz	500 VY 50 Hz	Other rated voltage, connection
400 VY 50 Hz	400 VΔ 50 Hz	220 VΔ 50 Hz	660 VY 50 Hz	575 VΔ 60 Hz		or frequency, max. 690 V
415 VY 50 Hz	415 VΔ 50 Hz					
220 VΔ 50 Hz	660 VY 50 Hz	**G [a]**	**H [a]**	**T [b]**	**U [b]**	
230 VΔ 50 Hz	690 VY 50 Hz	415 VY 50 Hz	415 VΔ 50 Hz	660 VΔ 50 Hz	690 VΔ 50 Hz	
440 VY 60 Hz	440 VΔ 60 Hz					

[a] On request for motor sizes 315-400. [b] On request for motor sizes 355-400.

Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW 400V 50Hz	440V 60Hz	Type designation	Product code	Speed r/min	Efficiency Full load 100%	Efficiency 3/4-load 75%	Power factor cos φ 100%	Current I_N A	Current I_s/I_N	Torque T_N Nm	Torque T_s/T_N	Torque T_{max}/T_N	Moment of inertia J=1/4 GD² kgm²	Weight EEx d kg	Weight EEx de kg	Sound pressure level L_P dB(A)
750 r/min = 8 poles				**400 V 50 Hz [1]**									**Basic design**			
0.18	**0.22**	**M2JA/KA 80 LS**	3GJA/KA 084 310-••B	700	53.2	49.0	0.47	1.1	3.4	2.5	3.5	3.6	0.002	24	24	36
0.25	**0.3**	**M2JA/KA 80 L**	3GJA/KA 084 320-••B	690	57.5	53.0	0.52	1.3	3.1	3.5	2.5	2.6	0.002	24	24	36
0.37	**0.45**	**M2JA/KA 90 S**	3GJA/KA 094 110-••B	700	61.0	56.0	0.56	1.7	3.0	5	2.0	2.2	0.0031	32	32	36
0.55	**0.65**	**M2JA/KA 90 L**	3GJA/KA 094 510-••B	695	62.7	59.0	0.54	2.4	3.0	7.6	2.0	2.3	0.0047	37	37	36
0.75	**0.9**	**M2JA/KA 100 LA**	3GJA/KA 104 510-••B	715	71.4	68.0	0.57	2.8	3.9	10.1	2.4	2.8	0.0069	44	44	44
1.1	**1.3**	**M2JA/KA 100 LB**	3GJA/KA 104 520-••B	705	71.7	69.0	0.61	3.8	3.8	15	2.1	2.6	0.0083	47	47	44
1.5	**1.75**	**M2JA/KA 112 M**	3GJA/KA 114 310-••B	700	73.4	72.8	0.61	4.9	3.8	20	2.3	2.5	0.01	51	51	46
2.2	**2.5**	**M2JA/KA 132 S**	3GJA/KA 134 110-••B	720	79.2	75.4	0.67	5.9	5.3	29.2	1.8	2.5	0.038	82	82	56
3	**3.5**	**M2JA/KA 132 M**	3GJA/KA 134 310-••B	720	80.0	79.0	0.68	7.8	5.5	39.8	2.4	2.6	0.045	96	96	56
4	**4.6**	**M3JP/KP 160 MLA**	3GJP/KP 164 410-••G	717	83.0	83.1	0.70	10.1	5.2	53	1.8	2.8	0.071	152	146	59
5.5	**6.4**	**M3JP/KP 160 MLB**	3GJP/KP 164 420-••G	715	84.1	84.6	0.70	13.9	5.2	73	1.9	2.8	0.09	166	160	53
7.5	**8.6**	**M3JP/KP 160 MLC**	3GJP/KP 164 430-••G	718	86.4	87.1	0.69	18.4	5.7	100	2.1	3.1	0.121	194	188	55
11	**13**	**M3JP/KP 180 MLB**	3GJP/KP 184 420-••G	724	89.9	90.0	0.72	24.5	5.7	145	1.7	2.7	0.239	233	227	63
15	**17**	**M3JP/KP 200 MLA**	3GJP/KP 204 410-••G	734	90.4	90.5	0.78	31	7.0	195	2.4	3.2	0.45	315	295	56
18.5	**21**	**M3JP/KP 225 SMA**	3GJP/KP 224 210-••G	734	90.5	90.5	0.73	41	6.1	241	2.2	3.0	0.61	370	350	55
22	**25**	**M3JP/KP 225 SMB**	3GJP/KP 224 220-••G	732	90.7	91.0	0.76	46	6.5	287	2.2	2.9	0.68	385	365	56
30	**34**	**M3JP/KP 250 SMA**	3GJP/KP 254 210-••G	735	92.0	92.1	0.78	61	6.7	390	2.0	2.9	1.25	455	435	56
37	**43**	**M3JP/KP 280 SMA**	3GJP/KP 284 210-••G	741	93.4	93.3	0.78	74	7.3	477	1.7	3.0	1.85	605	605	65
45	**55**	**M3JP/KP 280 SMB**	3GJP/KP 284 220-••G	741	94.0	93.8	0.78	90	7.6	580	1.8	3.1	2.2	745	665	65
55	**63**	**M3JP/KP 315 SMA**	3GJP/KP 314 210-••G	742	94.1	94.0	0.81	104	7.1	708	1.6	2.7	3.2	930	850	62
75	**85**	**M3JP/KP 315 SMB**	3GJP/KP 314 220-••G	741	94.4	94.3	0.82	141	7.1	968	1.7	2.7	4.1	1030	950	62
90	**105**	**M3JP/KP 315 SMC**	3GJP/KP 314 230-••G	741	94.8	94.7	0.82	167	7.4	1161	1.8	2.7	4.9	1100	1020	64
110	**125**	**M3JP/KP 315 MLA**	3GJP/KP 314 410-••G	740	95.0	95.0	0.83	203	7.3	1420	1.8	2.7	5.8	1250	1170	72
132	**150**	**M2JA/KA 355 S**	3GJA/KA 354 100-••A	742	95.0	94.9	0.80	250	5.8	1699	1.5	2.3	10.4	1550	1550	75
160	**180**	**M2JA/KA 355 SMA**	3GJA/KA 354 210-••A	742	95.2	95.1	0.80	305	6.3	2059	1.7	2.4	12.5	1800	1800	75
200	**230**	**M2JA/KA 355 MLA**	3GJA/KA 354 410-••A	743	95.5	95.1	0.77	395	6.6	2571	1.8	2.7	14.6	2100	2100	75
250	**285**	**M2JA/KA 355 MLC**	3GJA/KA 354 430-••A	744	95.7	95.4	0.80	470	6.6	3209	1.5	3.0	15.8	2100	2100	75
200	**230**	**M2JA/KA 400 M**	3GJA/KA 404 300-••A	743	95.5	95.1	0.77	395	6.6	2571	1.8	2.7	14.6	2150	2150	75
250	**285**	**M2JA/KA 400 MA**	3GJA/KA 404 410-••A	744	95.7	95.4	0.80	470	6.6	3209	1.5	3.0	15.8	2150	2150	75
315	**360**	**M2JA/KA 400 LKA**	3GJA/KA 404 510-••A	744	96.0	95.9	0.79	605	6.3	4043	1.4	2.6	16.5	2800	2800	80
355	**400**	**M2JA/KA 400 LKB**	3GJA/KA 404 530-••A	744	96.2	96.0	0.79	680	6.6	4557	1.5	2.7	19	3050	3050	80
750 r/min = 8 poles				**400 V 50 Hz [1]**									**High-output design**			
18.5	**21**	**M3JP/KP 200 MLB**	3GJP/KP 204 420-••G	734	90.3	90.5	0.79	37.5	6.9	241	2.2	3.2	0.54	335	315	57
30	**34** [2]	**M3JP/KP 225 SMC**	3GJP/KP 224 230-••G	731	90.3	90.7	0.76	63	6.3	392	2.3	3.0	0.75	410	390	59
37	**42**	**M3JP/KP 250 SMB**	3GJP/KP 254 220-••G	737	92.8	92.7	0.77	75	7.5	479	2.3	3.4	1.52	500	480	65
55	**65**	**M3JP/KP 280 SMC**	3GJP/KP 284 230-••G	741	94.4	94.3	0.80	105	7.9	709	1.9	3.1	2.85	825	745	65

[1] Motors are certified for the voltages 380-400-415 V 50 Hz according to IEC 60034-1. Values above are given for 400 V 50 Hz; data for other voltages on request.

Detailed data for 440 V 60 Hz on request.

[2] Temperature rise class F

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Data for other voltages and frequencies, and for surface temperature T5 on request.

The two bullets in the product code indicate choice of mounting arrangement (see ordering information), voltage and frequency (below).

S	D	A [a]	B [a]	E	F [b]	X
380 VY 50 Hz	380 VΔ 50 Hz	380 VY 50 Hz	380 VΔ 50 Hz	500 VΔ 50 Hz	500 VY 50 Hz	Other rated voltage, connection
400 VY 50 Hz	400 VΔ 50 Hz	220 VΔ 50 Hz	660 VY 50 Hz	575 VΔ 60 Hz		or frequency, max. 690 V
415 VY 50 Hz	415 VΔ 50 Hz					
220 VΔ 50 Hz	660 VY 50 Hz	**G [a]**	**H [a]**	**T [b]**	**U [b]**	
230 VΔ 50 Hz	690 VY 50 Hz	415 VY 50 Hz	415 VΔ 50 Hz	660 VΔ 50 Hz	690 VΔ 50 Hz	
440 VY 60 Hz	440 VΔ 60 Hz					

[a] On request for motor sizes 315-400. [b] On request for motor sizes 355-400.

Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4, two-speed

ATEX Certified

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW	Motor type		Product code		Speed r/min	Current I_N	Weight kg
1500/1000 r/min = 4/6 poles			**400 V 50 Hz**		**Fan drive, two separate windings**		
0.95/0.28	**M2JA/KA**	**90 S**	3GJA/KA	098 304-••B	1390/950	2.3/1.1	32.5
1.25/0.4	**M2JA/KA**	**90 L**	3GJA/KA	098 514-••B	1410/955	3.0/1.3	37
1.8/0.55	**M2JA/KA**	**100 LA**	3GJA/KA	108 514-••B	1435/965	3.9/1.9	44
2.2/0.7	**M2JA/KA**	**100 LB**	3GJA/KA	108 524-••B	1435/970	4.7/2.4	47.5
2.6/0.8	**M2JA/KA**	**112 M**	3GJA/KA	118 314-••B	1425/970	5.3/2.8	51.5
4.5/1.5	**M2JA/KA**	**132 S**	3GJA/KA	138 114-••B	1460/985	8.8/4.9	79
6.0/2.0	**M2JA/KA**	**132 M**	3GJA/KA	138 314-• •B	1460/980	11.5/5.4	82
11/3.7	**M3JP/KP**	**160 MLC**	3GJP/KP	168 434-••G	1467/973	22/9	172
15/4.7	**M3JP/KP**	**160 MLE**	3GJP/KP	168 454-••G	1465/972	29.5/11.5	195
18.5/5.8	**M3JP/KP**	**180 MLC**	3GJP/KP	188 434-••G	1476/984	35/15.2	239
21/6.6	**M3JP/KP**	**200 MLB**	3GJP/KP	208 424-••G	1474/989	38/14	320
26/8	**M3JP/KP**	**200 MLC**	3GJP/KP	208 434-••G	1474/987	47/16.7	340
31/10	**M3JP/KP**	**225 SMB**	3GJP/KP	228 224-••G	1481/991	55/21.5	385
40/12.5	**M3JP/KP**	**225 SMC**	3GJP/KP	228 234-••G	1481/989	71/26	415
54/17	**M3JP/KP**	**250 SMB**	3GJP/KP	258 224-••G	1480/987	97/38	505
85/27	**M3JP/KP**	**280 SMB**	3GJP/KP	288 224-••G	1487/992	160/59	765
100/30	**M3JP/KP**	**280 SMC**	3GJP/KP	288 234-••G	1486/991	180/62	825
120/36	**M3JP/KP**	**315 SMB**	3GJP/KP	318 224-••G	1487/991	212/72	1060
145/43	**M3JP/KP**	**315 SMC**	3GJP/KP	318 234-••G	1487/991	256/86	1100
180/54	**M3JP/KP**	**315 MLA**	3GJP/KP	318 414-••G	1484/990	321/109	1260
160/55	**M2JA/KA**	**355 S**	3GJA/KA	358 104-••A	1483/986	275/105	1550
240/85	**M2JA/KA**	**355 SMA**	3GJA/KA	358 214-••A	1487/988	410/160	1800
315/90	**M2JA/KA**	**355 MLA**	3GJA/KA	358 414-••A	1494/994	540/165	2100
315/90	**M2JA/KA**	**400 M**	3GJA/KA	408 304-••A	1494/994	540/165	2150
370/120	**M2JA/KA**	**400 LKA**	3GJA/KA	408 514-••A	1495/994	655/225	3050
3000/1500 r/min = 2 - 4 poles			**400 V 50 Hz**		**Fan drive, Dahlander-connection**		
0.95/0.2	**M2JA/KA**	**80 L**	3GJA/KA	088 328-••B	2750/1420	2.0/0.6	24
1.4/0.3	**M2JA/KA**	**90 S**	3GJA/KA	098 118-••B	2860/1460	3.0/1.0	32.5
1.9/0.4	**M2JA/KA**	**90 L**	3GJA/KA	098 518-••B	2880/1465	3.9/1.2	37
3/0.6	**M2JA/KA**	**100 L**	3GJA/KA	108 518-••B	2875/1460	7.5/2.4	44
3.7/0.75	**M2JA/KA**	**112 M**	3GJA/KA	118 318-••B	2900/1470	7.1/2.0	51.5
6.2/1.3	**M2JA/KA**	**132 S**	3GJA/KA	138 118-••B	2880/1455	11.3/3.4	79
8.3/1.7	**M2JA/KA**	**132 M**	3GJA/KA	138 128-••B	2875/1455	14.8/4.0	82
11/2.5	**M3JP/KP**	**160 MLB**	3GJP/KP	168 428-••G	2935/1471	20/4.9	172
14/3	**M3JP/KP**	**160 MLC**	3GJP/KP	168 438-••G	2931/1473	25.5/5.9	172
18.5/4	**M3JP/KP**	**160 MLE**	3GJP/KP	168 458-••G	2935/1473	33.5/77	195
22/5	**M3JP/KP**	**180 MLB**	3GJP/KP	188 428-••G	2954/1481	40/9.8	220
25/5.5	**M3JP/KP**	**180 MLC**	3GJP/KP	188 438-••G	2952/1480	44/10.5	239
34/8	**M3JP/KP**	**200 MLC**	3GJP/KP	208 438-••G	2951/1478	61/18	340
40/11	**M3JP/KP**	**225 SMB**	3GJP/KP	228 228-••G	2964/1480	69/23.5	400
50/14	**M3JP/KP**	**225 SMC**	3GJP/KP	228 238-••G	2962/1479	87/29.5	420
60/15.5	**M3JP/KP**	**250 SMB**	3GJP/KP	258 228-••G	2959/1480	104/33	500
90/30	**M3JP/KP**	**280 SMB**	3GJP/KP	288 228-••G	2965/1484	153/54	765
105/33	**M3JP/KP**	**280 SMC**	3GJP/KP	288 238-••G	2966/1483	186/60	825
125/25	**M3JP/KP**	**315 SMB**	3GJP/KP	318 228-••G	2972/1490	217/53	1040
175/45	**M3JP/KP**	**315 MLA**	3GJP/KP	318 418-••G	2980/1492	287/81	1260
190/45	**M2JA/KA**	**355 S**	3GJA/KA	358 108-••A	2987/1491	345/95	1550
200/50	**M2JA/KA**	**355 SMA**	3GJA/KA	358 218-••A	2987/1491	360/100	1750

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Detailed technical data on request.

The two bullets in the product code indicate choice of mounting arrangement (see ordering information), voltage and frequency (next page).

Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4, two-speed

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW	Motor type	Product code	Speed r/min	Current I_N	Weight kg
1500/750 r/min = 4-8 poles		**400 V 50 Hz**	**Fan drive, Dahlander-connection**		
0.6/0.11	**M2JA/KA 80 L**	3GJA/KA 088 329-••B	1415/690	1.6/0.6	24
1/0.23	**M2JA/KA 90 S**	3GJA/KA 098 119-••B	1400/705	2.4/1.0	32.5
1.5/0.31	**M2JA/KA 90 L**	3GJA/KA 098 519-••B	1420/720	3.7/1.5	37
2/0.45	**M2JA/KA 100 LA**	3GJA/KA 108 519-••B	1425/720	4.3/1.7	44
2.4/0.5	**M2JA/KA 100 LB**	3GJA/KA 108 529-••B	1435/725	5.2/2.0	47.5
2.9/0.6	**M2JA/KA 112 M**	3GJA/KA 118 319-••B	1435/725	6.1/2.4	51.5
5.0/1.0	**M2JA/KA 132 S**	3GJA/KA 138 119-••B	1450/725	9.5/3.2	79
6.8/1.4	**M2JA/KA 132 M**	3GJA/KA 138 129-••B	1460/730	13.2/4.9	82
11/2.5	**M3JP/KP 160 MLC**	3GJP/KP 168 439-••G	1468/732	22/8.3	172
15/3.5	**M3JP/KP 160 MLE**	3GJP/KP 168 449-••G	1467/731	29/11	195
18.5/3.7	**M3JP/KP 180 MLB**	3GJP/KP 188 429-••G	1475/737	36/13.2	220
22/4.4	**M3JP/KP 180 MLC**	3GJP/KP 188 439-••G	1475/739	43/15.5	239
30/7	**M3JP/KP 200 MLB**	3GJP/KP 208 429-••G	1478/736	58/21	340
37/10	**M3JP/KP 225 SMB**	3GJP/KP 228 229-••G	1482/735	70/26.5	390
42/11	**M3JP/KP 225 SMC**	3GJP/KP 228 239-••G	1480/733	77/28.5	425
60/15	**M3JP/KP 250 SMB**	3GJP/KP 258 229-••G	1482/738	110/40	505
80/18.5	**M3JP/KP 280 SMB**	3GJP/KP 288 229-••G	1486/743	145/47	765
90/20	**M3JP/KP 280 SMC**	3GJP/KP 288 239-••G	1486/743	160/50	825
125/28	**M3JP/KP 315 SMB**	3GJP/KP 318 229-••G	1488/744	226/73	1060
160/37	**M3JP/KP 315 MLA**	3GJP/KP 318 419-••G	1486/742	283/93	1260
155/38	**M2JA/KA 355 S**	3GJA/KA 358 109-••A	1492/746	275/77	1550
175/44	**M2JA/KA 355 SMA**	3GJA/KA 358 219-••A	1492/743	305/90	1800
220/55	**M2JA/KA 355 MLA**	3GJA/KA 358 419-••A	1493/745	380/125	2100
220/55	**M2JA/KA 400 M**	3GJA/KA 408 309-••A	1493/745	380/125	2150
1500/1000 r/min = 4/6 poles		**400 V 50 Hz**	**Constant torque, two separate windings**		
0.8/0.4	**M2JA/KA 90 S**	3GJA/KA 099 304-••B	1415/960	2.1/1.6	32.5
1.0/0.6	**M2JA/KA 90 L**	3GJA/KA 099 514-••B	1425/950	2.5/2.1	37
1.5/0.9	**M2JA/KA 100 LA**	3GJA/KA 109 514-••B	1445/965	3.4/3.2	44
1.8/1.0	**M2JA/KA 100 LB**	3GJA/KA 109 524-••B	1450/965	4.2/3.3	47.5
2.2/1.2	**M2JA/KA 112 M**	3GJA/KA 119 314-••B	1445/965	4.8/3.8	51.5
3.3/2.2	**M2JA/KA 132 S**	3GJA/KA 139 114-••B	1420/980	7.1/6.4	79
4.5/3	**M2JA/KA 132 M**	3GJA/KA 139 314-••B	1470/980	9.3/8.0	82
7.5/5.5	**M3JP/KP 160 MLC**	3GJP/KP 169 434-••G	1474/972	15.2/13	172
11/7.7	**M3JP/KP 160 MLE**	3GJP/KP 169 454-••G	1470/971	22/18	195
14/9.5	**M3JP/KP 180 MLC**	3GJP/KP 189 434-••G	1479/984	27.5/24	239
18.5/13	**M3JP/KP 200 MLB**	3GJP/KP 209 424-••G	1476/985	34/26	320
22/15	**M3JP/KP 200 MLC**	3GJP/KP 209 434-••G	1477/985	40/29	340
28/19	**M3JP/KP 225 SMB**	3GJP/KP 229 224-••G	1481/985	50/38	385
34/23	**M3JP/KP 225 SMC**	3GJP/KP 229 234-••G	1481/986	60/45	415
45/30	**M3JP/KP 250 SMB**	3GJP/KP 259 224-••G	1483/984	85/64	505
65/43	**M3JP/KP 280 SMB**	3GJP/KP 289 224-••G	1485/988	117/87	765
76/50	**M3JP/KP 280 SMC**	3GJP/KP 289 234-••G	1487/989	137/101	825
90/60	**M3JP/KP 315 SMB**	3GJP/KP 319 224-••G	1490/991	165/125	1060
110/75	**M3JP/KP 315 SMC**	3GJP/KP 319 234-••G	1490/992	200/158	1100
140/95	**M3JP/KP 315 MLA**	3GJP/KP 319 414-••G	1489/990	250/190	1260

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Detailed technical data on request.

The two bullets in the product code indicate choice of mounting arrangement (see ordering information), voltage and frequency (below).

Motor	S	D	A	B	E	H	T	U	X
80-250	230V 50Hz	400V 50Hz	220V 50Hz	380V 50Hz	500V 50Hz	415V 50Hz	660V 50Hz	690 V 50 Hz	Other rated voltage
280-400	220-230V 50Hz 440-480V 60Hz	380-400V 50Hz	220V 50Hz	380V 50Hz	500V 50Hz 575V 60Hz	400-415V 50Hz 460-480V 60Hz			connection or freq. max. 690 V

Technical data – Flameproof motors

EEx d IIB/IIC T4, EEx de IIB/IIC T4, two-speed

IP 55, IC 411; Insulation class F, temperature rise class B

Output kW	Motor type		Product code		Speed r/min	Current I_N	Weight kg
3000/1500 r/min = 2-4 poles			**400 V 50 Hz**		**Constant torque, Dahlander-connection**		
0.95/0.6	**M2JA/KA**	**80 L**	3GJA/KA	089 328-••B	2750/1420	2.0/1.8	24
1.1/0.85	**M2JA/KA**	**90 S**	3GJA/KA	099 118-••B	2735/1405	2.4/2.1	32.5
1.5/1.25	**M2JA/KA**	**90 L**	3GJA/KA	099 518-••B	2800/1410	3.1/3.0	37
2.2/1.75	**M2JA/KA**	**100 LA**	3GJA/KA	109 518-••B	2815/1430	4.4/3.8	44
2.9/2.25	**M2JA/KA**	**100 LB**	3GJA/KA	109 528-••B	2850/1440	5.8/5.1	47.5
3.6/2.8	**M2JA/KA**	**112 M**	3GJA/KA	119 318-••B	2860/1440	7.0/6.1	51.5
4.7/3.1	**M2JA/KA**	**132 SB**	3GJA/KA	139 118-••B	2820/1420	8.8/7.4	79
7.2/4.8	**M2JA/KA**	**132 M**	3GJA/KA	139 128-••B	2870/1435	12.8/11.0	82
11/8	**M3JP/KP**	**160 MLB**	3GJP/KP	169 428-••G	2935/1466	20/15.3	172
14/10.5	**M3JP/KP**	**160 MLC**	3GJP/KP	169 438-••G	2931/1459	25.5/21	172
18.5/14	**M3JP/KP**	**160 MLE**	3GJP/KP	169 458-••G	2935/1460	33.5/27	195
22/16.5	**M3JP/KP**	**180 MLB**	3GJP/KP	189 428-••G	2954/1474	40/32	220
25/18.5	**M3JP/KP**	**180 MLC**	3GJP/KP	189 438-••G	2952/1472	44/35	239
31/22	**M3JP/KP**	**200 MLB**	3GJP/KP	209 428-••G	2952/1474	53/43	340
38/25	**M3JP/KP**	**225 SMB**	3GJP/KP	229 228-••G	2950/1476	67/56	400
45/29	**M3JP/KP**	**225 SMC**	3GJP/KP	229 238-••G	2950/1477	79/63	420
50/40	**M3JP/KP**	**250 SMB**	3GJP/KP	259 228-••G	2960/1482	83/71	505
90/65	**M3JP/KP**	**280 SMB**	3GJP/KP	289 228-••G	2965/1488	153/117	765
105/75	**M3JP/KP**	**280 SMC**	3GJP/KP	289 238-••G	2966/1486	186/136	825
125/85	**M3JP/KP**	**315 SMB**	3GJP/KP	319 228-••G	2972/1485	217/178	1040
175/120	**M3JP/KP**	**315 MLA**	3GJP/KP	319 418-••G	2980/1491	287/223	1260
170/125	**M2JA/KA**	**355 S**	3GJA/KA	359 108-••A	2980/1486	285/260	1550
180/150	**M2JA/KA**	**355 SMA**	3GJA/KA	359 218-••A	2983/1487	300/290	1750
220/165	**M2JA/KA**	**355 MLA**	3GJA/KA	359 418-••A	2985/1490	370/340	2150
220/165	**M2JA/KA**	**400 M**	3GJA/KA	409 308-••A	2985/1490	370/340	2200
1500/750 r/min = 4-8 poles			**400 V 50 Hz**		**Constant torque, Dahlander-connection**		
0.45/0.23	**M2JA/KA**	**80 L**	3GJA/KA	089 329-••B	1400/690	1.2/1.2	24
0.55/0.3	**M2JA/KA**	**90 S**	3GJA/KA	099 119-••B	1360/700	1.3/1.3	32.5
0.75/0.4	**M2JA/KA**	**90 L**	3GJA/KA	099 519-••B	1355/700	1.7/1.6	37
1.4/0.7	**M2JA/KA**	**100 LA**	3GJA/KA	109 519-••B	1425/710	3.1/2.8	44
1.8/0.9	**M2JA/KA**	**100 LB**	3GJA/KA	109 529-••B	1420/705	3.8/3.4	47.5
2.0/1.0	**M2JA/KA**	**112 M**	3GJA/KA	119 319-••B	1425/710	3.7/2.9	51.5
3.8/1.9	**M2JA/KA**	**132 S**	3GJA/KA	139 119-••B	1450/730	7.4/7.3	79
5/2.5	**M2JA/KA**	**132 M**	3GJA/KA	139 129-••B	1455/730	9.2/9.2	82
8/4.5	**M3JP/KP**	**160 MLC**	3GJP/KP	169 439-••G	1456/727	15.5/14.9	172
12/7	**M3JP/KP**	**160 MLE**	3GJP/KP	169 459-••G	1461/727	23/23.5	195
15/8	**M3JP/KP**	**180 MLA**	3GJP/KP	189 419-••G	1465/732	27/19	225
18.5/11	**M3JP/KP**	**180 MLB**	3GJP/KP	189 429-••G	1466/730	33/26	233
22/13	**M3JP/KP**	**200 MLB**	3GJP/KP	209 429-••G	1476/737	39/30	320
27/16	**M3JP/KP**	**200 MLC**	3GJP/KP	209 439-••G	1473/736	48/35.5	340
34/20	**M3JP/KP**	**225 SMB**	3GJP/KP	229 229-••G	1479/739	60/48	385
37/24	**M3JP/KP**	**225 SMC**	3GJP/KP	229 239-••G	1476/736	64/53	415
52/31	**M3JP/KP**	**250 SMB**	3GJP/KP	259 229-••G	1483/741	90/72	500
65/40	**M3JP/KP**	**280 SMB**	3GJP/KP	289 229-••G	1487/743	116/92	745
85/50	**M3JP/KP**	**280 SMC**	3GJP/KP	289 239-••G	1487/743	149/115	825
95/65	**M3JP/KP**	**315 SMB**	3GJP/KP	319 229-••G	1489/744	166/140	1030
115/80	**M3JP/KP**	**315 SMC**	3GJP/KP	319 239-••G	1489/743	198/167	1100
150/95	**M3JP/KP**	**315 MLA**	3GJP/KP	319 419-••G	1489/744	260/201	1250
150/90	**M2JA/KA**	**355 S**	3GJA/KA	359 109-••A	1491/741	260/195	1550
180/130	**M2JA/KA**	**355 SMA**	3GJA/KA	359 219-••A	1487/741	310/280	1800
210/160	**M2JA/KA**	**355 MLA**	3GJA/KA	359 419-••A	1489/742	360/355	2100
210/160	**M2JA/KA**	**400 M**	3GJA/KA	409 309-••A	1489/742	360/355	2150
250/185	**M2JA/KA**	**400 LKA**	3GJA/KA	409 519-••A	1493/745	435/485	3050

ATEX certification process ongoing for frame sizes 355-400.

Notes:
- **When ordering sizes 160-200 with lifetime lubrication, variant code 194 '2Z bearings at both ends' has to be added**
- **When ordering IIC motors, following variant code has to be added: 461 = EEx d, EEx de design, Group IIC**

Detailed technical data on request.

The two bullets in the product code indicate choice of mounting arrangement (see ordering information), voltage and frequency (see previous page).

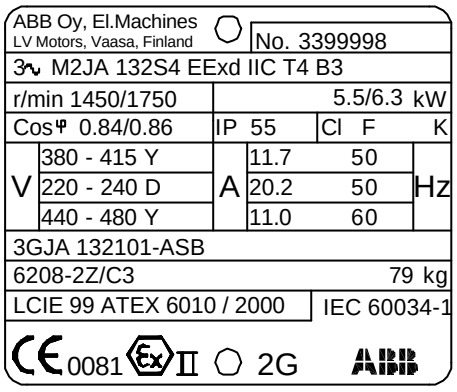
Rating plates

For motor sizes 80 to 132 the rating plate gives one current value for the voltage area. That is the highest current that can occur within the voltage area with the given output.

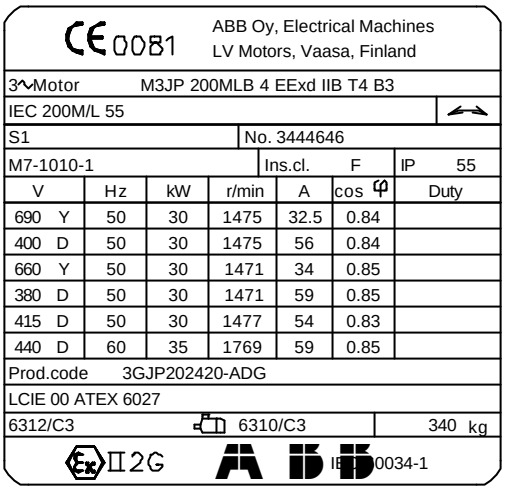
For motor sizes 160 to 400 the rating plate is in table form giving values for speed, current and power factor for six voltage levels.

European standards require special marking on safety motors. The marking shall include the following:
- type of protection
- apparatus group
- temperature class
- name of certifying body
- certificate number

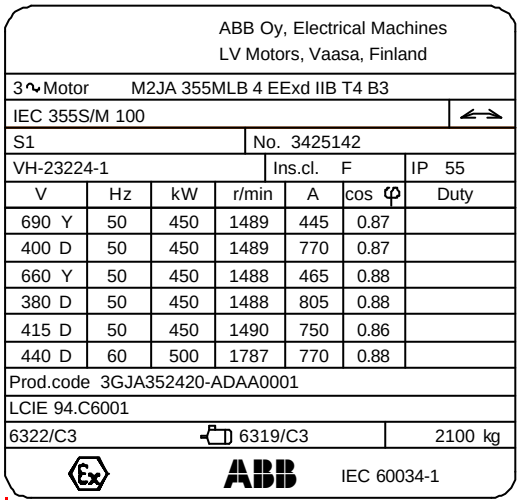
Motor sizes 80 to 132



Motor sizes 160 to 315



Motor sizes 355 to 400



Variant codes - Flameproof motors

Code	Variant codes / Flameproof motors [1]	Motor size 80-132	160-250	280-315	355-400
	Balancing				
052	Balancing to grade R (ISO 2373).	P	P	P	P
417	Balancing to grade S (ISO 2373).	P	P	P	P
424	Full key balancing.	P	P	P	P
	Bearings and lubrication				
036	Transport locking for bearings.	P	M	P	P
037	Roller bearing at D-end.	–	M	P	P
039	Cold resistant grease. For bearing temperatures -55...+100°C.	P	M	P	P
040	Heat resistant grease. Form bearing temperatures -25...+150°C.	M	S	S	S
041	Bearings regreasable via grease nipples.	–	S	S	S
194	2Z-bearings at both ends. Sizes 160-250 available as stocked option with lifetime bearings.	S	M	R	–
042	Locked drive-end	S	S	S	S
043	SPM-nipples.	–	S	S	S
058	Angular contact bearing at D-end.	–	R	R	R
107	Bearing mounted PT100 resistance elements. (only M2KA/EEx de)	–	P	P	P
433	Grease relief. (Not possible for flange-mounted sizes 160-180)	–	–	–	–
	Brakes				
412	Built-on brake.	–	R	R	R
	Branch standard designs				
142	"Manilla" winding connection. (440 VD series, 220 VD parallel, 60 Hz)	–	P	P	P
178	Stainless steel/acid proof bolts.	S	M	P	P
209	Non-standard voltage or frequency converter supply.	R	P	P	P
411	Increased efficiency design.	–	R	R	R
425	Corrosion protected stator and rotor core.	S	S	P	P
785	Reinforced tropicalisation.	P	P	S	S
	Cooling system				
044	Unidirectional fan, clockwise seen from D-end.	–	–	R	R
045	Unidirectional fan, counter clockwise seen from D-end.	–	–	R	R
068	Metal fan.	P	P	P	P/S
075	Cooling method IC 418 (without fan).	R	P	P	P
183	Separate motor cooling (fan axial, N-end).	–	P	P	P
422	Separate motor cooling (fan top or side, N-end).	–	–	P	P
791	Stainless steel fan cover.	–	R	R	R
	Coupling				
035	Assembly of customer supplied coupling-half.	M	M	M	M
	Drain holes				
076	Draining holes with plugs.	–	P	P	P

[1] Certain variant codes cannot be used simultaneously.

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M = On modification of a stocked motor, or on new manufacture, the number per order may be limited.
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Code	Variant codes / Flameproof motors [1]	Motor size 80-132	160-250	280-315	355-400
	Hazardous environments				
461	EEx d(e) design, Group IIC.	M	M	P	P
462	EEx d(e) design, temperature class T5.	P	R	R	R
463	EEx d(e) design, temperature class T6, up to frame size 250.	R	R	R	–
464	Alleinschutz -design. Certification of flameproof motor and protection device together.	R	R	R	R
	Heating elements				
450	Heating element, 110-120 V.	M	M	M	M
451	Heating element, 220-240 V.	M	M	M	M
	Insulation system				
014	Winding insulation class H.	–	R	P	P
405	Special winding insulation for frequency converter supply.	P	P	P	P
	Mounting arrangements				
008	IM 2101 foot/flange mounted, IEC flange, from IM 1001 (B34 from B3).	P	–	–	–
009	IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3).	M	M	M	M
047	IM 3601 flange mounted, IEC flange, from 3001 (B14 from B5).	M	–	–	–
	Noise reduction				
055	Noise reducing cover.	–	–	P	P
	Painting				
114	Special paint colour, standard grade.	M	M	M	M
111	Offshore two-pack polyamide cured epoxy pain 160 µm.	–	P	P	P
115	Offshore, zinc primer painting.	–	P	P	P
179	Special paint specification.	R	R	R	R
	Protection				
005	Protective roof, vertical motor, shaft down.	M	M	M	M
072	Radial seal at D-end. Sizes 80-132 only with flange-mounted motors.	M	M	M	M
073	Sealed against oil at D-end.	P	P	P	P
158	Degree of protection IP 65.	–	M	–	–
211	Weather protected, IP xxW.	P	P	P	P
401	Protective roof, horizontal motor.	–	–	P	P
403	Degree of protection IP 56.	M	M	P	P
404	Degree of protection IP 56, without fan.	–	P	P	P
783	Labyrinth sealing at D-end.	–	P	P	P
	Rating & instruction plates				
002	Restamping voltage, frequency and output, continuous duty.	R	R	R	R
095	Restamping output (maintained voltage, frequency), intermittent duty.	–	–	–	–
138	Mounting of additional identification plate.	M	M	M	M
139	Additional identification plate delivered loose.	M	M	M	M
150	Instruction plates and maintenance in non-standard language.	R	R	R	R
161	Additional rating plate delivered loose.	M	M	M	M

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Code	Variant codes / Flameproof motors [1]	Motor size 80-132	160-250	280-315	355-400
	Shaft & rotor				
069	Two shaft extensions as per basic catalogue.	P	P	P	P
070	One or two special shaft extensions, standard shaft material.	P	P	P	P
155	Cylindrical shaft extension, D-end, without key-way.	P	P	P	P
156	Cylindrical shaft extension, N-end, without key-way.	P	P	P	P
164	Shaft extension with closed key-way.	S	S	P	P
165	Shaft extension with open key-way.	P	P	S	S
410	Stainless/acid-proof steel shaft (standard or non-standard design).	R	R	P	P
431	Special shaft material for low temperatures, -40°C.	P	P	P	P
	Standards and regulations				
152	Classified shaft material.	P	P	P	P
421	VIK design (Verband der industriellen Energie- und Kraftwirtshaft e.V).	P	P	P	P
773	EEMUA No 132 1988 design.	R	R	P	P
774	NORSOK (North SeaTerritorial Waters) design.	R	R	P	P
775	SHELL DEP 33.66.05.31-Gen. January 1999 design.	M	M	P	P
	Marine motors				
	See catalogue "M3000 Marine motors, BA/Marine GB" for details.				
	Stator winding temperature sensors				
121	Bimetal detectors, break type (NCC), (3 in series), 130°C in stator winding.	P	P	P	P
122	Bimetal detectors, break type (NCC), (3 in series), 150°C in stator winding.	P	P	P	P
125	Bimetal detectors, break type (NCC), (2X3 in series), 150°C in stator winding.	P	P	P	P
127	Bimetal detectors, break type (NCC), (3 in series 130°C & 3 in series 150°) in stator winding.	P	P	P	P
435	PTC - thermistors (3 in series), 130°C, in stator winding.	P	P	P	P
436	PTC - thermistors (3 in series), 150°C, in stator winding.	M	S	S	S
439	PTC - thermistors (2x3 in series), 150°C, in stator winding.	P	P	P	P
441	PTC - thermistors (3 in series 130°C & 3 in series 150°C), in stator winding.	P	P	P	P
445	PT100 resistance element (1 per phase) in stator winding.	P	P	P	P
446	PT100 resistance element (2 per phase) in stator winding.	R	P	P	P
	Terminal box				
015	Δ-connection in terminal box (reconnection from Y).	M	M	M	M
017	Y-connection in terminal box (reconnection from Δ).	M	M	M	M
136	Extended cable connection, standard terminal box. M2AA motors: 2 m long connections cable.	R	R	R	R
137	Extended cable connection, low terminal box.	P	P	P	P
157	Terminal box degree of protection IP 65.	M	M	M	M
400	4 x 90 degr turnable terminal box. EEx de 160-180 = M	P	S/R	P	P
402	Terminal box adapted for Al -cables.	–	–	S	S
413	Extended cable connection, no terminal box.	–	–	R	R
418	Separate terminal box for temperature detectors.	–	P	P	P
466	Terminal box at N-end. Not possible for sizes 160-180.	–	R	R	R
468	Non-standard cable entry direction (please state cable direction).	P	P	P	P
469	Axial cable entry direction. EEx d = S, EEx de = R	R	S/R	R	R
730	Prepared for NPT cable glands.	P	P	P	P
731	Non-standard cable glands.	R	R	R	R

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Code	Variant codes / Flameproof motors [1]	Motor size 80-132	160-250	280-315	355-400
732	Standard cable gland EEx d IIB, armoured cable.	M	M	M	P
733	Standard cable gland EEx d IIB, non-armoured cable.	M	M	M	P
734	Standard cable gland EEx d IIC, armoured cable.	M	M	M	P
735	Standard cable gland EEx d IIC, non-armoured cable.	M	M	M	P
736	Standard cable gland EEx e, fulfilling EN 50014 and EN 50019. EEx de = S, EEx d = –	P	S/–	P	P
737	Standard cable gland EEx e, with clamping device, fulfilling EN 50014 and EN 50019. EEx de = L, EEx d = –	P	M/–	P	P
	Testing				
145	Type test report from test of identical motor.	M	M	M	M
146	Type test with report for motor from specific delivery batch.	M	M	P	P
147	Type test with report for motor from specific delivery batch, customer witnessed.	M	M	P	P
148	Routine test report.	M	M	P	P
221	Type test and multi-point load test with report for motor from specific delivery batch. Complete type test with partial load test.	P	P	P	P
222	Torque/speed curve, type test and multi-point load test with report for motor from specific delivery batch. Complete type test without partial load test.	P	P	P	P
760	Vibration level test.	M	M	P	P
761	Vibration spectrum test.	–	P	P	P
762	Noise level test.	P	P	P	P
763	Noise spectrum test.	P	P	P	P
764	Complete test with ABB frequency converter.	P	P	P	P
768	Chog type test with report for motor from specific delivery batch.	R	P	R	R
769	Chog type test report from test of identical motor.	R	P	R	R
	Variable speed drives				
181	Adapted for frequency converter, variable speed operation.	M	M	M	M
405	Special winding insulation for frequency converter supply, rated supply > 500 V.	P	P	P	P
701	Insulated bearing at N-end. Note: In Variable speed drives all Ex-motors size 280 and above must be equipped with insulated bearings.	–	R	P	P
704	EMC cable gland.	–	–	R	R
182	Separate motor cooling (fan axial, N-end).	–	P	P	P
422	Separate motor cooling (fan top or side, N-end).	–	–	P	P
476	Separate motor cooling (fan axial, N-end) and 1024 pulse tacho (Leine & Linde EEx e 840) mounted.	–	P	P	P
477	Separate motor cooling (fan axial, N-end) and 2048 pulse tacho (Leine & Linde EEx e 840) mounted.	–	P	P	P
747	EEx d pulse tacho.	–	P	P	P
	Y/Δ-starting				
117	Terminals for Y/Δ start at both speeds (two-speed windings).	–	R	P	P
118	Terminals for Y/Δ start at high speed (two-speed windings).	–	R	P	P
119	Terminals for Y/Δ start at low speed (two-speed windings).	–	R	P	P

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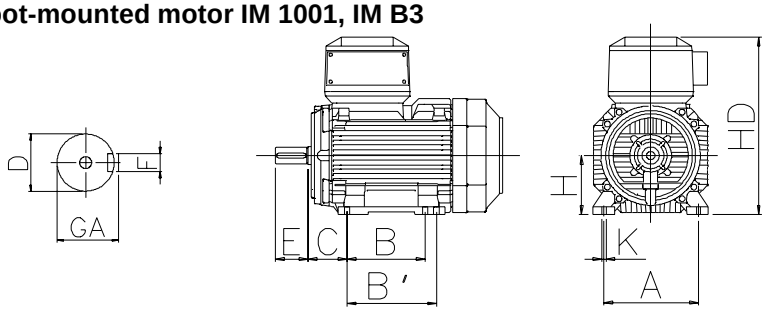
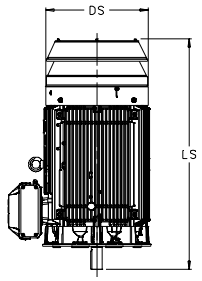
Dimension drawings

M3000 Flameproof motors

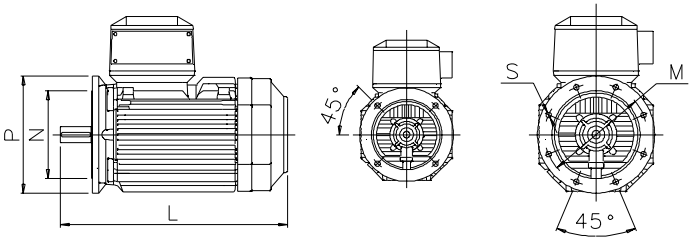
Foot-mounted motor IM 1001, IM B3



Motor with protection cover



Flange-mounted motor IM 3001, IM B5



Sizes 80-200 Sizes 225-400

IM 1001, IM B3 AND IM 3001, IM B5											IM 1001, IM B3								IM 3001, IM B5				Protective roof		
Motor size	D poles 2	D poles 4-8	GA poles 2	GA poles 4-8	F poles 2	F poles 4-8	E poles 2	E poles 4-8	L max poles 2	L max poles 4-8	A	B	B'	C	HD M2JA M3JP	HD M2KA M3KP	K	H	M	N	P	S	DS	LS poles 2	LS poles 4-8
80	19	19	21.5	21.5	6	6	40	40	287	287	125	100	–	50	251.5	250	10	80	165	130	200	12	150	306	306
90 S	24	24	27	27	8	8	50	50	336	336	140	100	125	56	276.5	275	10	90	165	130	200	12	170	360	360
90 L	24	24	27	27	8	8	50	50	336	336	140	100	125	56	276.5	275	10	90	165	130	200	12	170	360	360
100	28	28	31	31	8	8	60	60	399	399	160	140	–	63	295	294	10	100	215	180	250	15	188	444	444
112	28	28	31	31	8	8	60	60	419	419	190	140	–	70	307.5	306	12	112	215	180	250	15	188	444	444
132 S	38	38	41	41	10	10	80	80	512	512	216	140	178	89	352.5	351	12	132	265	230	300	15	255	548	548
132 M	38	38	41	41	10	10	80	80	512	512	216	140	178	89	352.5	351	12	132	265	230	300	15	255	548	548
160	42	42	45	45	12	12	110	110	711	711	254	210	254	108	447	388	14.5	160	300	250	350	18.5	328	756	756
180	48	48	51.5	51.5	14	14	110	110	706	706	279	241	279	121	485	426	14.5	180	300	250	350	18.5	359	756	756
200	55	55	59	59	16	16	110	110	774	774	318	267	305	133	616	573	18.5	200	350	300	400	18.5	414	844	844
225	55	60	59	64	16	18	110	140	841	871	356	286	311	149	663	620	18.5	225	400	350	450	18.5	462	921	951
250	60	65	64	69	18	18	140	140	875	875	406	311	349	168	726	683	24	250	500	450	550	18.5	506	965	965
280 SM_	65	75	69	79.5	18	20	140	140	1090	1090	457	368	419	190	862	768	24	280	500	450	550	18	555	1190	1190
315 SM_	65	80	69	85	18	22	140	170	1176	1206	508	406	457	216	929	858	30	315	600	550	660	23	624	1290	1320
315 ML_	65	90	69	95	18	25	140	170	1287	1317	508	457	508	216	929	858	30	315	600	550	660	23	624	1401	1431
355 S_	70	100	74.5	106	20	28	140	210	1344	1414	610	500	–	254	1150	985	35	355	740	680	800	23	590	1480	1550
355 SM_	70	100	74.5	106	20	28	140	210	1396	1466	610	500	560	254	1150	985	35	355	740	680	800	23	590	1530	1600
355 ML_	70	100	74.5	106	20	28	140	210	1501	1571	610	560	630	254	1150	985	35	355	740	680	800	23	590	1635	1705
400 M_	70	100	74.5	106	20	28	140	210	1501	1571	686	630	–	280	1195	1035	35	400	–	–	–	–	590	1635	1705
400 LK_	80	100	85	106	22	28	170	210	1708	1748	686	710	800	280	1240	1070	35	400	740	680	800	23	700	1860	1900

IM 3601, IM B14 - Available flange alternatives ; see also variant codes.

Flange size	Variant code	Flange dimensions P	M	N	S	Motor size M2JA/M2KA 80	90	100	112	132	
FT100	258	120	100	80	M6	S	NA	NA	NA	NA	S = Standard flange
FT115	260	140	115	95	M8	R	S	NA	NA	NA	R = Special flange
FT130	229	160	130	110	M8	R	R	S	S	NA	NA = Not possible
FT165	236	200	165	130	M10	NA	NA	NA	NA	S	
FT215	246	250	215	180	M12	NA	NA	R	R	R	
FT265	256	300	265	230	M12	NA	NA	NA	NA	R	

Tolerances:

A, B	± 0,8
D, DA	ISO k6 < Ø 50mm ISO m6 > Ø 50mm
F, FA	ISO h9
H	+0 -0.5
N	ISO j6
C, CA	± 0.8

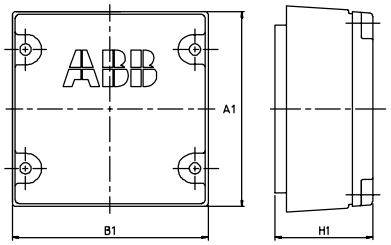
Above table gives the main dimensions in mm.

For detailed drawings please check our web-pages 'www.abb.com/motors&drives' or contact ABB.

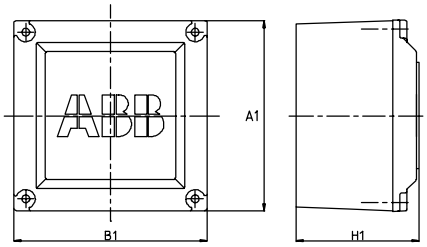
Dimension drawings

Flameproof motors — Terminal boxes, standard with 6 terminals

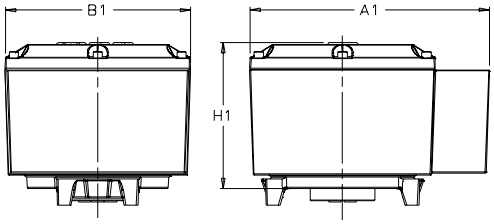
Motor sizes 80-132



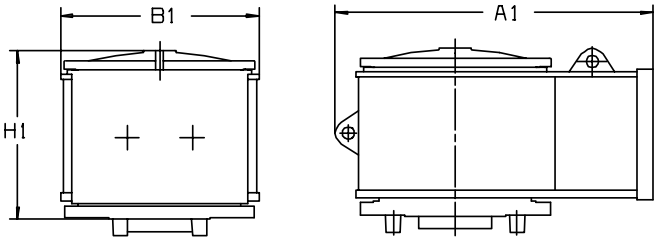
Motor sizes 160 - 250



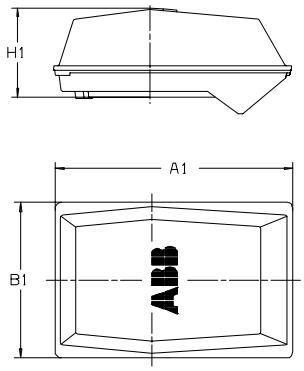
EEx d - motor sizes 280 - 315



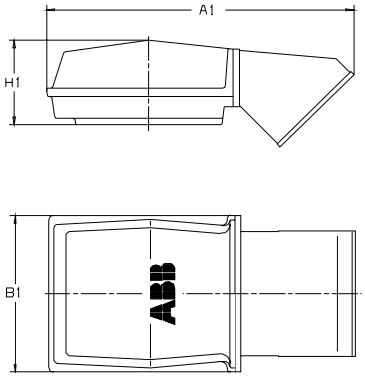
EEx d - motor sizes 355 - 400



EEx de - motor sizes 280 - 315



EEx de - motor sizes 355 - 400



Motor size	Terminal box	A1	B1	H1
EEx d:				
80 - 132		164	162.5	68
160 - 180		234	234	111
200 - 250		339	290	226
280 - 315	M3JP/M2JA 142/2	465	370	260
355 - 400	M2JA 162/2 + Adapter MPMM-ZL1	790	490	420

For motor dimensions please see dimension drawings on earlier pages.

Motor size	Terminal box	A1	B1	H1
EEx de:				
80 - 132		175.5	174	70.5
160 - 180		234	234	51.5
200 - 250		352	319	183.5
280 - 315	M3KP/M2KA 142/2	536	350	197
355 - 400	M2KA 162/2 + Adapter MPMM-ZL1	787	410	226

Note: Smallest 355 sizes may be equipped with the 142/2 terminal box, for detail information contact us.

Flameproof motors EEx d, EEx de in brief, basic design

Motor size			80	90	100	112	132	160	180
Stator	Material Paint colour shade		Cast iron EN-GJL-200 Blue, Munsell 8B 4.5/3.25 (≈ NCS 4822-B05G)						
	Paint thickness		Alkyd paint, thickness ≥ 70 µm					Two-pack epoxy paint, thickness ≥ 80 µm	
Bearing end shields	Material Paint colour shade		Cast iron EN-GJL-200 Blue, Munsell 8B 4.5/3.25 (≈ NCS 4822-B05G)						
	Paint thickness		Alkyd paint, thickness ≥ 70 µm					Two-pack epoxy paint, thickness ≥ 80 µm	
Bearings	D-end	2-pole 4-12 -pole	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6206-2Z/C3	6208-2Z/C3	6309M/C3 6309/C3	6310M/C3 6310/C3
	N-end	2-pole 4-12 -pole	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6206-2Z/C3	6208-2Z/C3	6309M/C3 6309/C3	6309M/C3 6309/C3
Axially-locked bearings	Inner bearing cover		As standard, locked at D-end						
Bearing seal			V-ring as standard, radial seal on request					Gamma-ring as standard, radial seal on request	
Lubrication			Permanent grease lubrication					Regreasable bearings as std, bearings greased for life as stock option	
SPM-nipples			–					As standard	
Rating plate	Material		Stainless steel						
Terminal box	Frame material Cover material Cover screws material		Cast iron EN-GJL-200 Cast iron EN-GJL-200 Acidproof steel (INOX)					Cast Iron EN-GJL-200 Cast Iron EN-GJL-200 Steel 5G, coated with zinc and yellow cromated	
Connections	Cable entries Terminals		1xM25x1.5 6 terminals for connection with cable lugs (not included)	1xM25x1.5	1xM32x1.5	1xM32x1.5	1xM32x1.5	2xM40x1.5	2xM40x1.5
Fan	Material		Reinforced glass fiber laminate					Reinforced glass fiber laminate or aluminium	
Fan cover	Material Paint colour shade		Steel Blue, Munsell 8b 4.5/3.25 (≈ NCS 4822-B05G)					Zinc coated steel	
	Paint thickness		Two-pack epoxy polyester paint, thickness ≥ 80 µm					Two-pack polyester paint, thickness ≥ 80 µm	
Stator winding	Material Insulation		Copper Insulation class F						
	Winding protection		On request					3 pcs thermistors as standard	
Rotor winding	Material		Pressure die-cast aluminium						
Balancing method			Half key balancing						
Key ways			Closed						
Drain holes			–					Optional	
Enclosure			IP 55, higher protection on request						
Cooling method			IC 411						
Mounting arrangements	Foot-mounted		IM B3 (IM1001), IM B6 (IM1051), IM B7 (IM1061), IM B8 (IM1071), IM V5 (IM1011), IM V6 (IM1031)						
	Flange-mounted Foot- and flange-m.		IM B5 (IM3001), IM V1 (IM3011), IM V3 (IM3031) IM B14 (IM3601), V18 (IM3611), V19 (IM3631) IM B34 (IM2101), IM B35 (IM2001), IM V15 (IM2011), IM V36 (IM2031)						

Flameproof motors EEx d, EEx de in brief, basic design

Motor size			200	225	250	280	315	355	400
Stator	Material Paint colour shade		Cast iron EN-GJL-200 Blue, Munsell 8B 4.5/3.25 (≈ NCS 4822-B05G)						
	Paint thickness		Two-pack epoxy paint, thickness ≥ 80 µm			Two-pack epoxy paint, thickness ≥ 70 µm			
Bearing end shields	Material Paint colour shade		Cast iron EN-GJL-200 Blue, Munsell 8B 4.5/3.25 (≈ NCS 4822-B05G)				Spheroidal graphit EN-GJS-400		
	Paint thickness		Two-pack epoxy paint, thickness ≥ 80 µm			Two-pack epoxy paint, thickness ≥ 70 µm			
Bearings	D-end	2-pole	6312M/C3	6313M/C3	6315M/C3	6316/C3	6316/C3	6319M/C4	6319M/C4
		4-12 -pole	6312/C3	6313/C3	6315/C3	6316/C3	6319/C3	6322/C3	6322/C3
	N-end	2-pole	6310M/C3	6312M/C3	6313M/C3	6316/C3	6316/C3	6319M/C4	6319M/C4
		4-12 -pole	6310/C3	6312/C3	6313/C3	6316/C3	6316/C3	6319/C3	6319/C3
Axially-locked bearings	Inner bearing cover		As standard, locked at D-end						
Bearing seals			Gamma-ring as standard, radial seal on request			V-ring as standard, radial seal on request			
Lubrication			Regreasable bearings as standard, bearings greased for life as stock option			Regreasable bearings. regreasing nipples, M10x1			
SPM-nipples			As standard			Optional		As standard	
Rating plate	Material		Stainless steel						
Terminal box	Frame material Cover material Cover screws material		Cast iron EN-GJL-200 Cast iron EN-GJL-200 Steel 5G, coated with zinc and yellow cromated					Cast iron EN-GJL-150 or steel	
Connections	Cable entries Terminals		2xM50x1.5	2xM50x1.5	2xM50x1.5[1)]	2xM63x1.5	2xM63x1.5	2xM80x1.5	2xM80x1.5
			6 terminals for connection with cable lugs (not included) [1)]for EEX de motors 2xM63x1.5						
Fan	Material		Reinforced glass fiber laminate or aluminium			Reinforced glass fiber laminate, aluminium or polypropylene with metal hub			
Fan cover	Material Paint colour shade		Zinc coated steel Blue, Munsell 8B 4.5/3.25 (≈ NCS 4822-B05G)			Steel			
	Paint thickness		Two-pack polyester paint, thickness ≥ 80 µm			Two-pack epoxy polyester paint, thickness ≥ 80 µm			
Stator winding	Material Insulation		Copper Insulation class F						
	Winding protection		3 pcs thermistors as standard						
Rotor winding	Material		Pressure die-cast aluminium			Pressure die-cast aluminium or copper			
Balancing method			Half key balancing						
Key ways			Closed			Open			
Drain holes			Optional						
Enclosure			IP 55, higher protection on request						
Cooling method			IC 411						
Mounting arrangements	Foot-mounted		IM B3 (IM1001), IM B6 (IM1051), IM B7 (IM1061), IM B8 (IM1071), IM V5 (IM1011), IM V6 (IM1031)						
	Flange-mounted		IM B5 (IM3001), IM V1 (IM3011), IM V3 (IM3031) Note: Motor size 400 LK_ IM B5 and V3 on request.						
	Foot- and flange-m.		IM B35 (IM2001), IM V15 (IM2011), IM V36 (IM2031)						

Frequency converter drive and hazardous areas

Motors with protection types EEx d, EEx de, Ex nA, EEx nA and dust ignition proof (with cast iron frame) are designed and certified for variable speed drives.

When using a squirrel cage Ex-motor with a frequency converter, the following points must be taken into account, in addition to the general selection criteria.

A. Safety criteria

These criteria are imposed by the competent bodies in order to secure the use of motors with inverters in hazardous areas.

1. Type tests and certification

Type tests according to the test procedure imposed by the Ex notified bodies of a representative number of motors with converters are available by ABB.

ABB has type tested and certified at LCIE the complete range of Ex nA, EEx nA, Ex N, EEx d, EEx de and DIP (cast iron) so that in respect with the following conditions according to points 2 and 3 below no more individual type tests are needed.

2. Dimensioning

The voltage (or current) fed by the frequency converter is not purely sinusoidal. This may increase the losses, vibration, and noise of the motor. Further-more, a change in the distribution of the losses may affect the motor temperature balance and lead to an increase in the temperature of the bearings. In every case, the motor must be correctly sized according to the instructions supplied with the selected frequency converter (see loadability curve next page).

When using ABB converters use the Drive*Size* dimensioning programme or "ISOTHERM GUIDE-LINES" of the corresponding converter type for sizing the motors.

3. Critical parameters to indicate on the motor

In a frequency converter drive, the actual operating speed of the motor may deviate considerably from its nominal speed (i.e. the speed stamped on the rating plate). For higher speeds, ensure that the highest permissible rotational speed of the motor or the critical speed of the entire equipment, is not exceeded.

In addition, bearing lubrication and any ventilation noise suppression arrangements will require special attention. The maximum speed of Ex-motors must also be checked since the EN standard determines some speed limits for the cooling equipment and for the minimum gap between rotor and stator.

Permissible maximum speeds are described in figure 1 below. More precise values available from ABB.

Figure 1. Maximum permissible speeds

Frame size	Speed r/min 2-pole	4-pole
71-200	4000	3600
225-280	3600	2600
315	3600	2300
355	3600	2200
400	3600	1800

4. Thermal protection

All ABB Ex-motors are equipped with PTC thermistors or as option for EEx d and EEx de motors bi-metal switches.

5. Rating plates

There will be an other rating plate indicating the essential speed duty parameters:
- speed range
- power range
- voltage & current range
- type of torque (constant or quadratic)
- converter setting (switching frequency FSW)

CE 0081 ABB Oy, Electrical Machines
LV Motors, Vaasa, Finland

3~Motor M3JP 250SMA 4 EExd IIB T4 B3
IEC 250S/M 65
S1 No. 3492820
LJ-20964-1 / 2001 Ins.cl. F IP 55

V	Hz	kW	r/min	A	cos φ	Duty
690 Y	50	55	1479	58	0.83	
400 D	50	55	1479	101	0.83	
660 Y	50	55	1475	60	0.85	
380 D	50	55	1475	104	0.85	
415 D	50	55	1480	99	0.82	
440 D	60	63	1775	103	0.85	

Prod.code 3GJP252210-ADG138148
LCIE 00 ATEX 6030
6315/C3 6313/C3 450 kg
Ex II 2D A B B IEC 60034-1

ABB Oy, Electrical Machines
LV Motors, Vaasa, Finland

3~Motor M3JP 250SMA 4 EExd IIB T4
No 3492820
CONVERTER SUPPLY
FC Type: ACS 600
Switc.freq.: > 3 KHz
F.W.P. 400 VD 50 Hz

V	Hz	kW	r/min	A	cosφ	DUTY
400	50	44	1483	87		S9
80	10	8.4	281	90		S9

CONSTANT TORQUE 10-50 Hz T:284Nm
A B B

B. Technical criteria

1. Lubrication

The effectiveness of the motor lubrication should be checked by measuring the surface temperature of bearing endshields under normal operating condi-tions. If the measured temperature is +80°C or above, the relubrication intervals specified in ABB's standard instruction manuals must be shortened; i.e. the relubrication interval should be halved for every 15 K increase in bearing temperature. If this is not possible ABB recommends the use of lubricants suitable for high operating temperature conditions.These lubricants allow a normal relubrication interval and 15 K increase in bearing temperature conditions.

2. Insulation protection

Frequency converters, based on IGBT power compo-nents, cause higher voltage stress on the windings of the motor due to rapid switchings and reflections in the cables than sinusoidal supply voltage. Therefore the precautions described in table 1 below must be taken to protect the winding of the motor.

For GTO converters, please contact ABB.

Note: ABB does not recommend increased safety EEx e motors for VSD applications.

3. Bearing currents

Depending on shaft height and network voltage supply, bearing currents and voltages must be avoided in Ex-motors. In such cases insulated bearings or a properly dimensioned filter at the converter output must be used acc. to intructions in table 1 below. When ordering clearly state which alternative will be used.

4. EMC

For fulfilling the EMC requirements, special EMC cable(s) must be used in addition to the correct cable gland mounting, with special, extra earthing pieces (variant code 704). Note that you must use only symmetrical shielded cables.

Correct earthing of the motor and the driven equipment is important to avoid bearing voltages and currents.

Table 1. Selection rules for insulation in variable speed drives

	Motor frame size **< IEC 250**	**≥ IEC 280**	**≥ IEC 355**
$U_N \leq 500$ V	Standard Ex-motor	Standard Ex-motor + Insulated N-bearing	Standard Ex-motor + Insulated N-bearing + Common mode filter
$U_N \leq 600$ V	Standard Ex-motor + dU/dt-filter *OR* Reinforced insulation	Standard Ex-motor + dU/dt-filter + Insulated N-bearing *OR* Reinforced insulation + Insulated N-bearing	Standard Ex-motor + Insulated N-bearing + dU/dt-filter + Light Common mode filter *OR* Reinforced insulation + Insulated N-bearing + Common mode filter
$U_N \leq 690$ V	Reinforced insulation + dU/dt-filter	Reinforced insulation + dU/dt-filter + Insulated N-bearing	Reinforced insulation + Insulated N-bearing + dU/dt-filter + Light common mode filter

dU/dt filter
Series reactor. dU/dt decrease the changing rate of the phase and main voltages and thus reduce voltage stresses in the windings. dU/dt filters also decrease so called common mode currents and bearing currents.

Common mode and light common mode filters
Common mode filters are made of toroidal cores installed around motor cables. These filters reduce so called common mode currents in VSD applications and thus decrease the risk of bearing currents. Common mode filters do no significantly affect on the phase or main voltages on the motor terminals.
Common Mode Filter = 3 toroidal cores per each 3-phase motor cable
Light Common Mode Filter = 1 toroidal core per each 3-phase motor cable

Motor loadability with ACS 600

The loadability curve below is a guide line curve, for exact values please contact ABB. The curves below are valid for converters manufactured by ABB, they are basic rules and ABB reservs the right to changes. For use with converters others than from ABB, you can consult ABB.

Please note that the curve is according to temperature rise B; class F temperature rise is not allowed.

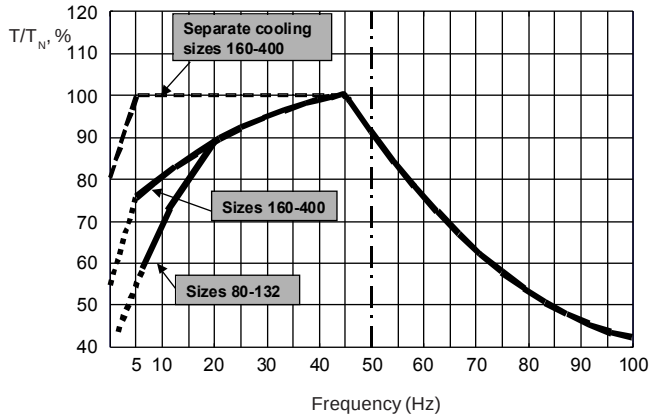
The loadability curves below assume the nominal frequency of the motor e.g. field weakening point is at 50 Hz. The loadability curve from 0 to 5 Hz is only valid in case of use a DTC control.

If needed please contact us to get more information. Values in table format are available from ABB on request.

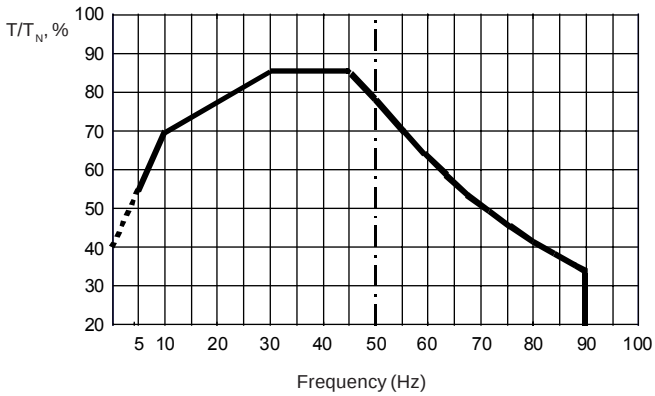
Figure 2. Motor loadability with ACS 600

Flameproof motors EEx d/EEx de T4 (50 Hz)

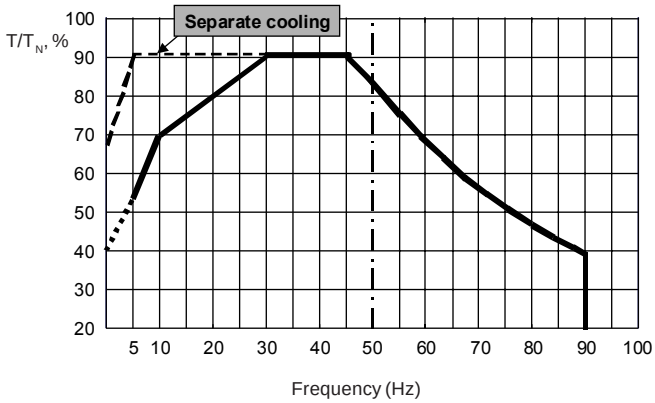
- corresponding curve for temperature class T5 and T6 on request



Non-sparking motors Ex nA, EEx nA, Ex N (50 Hz), frame sizes 71-132
Dust ignition proof cast iron motors T125 (50 Hz), frame sizes 71-355



Non-sparking motors Ex nA, EEx nA, Ex N (50 Hz), frame sizes 160-400



M3000 Motors for demanding industries

General design

– Standardized motors to meet IEC recommendations and CENELEC standards
– Corrosion and weather protected motors
– Offshore application: IP 55 or IP 56 on request
– Frame material: cast iron
– Insulation: class F
– Temperature rise: according class B
– High overload capacity: $T_{max} / T_N > 1.8$
– Accelerating torque: > 10%
– High starting performance
– Low noise level: < 85 dB(A)
– Design for variable speed applications

Safety of goods and personnel

– Explosion protection required :

Standard	Ex nA, EEx nA	EEx e	EEx d	EEx de
Yes	Yes	Yes	Yes	Yes

Variable speed applications

– EEx d, EEx de -motors are certified with included thermistors. A separate rating plate shows the regulation field and torque characteristics.
– EEx nA, Ex nA, Ex N -motors certified

Corrosion protection when needed

– Stainless steel screws
– Stainless steel grease nipples
– Stainless steel rating plates
– Corrosion resistant drain hole plug
– Radial seal, V-ring
– Fan made of reinforced glass fiber laminate
– 2 layers coating epoxy paint system
– Steel fan cover with epoxy coating
– Rotor and stator core corrosion protected

Interchangeability

– IEC output
– Network: 50 Hz or 60 Hz
– Large capacity of cable entries
– Double fixation holes on the majority of foot-mounted motors
– One earthing bolt in the terminal box and one on the frame as option
– Jacking bolts to make coupling easier as option
– Balancing full key or half key available as option

Running efficiency

– High efficiency motors and minimum power factor requested
– Efficiency corresponding to highest EU efficiency levels eff1
– Winding protection as option; PTC or PT100
– Grease nipples as option
– SPM nipples as option
– Motors sizes 71 - 315 equipped with same bearings at both ends
– Balancing close to class R
– Bearing lifetime L_{10}, 40.000 h
– Bearing temperature rise max. +55°C

Approved design for specifications

– EEMUA (Engineering Equipment and Materials Users Association) - Variant code 773
– NORSOK (North Sea Territorial Waters) - Variant code 774
– SHELL DEP 33.66.05.31 - Gen, January 1999 - Variant code 775
– UIC (Union des Industries Chimiques) - Variant code 787
– VIK (Verband der industriellen Energie- und Kraftwirtschaft e.V.) - Variant code 421

Specification

Motors acc. to VIK (Verband der industriellen Energie- und Kraftwirtschaft e.V.) – Variant code 421

General design for demanding industries

– Standardized motors to meet IEC recommendations and CENELEC standards
– Frame material: cast iron
– Insulation: class F
– Temperature rise: according class B
– Low noise level: < 77 dB(A) (+3 dB(A) tolerance)
– Degree of protection: Min. IP 54

Safety of goods and personnel

– Explosion protection availability:

Standard	Ex nA, EEx nA	EEx e	EEx d	EEx de
Yes, practically Ex nA	Yes	Yes	No	Yes

Corrosion protection

– Stainless steel rating plates
– Fan made of reinforced glass fiber laminate or aluminium
– Heavy industry paint system (70 µm epoxy)

Interchangeability

– Nominal voltages 380-400-415 V; voltage 420 V 0n request
– IEC output and dimensions
– Shaft dimension requirements for 315, 355 and 400
– Wide range voltage up to frame size 250
– Stamping of 'VIK' on rating plate
– Additional rating plate in terminal box
– Prepared for mounting of customer identification plate
– Stamping of weight for motors above 30 kg
– Drainage hole in flange for IM V3
– Plugs in unused fixation holes on foot-mounted motors
– Drainage holes, when provided, must be closed
– Terminal box 90° turnable without turning terminal board
– Terminal box with gland plate from size 200
– Split terminal box from size 315
– Undetachable screws in terminal box cover
– Earthing terminal on frame
– Half key balanced
– EEx e up to size 200 (incl.): one rating plate for T1/T2 and one for T3
– Minimum t_E = 7 sec for EEx e

Running efficiency

– Nominal bearing life ³ 40000 h in coupling
– Regreasable bearings available from size 250
– Button head grease nipples acc. to DIN 3404
– Grease intervals (amb. temp. 40°C) for 2 pole motors: min. 2000 h
– Grease intervals (amb. temp. 40°C) for 4-12 pole motors: min. 4000 h

Service

– Stock availability

Specifications approved for operations by:

– Amoco
– Basf
– Bayer
– Degussa
– Dow Chemical
– CSM
– Henkel
– Hoechst
– Merck
– Schering
– Veba Oil

Certificates

Example of certification of flameproof motors with CE-marking acc. to directive 94/9/EC

LCIE

1 **ATTESTATION D'EXAMEN CE DE TYPE**

2 Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles
Directive 94/9/CE

3 Numéro de l'attestation CE de type
LCIE 02 ATEX 6028

4 Appareil ou système de protection

Moteur asynchrone
Type : M3GP 280... et M3GP 315...

5 Demandeur : ABB OY, Electrical Machines, LV Motors

6 Adresse : PO Box 633
Strömbergin Puistotie 5A
65101 VAASA FINLANDE

7 Cet appareil ou système de protection et ses variantes éventuelles acceptées est décrit dans l'annexe de la présente attestation et dans les documents descriptifs cités en annexe.

8 Le LCIE, organisme notifié sous la référence 0081 conformément à l'article 9 de la directive 94/9/CE du Parlement européen et du Conseil du 23 mars 1994, certifie que cet appareil ou système de protection est conforme aux exigences essentielles en ce qui concerne la sécurité et la santé pour la conception et la construction d'appareils et de systèmes de protection destinés à être utilisés en atmosphères explosibles, données dans l'annexe II de la directive. Les vérifications et épreuves figurent dans notre rapport confidentiel N° 38 334 010 0010 A.

9 Le respect des exigences essentielles en ce qui concerne la sécurité et la santé est assuré par la conformité aux documents suivants :
- EN 50014 (1997)
- EN 50281-1-1 (1998)
- EN 50021 (1999)

10 Le signe X lorsqu'il est placé à la suite du numéro de l'attestation, indique que ce matériel ou système de protection est soumis aux conditions spéciales pour une utilisation sûre, mentionnées dans l'annexe de la présente attestation.

11 La présente attestation d'examen CE de type porte uniquement sur la conception, l'examen et l'essai de l'équipement ou du système de protection spécifié conformément à la directive 94/9/CE.
Toutes autres exigences de la Directive sont applicables au procédé de fabrication et de livraison de cet équipement ou système de protection. Ces derniers ne sont pas couverts par la présente attestation.

12 Le marquage de l'appareil ou du système de protection devra comporter, entre autres indications utiles, les mentions suivantes :

Ex II 2 D et/ou 3G et/ou 3D
EEx nA II T1, T2 ou T3
IP 6X/5X, T ... °C (ex : T 120 °C, T 125 °C)

Ex

1 **EC TYPE EXAMINATION CERTIFICATE**

2 Equipment or Protective System Intended for use in Potentially explosive atmospheres
Directive 94/9/CE

3 EC type Examination Certificate number
LCIE 02 ATEX 6028

4 Equipment or Protective system

Asynchronous motor
Type : M3GP 280... and M3GP 315...

5 Applicant : ABB OY, Electrical Machines, LV Motors

6 Address : PO Box 633
Strömbergin Puistotie 5A
65101 VAASA FINLAND

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein refered to.

8 LCIE, notified body number 0081 in accordance with article 9 of the directive 94/9/CE of the European Parliament and Council of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective system intended for use in potentially explosive atmospheres, given in Annex II to the directive.
The examination and test results are recorded in confidential report No 38 334 010 0010 A.

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

- EN 50014 (1997)
- EN 50281-1-1 (1998)
- EN 50021 (1999)

10 If the sign X is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC.

Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

Ex II 2 D and/or 3G and/or 3D
EEx nA II T1, T2 or T3
IP 6X/5X, T ... °C (ex : T 120 °C, T 125 °C)

Fontenay-aux-Roses, le 04 mars 2002

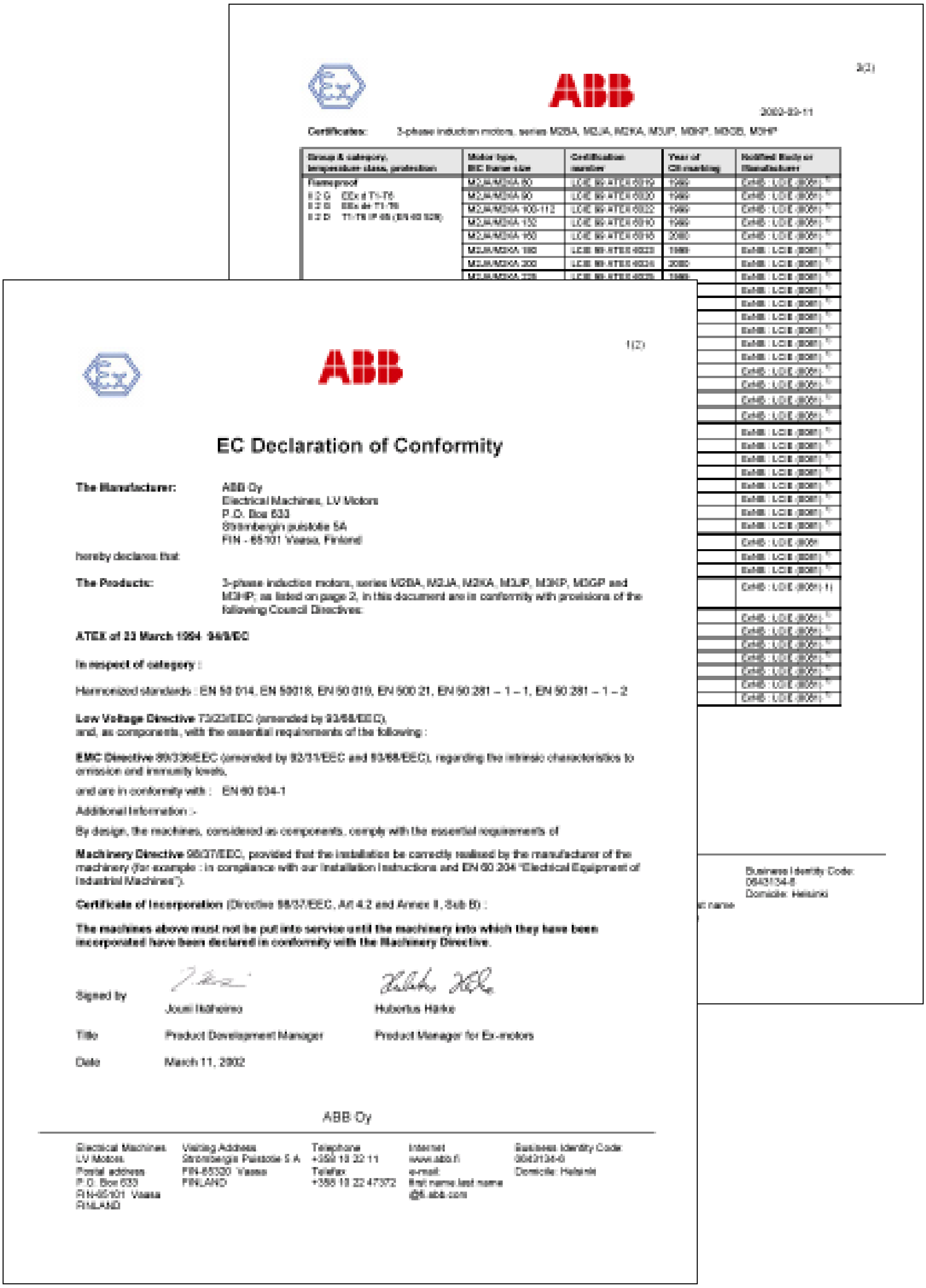
Le Directeur de l'organisme certificateur
Manager of the certification body
Jean-Pierre GOMEL
Président et directeur général

Timbre sec/dry seal

LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES
Société anonyme à Directoire et Conseil de surveillance au capital de 15 745 984 euros - RCS Nanterre B 408 363 174
33, avenue du Général Leclerc - BP n° 8 - F 92266 FONTENAY-AUX-ROSES CEDEX - Tél. : +33 1 40 95 60 60

Certificates

Example of a EC Declaration of Conformity



1(2)

ABB

EC Declaration of Conformity

The Manufacturer: ABB Oy
Electrical Machines, LV Motors
P.O. Box 633
Strömbergin puistotie 5A
FIN - 65101 Vaasa, Finland

hereby declares that

The Products: 3-phase induction motors, series M2BA, M2JA, M2KA, M3JP, M3KP, M3GP and M3HP; as listed on page 2, in this document are in conformity with provisions of the following Council Directives:

ATEX of 23 March 1994 94/9/EC

In respect of category :

Harmonized standards : EN 50 014, EN 50018, EN 50 019, EN 500 21, EN 50 281 – 1 – 1, EN 50 281 – 1 – 2

Low Voltage Directive 73/23/EEC (amended by 93/68/EEC),
and, as components, with the essential requirements of the following :

EMC Directive 89/336/EEC (amended by 92/31/EEC and 93/68/EEC), regarding the intrinsic characteristics to emission and immunity levels,

and are in conformity with : EN 60 034-1

Additional Information :-

By design, the machines, considered as components, comply with the essential requirements of

Machinery Directive 98/37/EEC, provided that the installation be correctly realised by the manufacturer of the machinery (for example : in compliance with our installation instructions and EN 60 204 "Electrical Equipment of Industrial Machines").

Certificate of Incorporation (Directive 98/37/EEC, Art 4.2 and Annex II, Sub B) :

The machines above must not be put into service until the machinery into which they have been incorporated have been declared in conformity with the Machinery Directive.

Signed by	Jouni Ikäheimo	Hubertus Härke
Title	Product Development Manager	Product Manager for Ex-motors
Date	March 11, 2002	

ABB Oy

Electrical Machines
LV Motors
Postal address
P.O. Box 633
FIN-65101 Vaasa
FINLAND

Visiting Address
Strömbergin Puistotie 5 A
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FINLAND

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+358 10 22 11
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Internet
www.abb.fi
e-mail:
first name.last name
@fi.abb.com

Business Identity Code
0643134-6
Domicile: Helsinki

Certificates

Example of certification of Dust ignition proof motors

LABORATORIO OFICIAL J.M. MADARIAGA

(1) CERTIFICADO DE EXAMEN CE DE TIPO

(2) Equipos y sistemas de protección destinados a ser utilizados en atmósferas potencialmente explosivas. Directiva 94/9/CE

(3) Número del Certificado de Examen CE de Tipo **LOM 99ATEX2024**

(4) Equipo o sistema de protección: Motores eléctricos para polvo serie MBT
Tipos MBT 200, MBT 225 y MBT 250

(5) Solicitante: ABB Motores, S.A.

(6) Dirección: Polígono Industrial de S.O.
08192-SANT QUIRZE DEL VALLÉS
BARCELONA (ESPAÑA)

(7) Este equipo o sistema de protección y sus variantes eventualmente aceptadas está descrito en el anexo del presente certificado y en los documentos descriptivos citados en dicho anexo

(8) El Laboratorio Oficial J.M. Madariaga (LOM), organismo notificado bajo la referencia nº 0163, conforme al artículo 9 de la Directiva 94/9/CE del Parlamento Europeo y del Consejo del 23 de Marzo de 1994, certifica que este equipo o sistema de protección es conforme a los Requisitos Esenciales de Seguridad y Salud relativos al diseño y construcción de equipos y sistemas destinados a ser utilizados en atmósferas potencialmente explosivas, indicados en el Anexo II de la Directiva.
La verificaciones y ensayos se recogen en el protocolo confidencial **LOM 99.083 XP**

(9) El cumplimiento con los Requisitos Esenciales de Seguridad y Salubridad está basado en la conformidad a los siguientes documentos:
– Normas **EN 50014:1997** **EN 50281-1-1:1998**

(10) Si el signo X aparece después del número de certificado indica que este material o sistema de protección está sometido a las condiciones especiales de utilización que figuran en el anexo del presente certificado.

(11) Este Certificado de Examen CE de Tipo se refiere únicamente al diseño y construcción del equipo o sistema de protección especificado, conforme a la Directiva 94/9/CE. Son aplicables exigencias suplementarias de esta Directiva para la fabricación y suministro de este equipo o sistema de protección.

(12) El marcado del equipo o sistema de protección deberá incluir, entre otras indicaciones relevantes, lo siguiente:
Ex II 2D T 125ºC

OFICIAL LABORATORIO J.M. MADARIAGA

Madrid, 11 de Junio de 1999

Carlos Fernández Ramón
DIRECTOR DEL LABORATORIO

Angel Vega Remesal
Responsable del área ATEX

(Este documento solo puede reproducirse integramente y sin cambio alguno) Pág. 1/3

ENAC INSPECCION Nº 23/EI/037/98

MINISTERIO DE INDUSTRIA Y ENERGÍA • MINISTERIO DE EDUCACIÓN Y CIENCIA
ENSAYOS E INVESTIGACIONES DE MATERIALES Y EQUIPOS PARA ATMÓSFERAS EXPLOSIVAS Y MINERÍA
(Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29 -)

Alenza, 2 - 28003-MADRID • ☎ (34) 91 4421366/ 91 3367009 • Fax.(34) 91 4419933 • ✉ lom@dse.upm.es

ABB High Voltage motor's product offer for hazardous areas

Flameproof motors

Type of protection: EEx d IIB/IIC T4, EEx de, IIB/IIC T4
Features: LV-11kV, 50/60 Hz, 2-18 poles, VSD applications, IP55, IC411, IC511, Horizontal or Vertical

Motor type	IEC frame size	Output kW
Ribs cooled	355 - 500	150 - 1250 kW
Tubes cooled	500 - 710	800 - 4500 kW

Pressurised motors

Type of protection: Ex p, EEx p, Ex pe, EEx pe; Temperature classes T1-T4, Gas groups A, B anc C
Features: 50/60 Hz, 2-24 poles, VSD applications, acc. to ATEX Directive and IEC standards

Motor type	IEC frame size	Output kW
Induction motors	315 - 1120	up to 18 MW (24000 HP)
Synchronous motors	710 - 1250	up to 55 MW (74000 HP)

Increased safety motors

Type of protection: Ex e, EEx e, Temperature classes T1-T3, Gas groups A, B and C
Features: 50/60 Hz, 2-24 poles, VSD applications, acc. to ATEX Directive and IEC Standards

Motor type	IEC frame size	Output kW
Induction motors	315 - 1120	up to 10 MW (13410 HP)

Non-sparking motors

Type of protection: Ex nA, EEx nA, T1-T4, Gas groups A,B and C
Features: 50/60 Hz, 2-24 poles, VSD applications, acc. to ATEX Directive and IEC Standards, CSA/UL certified

Motor type	IEC frame size	Output kW
Induction motors	315 - 1120	up to 18 MW (24000 HP)
Synchronous motors	500 - 1250	up to 55 MW (74000 HP)

Motors for North America (NEC and CEC)

Type of protection: Class I Division 2, Class I Zone 2, Class II Division 2, Class III; T1-T4
Features: 50/60 Hz, 2-24 poles, VSD applications, designed for North American markets, CSA/UL-certified

Motor type	IEC frame size	Output kW
Induction motors	315 - 1120	up to 18 MW (24000 HP)
Synchronous motors	710 - 1250	up to 55 MW (74000 HP)

More information for these motors can be found from web-pages:

www.abb.com/motors&drives

ABB Low Voltage Motors' total product offer

M2000 range

Motor type	IEC frame size	Output kW
Aluminium motors	56 - 132	0.055 - 7.5 kW
Cast iron motors	71 - 315	0.25 - 200 kW

M3000 range

Motor type	IEC frame size	Output kW
Aluminium motors	56 - 280	0.055 - 95 kW
Cast iron motors	71 - 400	0.25 - 710 kW
Steel motors	280 - 400	75 - 630 kW
Hazardous area motors	71 - 400	0.25 - 630 kW
Marine motors	56 - 400	0.06 - 630 kW
Open drip proof motors (IP 23)	250 - 400	75 - 800 kW
Brake motors	63 - 160	0.18 - 15 kW
	NEMA frame size	**Output HP**
NEMA motors	404 - 587	100 - 700 HP

Special types/alternatives

- high speed motors, over 3000 r/min
- motor adjusted with a holding brake
- wind turbine generators
- motors for roller table drives
- water cooled motors
- smoke venting design
- single-phase motors
- fan application motors
- slip-ring motors
- stator/rotor units

Catalogues and brochures for
these motors are available from:

ABB
Electrical Machines
BA Marketing communications
P.O.Box 633
FIN-65101 Vaasa
tel. +358 (0) 10 22 11
fax +358 (0) 10 22 43575
www.abb.com/motors&drives

Ordering information

Sample order

When placing an order, the motor type, size and product code must be specified. The product code of the motor is composed in accordance with the following examples.

A	B	C					D, E, F		G
M3JP	**160 M**	**3GJP**	**162**	**300**	**-**	**A**	**D**	**A**	**003 etc.**
		1-4	5-6	7	8-10	11	12	13	14

A **Motor type**
B **Motor size**
C **Product code**
D Mounting arrangement code
E Voltage and frequency code
F Generation code
G **Variant codes**

Description of the product code:

Positions 1 - 4
3GAA = Totally enclosed motor with aluminium frame
3GBA = Totally enclosed motor with cast iron frame
3GJP = Totally enclosed frameproof motor EE xd with cast iron frame
3GKP = Totally enclosed flameproof motor EEx de with cast iron frame

Positions 5 and 6
IEC-frame size

06 = 63	**10** = 100	**18** = 180	**28** = 280
07 = 71	**11** = 112	**20** = 200	**31** = 315
08 = 80	**13** = 132	**22** = 225	**35** = 355
09 = 90	**16** = 160	**25** = 250	**40** = 400

Position 7
Speed (pole pairs)

1 = 2 poles	**4** = 8 poles	**7** [3]12 poles
2 = 4 poles	**5** = 10 poles	**8** =Two-speed motors
3 = 6 poles	**6** = 12 poles	**9** = Multi-speed motors

Position 8-10
Running number series

Position 11 - (Dash)

Position 12
Mounting arrangement
A = Foot-mounted, top mounted terminal box
R = Foot-mounted, terminal box RHS seen from D-end
L = Foot-mounted, terminal box LHS seen from D-end
B = Flange-mounted, large flange with clearance holes
C = Flange-mounted, small flange with tapped holes
V = Flange-mounted, Special flange
H = Foot/flange-mounted, large flange with clearance holes
J = Foot/flange-mounted, small flange with tapped holes
S = Foot/flange-mounted, terminal box RHS seen from D-end
T = Foot/flange-mounted, terminal box LHS seen from N-end
F = Foot/flange-mounted, special flange

Position 13
Voltage/frequency code
See tables on the technical data pages.

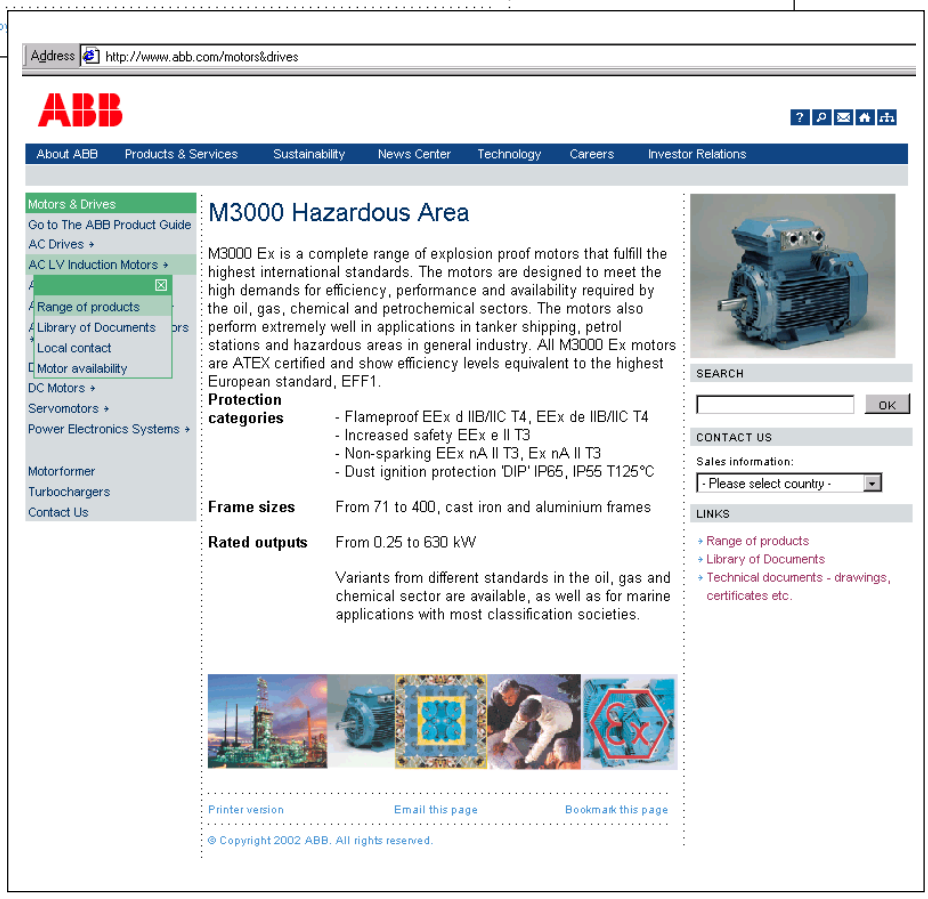
Position 14
Generation code
A, B, C...

Generation code is followed by variant codes according to the hazardous area, see below and on corresponding pages with variant codes:

094	Ex nA design acc. to IEC 79-15, Ex N acc. to BS 5000/16
097	EEx e design
407	Ex N design, fulfilling BS 5000/16, certif. provided
455	Ex N design, fulfilling BS 5000/16, without certif.
456	Ex nA design,fulfilling IEC 79-15,certif. provided
457	Ex nA design,fulfilling IEC 79-15,without certif.
480	EEx nA fulfilling EN 50021.
458	EEx e design, fulfilling EN 50014 and EN 50019
273	EEx e design, temperature class T3
274	EEx e design, temperature class T4
275	EEx e design, temperature class T5
276	EEx e design, temperature class T6
461	EEx d(e) design, Group IIC
462	EEx d(e) design, temperature class T5
463	EEx d(e) design, temperature class T6
452	DIP according to EN 50281-1, category 3D, IP55
453	DIP according to EN 50281-1, category 2D, IP65

Visit our web site

www.abb.com/motors&drives



Motors & Drives
AC LV Induction Motors
- Range of products
  - M3000 Range
    - Standard motors
    - Premium efficiency motors
    - Process motors
    - **Hazardous area motors**
    - Marine motors
    - Brake motors
    - Wind turbine generators
    - Roller table motors
    - Single phase motors
    - Fan application motors
    - Water-cooled motors
  - M2000 Range
- Library of documents
- Local contact
- Motor availability

Low Voltage Motors

Manufacturing sites (*) and some of the larger sales companies.

Australia
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http://online.abb.com/motors&drives

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