Low Voltage

Flameproof motors for explosive atmospheres

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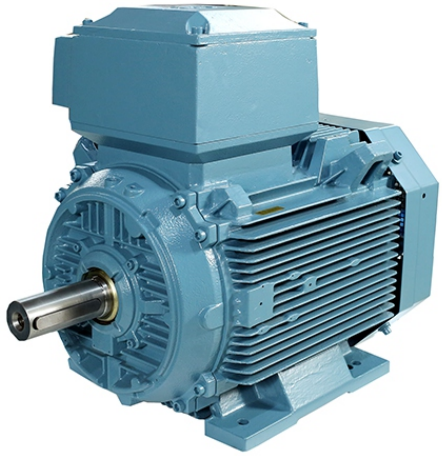
Low voltage flameproof motors for explosive atmospheres



Introduction

Electric Motors are used invariably across all the industries & applications. These motors when used in explosive atmospheres, it is of 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. In India, the applicable IS standards are harmonised with the IEC standards. The hazard may be due to an explosive atmosphere where there is a presence of mixture of gas, vapors or dusts with air that has the potential to ignite the atmosphere. Such areas are commonly found in segments like Oil & Gas, Chemical, Pharma, Food and Beverage, Mining, Textile and so on.

The motors intended to be operated in hazardous area are tested and certified by the regulatory authorities in line with IS/IEC standards. The hazardous area has been classified based on the presence of hazard, type and temperature classes of the hazard.

Hazardous area classifications & markings

Equipment protection levels (EPLs)

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

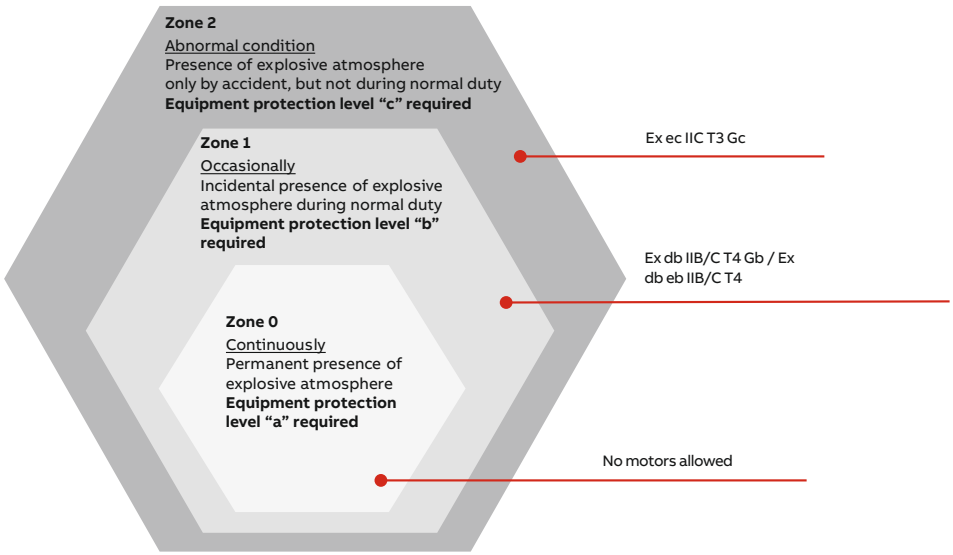
Equipment Protection level	Very High (a)	High (b)	Enhanced (b)
Explosive gas atmosphere	Ga	Gb	Gc
Explosive Dust atmosphere	Da	Db	Dc
Mine susceptible to firedamp	Ma	Mb	

Traditional relationship of EPLs to Zones	EPL	Ga	Gb	Gc	Da	Db	Dc
	Zone	0	1	2	20	21	22

New markings introduced

The latest revisions of the standards IS/IEC 60079-7 and IS/IEC 60079-1 have introduced some new markings for equipment suitable for locations where there is a potential risk of gas present.

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



Marking of temperatures, gas groups and explosive atmospheres

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

Temperature Class	Ignition temp.of gas/ vapor °C	Max. permissible temperature of equipment °C	Gas examples
T1	>450	450	Hydrogen
T2	>300<450	300	Ethanol
T3	>200<300	200	Hydrogen Sulfide
T4	>135<200	135	Diethyl ether
T5	>100<135	100	-
T6	>85<100	85	Carbon Disulfide

Gas subdivisions

IIA	~120 gases and vapors, e.g. butane / petroleum /propane
IIB	~30 gases and vapors, e.g. ethylene / dimethyl ether
IIC	limited number of gases and vapors, e.g. hydrogen H2 /acetylene C2H2 carbon disulfide CS2

Standards & Regulations

Motors for explosive atmospheres have to be officially approved by a recognized test organization, authorized to issue test certificates, to ensure compliance with standards for this type of equipment. ABB low voltage motors for explosive atmospheres are classified according to the categories, protection types and equipment protection type which are specified in the relevant standards.

IECEx

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

The IECEx System is a certification system which verifies compliance with IEC (International Electro technical Commission) standards relating to safety in explosive atmospheres.

It covers equipment, service facilities and personnel competencies and conformity mark licensing system. Created in September 1999, the System aims “to facilitate international trade in equipment and services for use in explosive atmospheres, while maintaining the required level of safety…” (source: IECEx website, www.iecex.com). It is a voluntary system which provides an internationally accepted means of proving that products and services are in compliance with IEC standards. The IECEx System comprises global certification programs for both equipment and service facilities. IECEx certification involves – in addition to product tests – assessment of quality control procedures and testing plans, audits of manufacturing plants, and routine on-going surveillance and inspections.

PESO

In India, these motors are required to follow the regulations set by PESO (Petroleum and Explosive Safety Organization).

The Petroleum and Explosives Safety Organization (PESO), formerly known as Department of Explosives, is functional since 05/09/1898 and has been serving the nation as a nodal agency for regulating safety of hazardous substances such as explosives, compressed gas and petroleum.

With an overall objective of ensuring safety and security of public and property from fire and explosion, the Organisation as a statutory authority is entrusted with the administration of Explosives Act, 1884, Petroleum Act, 1934; Inflammable Substances Act, 1952 and the following Rules framed under these Acts.

PESO's major work is to administer the responsibilities delegated under the Explosives Act 1884 and Petroleum Act 1934 and the Rules made thereunder related to manufacture, import, export, transport, possession, sale and use of Explosives, Petroleum products and Compressed gases.

Explosives Rules, 2008:

The major work under Explosives Rules, 2008 relates to grant of approval, licences for manufacture of explosives, authorization of explosives, storage of explosives, import/export of explosives, transport of explosives by road and packaging for explosives etc. prescribing safe procedures and methods for manufacture of various types of explosives including the tools, equipments and machineries. The Organisation also carries out investigation of accidents involving explosives and destruction of unserviceable/seized explosives in the interest of public safety and security.

The Organisation carries out inspection and audit of the new premises for verification /endorsement at the time of grant of licences/approvals and also periodic inspections of the licensed/approved premises.

Petroleum Rules, 2002:

Petroleum has been defined under the Act and Rules as liquid hydrocarbon or a mixture of liquid hydrocarbons and any inflammable mixture containing liquid hydrocarbons. The work relating to administration of these Rules covers approval of Refineries, Petrochemicals/Oil/Gas Processing Plants, transport of petroleum by water, land and pipeline, Flameproof and other safety equipments for use in areas laden with flammable gases and licensing of storage installations, Tank trucks for transportation by road, aircraft refueller and also issuance of Certificate of Gas Free in respect of Vessels/Ships carrying petroleum for dock entry or man entry or hot work.

The Organisation carries out inspection of these premises to ensure compliance of Rules and safety measures

- Providing operational and technical Advice and Assistance to the Central Government, States, Local Bodies, Law Enforcement Agencies, Industry, Trade and end users of these products.
- Uphold the commitment to transparency and efficiency.
- Develop alert, Innovative, and well trained work force to achieve our goals.
- Embrace learning and change in order to meet the challenges of the future
- Ensure public safety in the areas of manufacture, transport, storage, handling, etc. of Explosives, Petroleum, Carbide of Calcium, Inflammable substances and Compressed Gases.
- Advisory role in matters of safety to the government and semi-government bodies like Ports, Railways, Defence establishments & Ministry of Surface Transport, Environment & Forest, Petroleum Natural Gas, Pollution Control Authorities etc coming within the purview of Explosives Act 1884 and Petroleum Act 1934 and the rules framed thereunder.
- Framing National Standards concerning public safety in collaboration with BIS, OISD & other apex bodies and harmonizing Indian standards with international standards.
- Evaluation of new technologies finding applications in hazardous area for adoption in indigenous conditions within the purview of Explosives Act 1884 and Petroleum Act 1934 and the rules framed thereunder.
- Creating safety awareness amongst public.
- PESO is currently involved in regulation of over 2,56,000 premises all over India

(source: https://peso.gov.in)

What is Flameproof Motor?

Flameproof motors are designed to withstand the pressure caused by an internal explosion without incurring any damage and are also able to prevent flame propagation outside.

Flameproof Motors are with Equipment Protection Level “b” - which is not a source of ignition in normal operation including starting or during expected malfunctions.

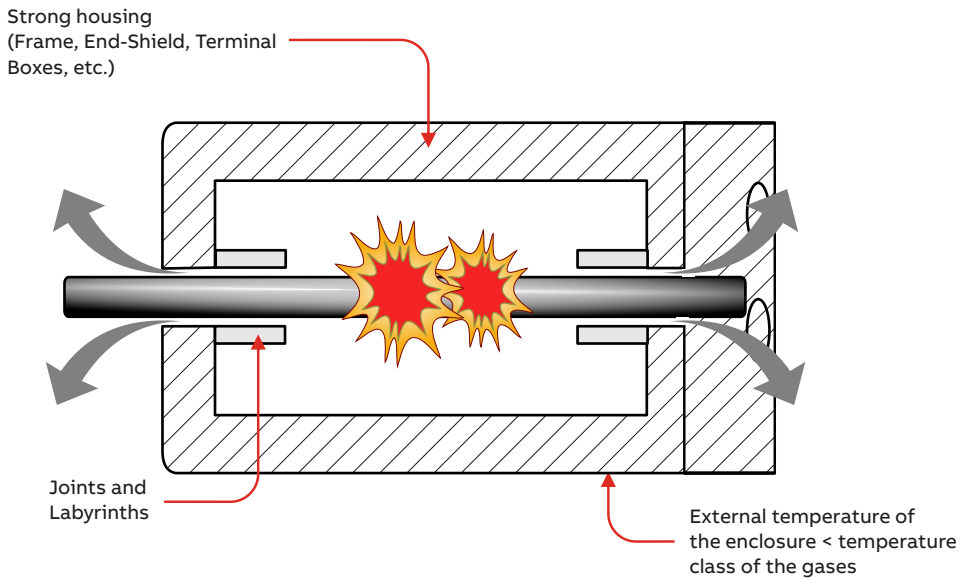
The main requirements of a flameproof motor are:

1. In case of an explosion inside the motor, the explosion is not transmitted outside the enclosure.
2. Hot gases cannot pass to the outside, or when occur, they have to be cooled enough to be at a temperature which is below the temperature class limit of the surrounding gases.
3. External accessories shall be always certified.

Flame path path as defined in standards IS/IEC 60079-1: 2014 is “place where the corresponding surfaces of two parts of an enclosure, or the conjunction of enclosures, come together and which prevents the transmission of an internal explosion to the explosive gas atmosphere surrounding the enclosure”.

The standards specify the minimum/ maximum values of the length of engagement, Gap, Number of threads in a threaded joint. However, better values ensure better protection & hence ensuring safety.

Flameproof motors require special enclosure to be able to withstand an internal explosion and prevent flames from propogating to the outside atmosphere. These enclosures need to undergo pressure test as per the standards. Various pressure levels specified in standards are 1.5 times, 2.0 times, 3.5 times and 4 times. Higher the pressure levels during the test, better is the safety provided by enclosure.



VFD operation of Flameproof Motors

Frequency converters provide significant benefits when used with motors for explosive atmospheres. The advantages include better process control through regulation of the motor speed, which lead to improve system efficiency ,reliablity and reduce size of system equipments which ulimately support low carbon footprints.

Certain criteia must be taken into account to ensure the safety of the frequency converter and motor combination, as well as the maximum usability of the application.

1. **Thermal dimesioning and protection**

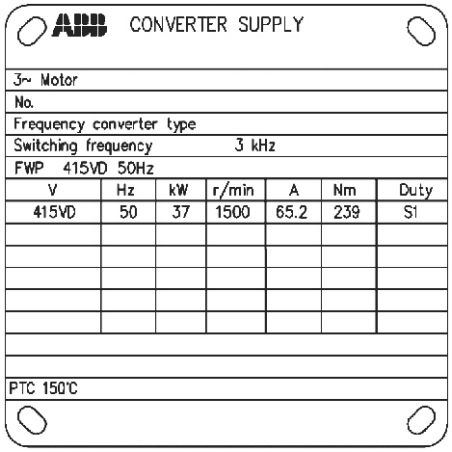
   The IS and IEC standards (IS/IEC 60079-1, IEC 60079-1) set the requirements for ensuring surface temperature class is not exceeded. Allowed methods include combined type test for the duty with the converter or direct surface temperature protection with PTC. Tripping temperature of detectors must be selected and certified to protect the surface temperature class of the motor. Use of motors with a temperature class requiring surface temperature than indicated in certificate must be dimensioned case by case basis, a combined type test of converter and motor is usually required to verify safe operation.

2. **Operating speed**

   When a motor is used with frequency converter, its actual operating speed may deviate considerably from its nominal speed (i.e the speed stamped on the rating plate). When operating at higher speeds, ensure that the highest permissible rotational speed of the motor, and critical speed of the equipment as a whole is not exceeded. Speed declaration can be mentioned either on separate plate or the regular plate required for variable speed drives.

3. **Rating plates**

   The IS and IEC standards require that the motors which are used in variable speed operation are provided with a rating plate that show the parameters for which the motor is intended. Please refer to the rating plate picture below



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

4. **Winding insulation**

   The standard IEC 60034-18-41, "Rotating Electrical Machines: Electrical insulation systems without partial discharge (Type I) used in rotating electrical machines powered by voltage converters - Qualification and quality control tests" defines stress categories (IVIC classes) i.e IVIC A, B, C & D. Standards recommend that the manufacturer can assign an impulse voltage insulation class (IVIC) for the insulation system. The IEC 60034-1, IEC 60034-25, further states that in case of a converter capable or converter duty electrical machine with Type 1 insulation (random/ wire wound) and an IVIC assigned, the insulation system should be suitable for IVIC C for phase to phase & IVIC B for phase to ground, or as otherwise agreed to between the user and the manufacturer.

   ABB Motor Insulation system qualified according tostandard IEC 60034-18-41 Impulse Voltage Insulation Class C (IVIC C).

Allowed voltage peaks

Maximum allowed line-to-line and line-to-earth voltage peaks at the motor terminals for ABB insulation system are presented in Table 2,which suits for stingent requirements

Allowed voltage peaks at motor terminals

Insulation System	ULL (Upeak)	ULE (Upeak)	Du/Dt (Upeak)
Standard	1600 V	1300 V	6 kV/us
Special	2300 V	1800 V	9 kV/us

IEC60034-18-41: Standard and Special insulation systems are qualified according to standard IEC 60034-18-41 Impulse Voltage Insulation Class C (IVIC C).

ABB Flameproof motors are designed & tested for IVIC class C category. To ensure the safe operations of motors in the hazarodus industries, For IECEx supply: IP55 is offered by default and IP66 is offered on request. For T3 class, PTC temperature of 150 Deg C is used and for T4 class, PTC used is 120 Deg C.

No combined testing is required with any drive for temperature classes upto T3. Please contact nearest sales office for T4 and above temperature classes, motor selection, loadability requirements.

ABB Flameproof Motors

Our flameproof motors are designed to meet and exceed industry expectations. With the Global presence of over decades, the motors have been widely recognized for their durability and performance across diverse industrial applications in the world while saving energy everyday. From design to final product, we adhere to rigorous quality procedures that meet international standards and quality systems. Our manufacturing facilities proudly hold certifications in ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018, ensuring that only the highest standards of quality are maintained.

Safety

Stringent Gap : Our motors are engineered with highly controlled tolerances to ensure optimal safety in hazardous environments. The stringent gap between components provides additional protection against sparks and increases safety standards for explosive atmospheres.

Compliance to Quality Standards: Each motor is built to meet and exceed global quality and safety standards, ensuring reliability and robust performance across diverse industrial applications. Our com-pliance reflects a commitment to safety, durability, and premium engineering.

PTC for VSD Operation: Equipped with PTC (Positive Temperature Coefficient) thermistors, our flame-proof motors are optimized for Variable Speed Drive (VSD) applications. This feature monitors motor temperature, providing added safety and efficiency during variable load conditions.

Reliability

IP66 Rating: The IP66 protection ensures that our motors are completely dust-tight and highly resistant to water ingress. This rating allows them to perform reliably even in the harshest environments, safe-guarding the motor from dust and water damage.

EN8D Shaft: Our motors feature an EN8D-grade steel shaft, known for its superior tensile strength, resilience, and wear resistance, delivering longevity even in heavy-duty operations.

C3 Epoxy Painting: A robust C3 epoxy coating protects the motor against corrosion, even in industrial environments with high moisture or chemical exposure. This layer enhances the motor's lifespan and maintains its appearance and performance.

Energy Efficiency

75% Load Efficiency: Our flameproof motors are specifically designed to achieve peak efficiency at 75% load, which is critical for industrial operations where motors often run below full load. This targeted efficiency level means the motor consumes less power relative to the work output, opti-mizing energy usage when operating at three-fourths capacity, a common load range in many real-world applications.This high efficiency at partial load results in lower energy costs, reducing operational expenses over the motor's lifespan. By maximizing performance in the 75% load range, our flameproof motors deliver consistent energy savings without sacrificing power, making them ideal for operations focused on sus-tainability and cost-efficiency. This energy optimization not only benefits the bottom line but also aligns with environmentally responsible practices by reducing greenhouse gas emissions and overall power demand.

Rating Plates in Flameproof Motors

Rating plates of the Flameproof Motors should contain the following details in addition to the details on a standard nameplate as per IS/ IEC standards:

Hazardous area marking as per IS/ IEC standards

Range of ambient that the motor is suitable for

ISI marking for PESO certified motors

Test report number as provided by the authorised test labs

PESO certificate number along with date of certification

IECEx certificate number in case of IECEx certified motors

Additionally, the VSD driven motors also have a separate nameplate indicating the load details, speed range, frequency converter type & Switching frequency. Thermistor values are also mentioned on the nameplate as part of safety requirements.

Applicable only for PESO certified motors. For IECEx motors, IP66 is offered on request"

Technical data

IE2

M2JAP Flameproof Motor

Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 ˚C (Temp. rise class B, 70 ˚C), S1 Duty
IE2 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

2 Pole, 3000 rev/min. IE2 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.75	M2JAP 80MB 2	3GJA081320-CIN	2900	77.4	75.4	70.3	0.68	2.30	6.5	2.5	3.7	4.5	0.0008	45
1.10	M2JAP 80MC 2	3GJA081330-CIN	2880	81.8	81.6	79.1	0.77	2.60	7.7	3.6	3.7	3.7	0.0010	47
1.50	M2JAP 90SLB 2	3GJA091020-CIN	2905	83.4	83.6	81.7	0.86	3.10	7.5	4.9	2.9	3.0	0.0025	55
2.20	M2JAP 90SLC 2	3GJA091030-CIN	2878	83.2	83.9	82.3	0.87	4.30	6.5	7.3	2.6	3.1	0.0028	56
3.70	M2JAP 100LC 2	3GJA101530-CIN	2920	85.5	85.1	83.0	0.87	6.70	9.0	12.2	3.2	3.6	0.0073	75
5.50	M2JAP 132SMB 2	3GJA131220-CIN	2875	87.0	87.2	85.8	0.86	10.60	7.5	18.1	2.7	3.4	0.0128	102
7.50	M2JAP 132SMC 2	3GJA131230-CIN	2890	88.1	88.3	87.0	0.87	13.60	7.5	24.7	2.6	3.4	0.0136	104
9.30	M2JAP 160MLJ 2	3GJA161490-CIN	2931	88.9	89.0	87.9	0.86	17.30	7.1	30.3	2.8	3.4	0.0430	213
11.00	M2JAP 160MLA 2	3GJA161410-CIN	2936	89.4	89.6	88.4	0.82	20.90	7.1	35.8	2.8	3.4	0.0430	213
15.00	M2JAP 160MLB 2	3GJA161420-CIN	2934	90.6	90.6	89.5	0.86	27.20	7.0	48.8	3.1	3.6	0.0520	222
18.50	M2JAP 160MLC 2	3GJA161430-CIN	2939	91.7	92.1	91.5	0.89	31.90	7.5	60.2	2.9	3.6	0.0620	233
22.00	M2JAP 180MLA 2	3GJA181410-CIN	2950	92.0	92.4	92.0	0.85	39.50	7.4	71.3	2.7	3.5	0.0890	265
30.00	M2JAP 200MLA 2	3GJA201410-CIN	2945	92.0	92.2	91.4	0.87	52.30	7.5	97.1	2.6	3.5	0.1500	310
37.00	M2JAP 200MLC 2	3GJA201430-CIN	2958	93.6	93.9	93.4	0.86	64.00	7.0	119.0	2.5	3.5	0.1900	340
45.00	M2JAP 225SMB 2	3GJA221220-CIN	2965	92.9	92.4	90.7	0.86	78.10	7.2	145.0	2.6	3.2	0.2600	400
55.00*	M2JAP 250SMA 2	3GJA251210-CIN	2970	94.2	94.2	93.2	0.86	94.00	7.0	177.0	2.2	3.2	0.4900	460
75.00	M2JAP 280SMA 2	3GJA281210-CIN	2981	93.8	93.3	91.8	0.86	130.00	7.0	240.0	2.2	3.1	0.8000	625
90.00	M2JAP 280SMB 2	3GJA281220-CIN	2979	94.1	94.0	93.0	0.87	154.00	7.0	289.0	2.2	3.0	0.9000	665
110.00	M2JAP 315SMA 2	3GJA311210-CIN	2978	94.3	94.2	93.1	0.88	185.00	7.0	353.0	2.2	3.1	1.2000	980
132.00	M2JAP 315SMB 2	3GJA311220-CIN	2985	94.6	94.3	93.2	0.87	223.00	7.0	422.0	2.4	3.1	1.4000	940
160.00	M2JAP 315SMC 2	3GJA311230-CIN	2984	94.8	94.6	93.8	0.87	270.00	7.0	512.0	2.5	3.1	1.7000	1025
200.00	M2JAP 315MLA 2	3GJA311410-CIN	2985	95.0	95.0	94.5	0.87	337.00	7.0	640.0	2.7	3.1	2.1000	1190
250.00	M2JAP 355SMA 2	3GJA351210-CIN	2984	95.0	94.7	93.7	0.87	421.00	7.0	800.0	2.3	3.3	3.0000	1600
315.00	M2JAP 355SMB 2	3GJA351220-CIN	2983	95.0	94.8	93.9	0.87	531.00	7.0	1009.0	2.3	3.1	3.4000	1680
355.00*	M2JAP 355SMC 2	3GJA351230-CIN	2985	95.0	94.9	94.2	0.86	605.00	7.0	1136.0	2.3	3.1	3.6000	1940
110.00(1)	M2JAP 280SMC 2	3GJA281230-CIN	2981	94.3	94.1	93.3	0.85	191.00	8.5	352.0	2.6	3.3	1.1000	725
250.00*(1)	M2JAP 315LKA 2	3GJA311810-CIN	2984	95.0	95.0	94.0	0.87	421.00	8.1	800.0	3.0	3.2	2.7000	1543
315.00*(1)	M2JAP 315LKC 2	3GJA311830-CIN	2984	95.0	95.0	94.3	0.87	531.00	9.5	1008.0	3.4	3.4	3.3000	1630
400.00*	M2JAP 355MLA 2	3GJA351410-CIN	2984	95.0	94.9	94.2	0.86	681.00	7.0	1280.0	2.4	3.0	4.1000	2190
450.00*	M2JAP 355MLB 2	3GJA351420-CIN	2986	95.0	94.9	94.3	0.88	749.00	7.0	1439.0	2.3	3.5	4.3000	2270
500.00*	M2JAP 355LKA 2	3GJA351810-CIN	2984	95.0	94.9	94.4	0.89	823.00	7.0	1600.0	2.2	4.0	4.8000	2510

Technical data

IE2

M2JAP Flameproof Motor
Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 ˚C (Temp. rise class B, 70 ˚C), S1 Duty
IE2 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

4 Pole, 1500 rev/min. IE2 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.55	M2JAP 80MA 4	3GJA082310-CIN	1445	77.1	75.9	70.9	0.66	1.60	6.4	3.6	3.6	3.7	0.0024	49
0.75	M2JAP 80MD 4	3GJA082340-CIN	1435	79.6	79.0	75.7	0.72	2.00	6.0	5.0	3.6	3.7	0.0029	40
1.10	M2JAP 90SLB 4	3GJA092020-CIN	1430	81.4	81.7	79.2	0.78	2.60	6.0	7.2	3.0	3.3	0.0039	55
1.50	M2JAP 90SLD 4	3GJA092040-CIN	1432	82.8	83.0	80.7	0.78	3.30	6.0	10.0	3.2	3.5	0.0044	58
2.20	M2JAP 100LC 4	3GJA102530-CIN	1450	84.3	83.7	80.3	0.75	4.90	7.8	14.5	3.0	4.0	0.0083	69
3.70	M2JAP 112MB 4	3GJA112320-CIN	1445	86.3	87.1	86.6	0.74	7.60	7.0	24.3	2.7	3.4	0.0188	81
5.50	M2JAP 132SMB 4	3GJA132220-CIN	1460	88.3	88.3	86.6	0.76	11.60	7.1	35.9	2.5	3.4	0.0296	107
7.50	M2JAP 132SMC 4	3GJA132230-CIN	1460	89.0	89.3	88.0	0.78	15.20	7.0	49.3	2.2	3.4	0.0327	110
9.30	M2JAP 160MLJ 4	3GJA162490-CIN	1460	89.3	89.8	89.3	0.83	17.40	7.5	60.8	2.7	3.4	0.0880	232
11.00	M2JAP 160MLC 4	3GJA162430-CIN	1465	90.6	90.7	89.6	0.80	21.30	7.5	71.4	3.2	3.9	0.0960	232
15.00	M2JAP 160MLE 4	3GJA162450-CIN	1470	91.5	91.8	91.1	0.82	27.80	8.2	97.5	3.2	3.5	0.1300	255
18.50	M2JAP 180MLA 4	3GJA182410-CIN	1476	91.8	92.1	91.3	0.79	36.00	7.0	120.0	2.7	3.0	0.1900	277
22.00	M2JAP 180MLB 4	3GJA182420-CIN	1476	92.2	92.3	91.4	0.79	41.70	7.5	142.0	3.0	3.3	0.2300	296
30.00	M2JAP 200MLB 4	3GJA202420-CIN	1473	92.5	93.1	92.9	0.83	54.80	7.0	194.0	2.6	2.8	0.3400	340
37.00	M2JAP 225SMB 4	3GJA222220-CIN	1482	93.6	93.5	92.4	0.82	67.20	7.0	238.0	3.1	3.2	0.4200	390
45.00	M2JAP 225SMC 4	3GJA222230-CIN	1479	93.8	94.1	93.6	0.83	80.50	7.0	291.0	2.8	2.9	0.4900	425
55.00	M2JAP 250SMA 4	3GJA252210-CIN	1480	94.5	94.8	94.4	0.80	101.00	6.0	355.0	2.7	2.9	0.7200	415
75.00	M2JAP 280SMA 4	3GJA282210-CIN	1486	94.0	93.9	93.1	0.83	134.00	7.0	482.0	2.6	2.9	1.2500	625
90.00	M2JAP 280SMB 4	3GJA282220-CIN	1486	94.2	94.3	93.7	0.84	159.00	7.0	578.0	2.6	2.9	1.5000	765
110.00	M2JAP 315SMA 4	3GJA312210-CIN	1490	94.5	94.4	93.4	0.85	191.00	7.0	705.0	2.5	2.9	2.3000	900
132.00	M2JAP 315SMB 4	3GJA312220-CIN	1487	94.7	94.7	94.1	0.84	231.00	7.0	848.0	2.4	2.9	2.7000	960
160.00	M2JAP 315SMC 4	3GJA312230-CIN	1489	94.9	94.8	94.1	0.83	283.00	7.0	1026.0	2.5	3.0	2.9000	1000
200.00	M2JAP 315MLA 4	3GJA312410-CIN	1490	95.1	95.2	94.7	0.84	348.00	7.0	1282.0	2.6	3.0	3.5000	1160
250.00	M2JAP 355SMA 4	3GJA352210-CIN	1489	95.1	95.3	94.8	0.84	436.00	7.0	1603.0	2.4	2.8	5.9000	1610
315.00	M2JAP 355SMB 4	3GJA352220-CIN	1492	95.1	95.1	94.5	0.84	549.00	7.0	2016.0	2.4	2.9	6.9000	1780
355.00*	M2JAP 355SMC 4	3GJA352230-CIN	1491	95.1	95.1	94.5	0.85	611.00	7.0	2274.0	2.5	2.9	7.2000	2010
110.00*(1)	M2JAP 280SMC 4	3GJA282230-CIN	1487	94.5	94.6	94.0	0.85	191.00	8.1	707.0	3.2	3.2	1.9000	725
250.00*(1)	M2JAP 315LKA 4	3GJA312810-CIN	1488	95.1	95.1	94.5	0.83	440.00	7.9	1604.0	2.7	3.1	4.4000	1524
280.00*(1)	M2JAP 315LKB 4	3GJA312820-CIN	1488	95.1	95.2	94.6	0.86	476.00	8.1	1797.0	2.8	3.3	5.0000	1620
315.00*(1)	M2JAP 315LKC 4	3GJA312830-CIN	1489	95.1	95.1	94.4	0.85	542.00	8.3	2020.0	2.8	3.4	5.5000	1600
400.00*	M2JAP 355MLA 4	3GJA352410-CIN	1491	95.1	95.1	94.5	0.83	705.00	7.0	2562.0	2.4	2.7	8.4000	2330
450.00*	M2JAP 355MLB 4	3GJA352420-CIN	1491	95.1	95.1	94.6	0.83	793.00	7.0	2882.0	2.4	3.0	8.4000	2330
500.00*	M2JAP 355LKA 4	3GJA352810-CIN	1492	95.1	95.0	94.4	0.84	871.00	7.0	3199.0	2.1	3.2	10.0000	2690

Technical data

IE2

M2JAP Flameproof Motor

Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 ˚C (Temp. rise class B, 70 ˚C), S1 Duty
IE2 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

6 Pole, 1000 rev/min. IE2 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.25	M2JAP 80MJ 6	3GJA083390-CIN	941	61.6	58.9	50.9	0.60	0.79	4.3	2.5	2.3	2.5	0.0019	44
0.37	M2JAP 80MA 6	3GJA083310-CIN	930	67.6	67.4	62.8	0.65	1.11	4.0	3.8	2.5	2.7	0.0019	44
0.55	M2JAP 80MB 6	3GJA083320-CIN	925	73.1	73.9	70.0	0.69	1.70	3.9	5.6	2.3	2.4	0.0024	46
0.75	M2JAP 90SLC 6	3GJA093030-CIN	942	75.9	75.2	69.8	0.62	2.30	4.0	7.5	2.9	3.2	0.0039	56
1.10	M2JAP 90SLE 6	3GJA093050-CIN	940	78.2	78.1	74.5	0.64	2.90	3.9	11.1	2.1	2.5	0.0060	59
1.50	M2JAP 100L 6	3GJA103500-CIN	955	81.4	81.5	79.3	0.68	4.00	4.4	15.0	2.0	2.9	0.0087	67
2.20	M2JAP 112MC 6	3GJA113330-CIN	960	84.2	85.5	84.9	0.70	5.10	5.5	22.1	2.0	2.8	0.0196	82
3.70	M2JAP 132SMJ 6	3GJA133290-CIN	965	84.3	84.3	81.0	0.69	8.80	5.0	36.8	1.6	2.2	0.0299	106
5.50	M2JAP 132SMF 6	3GJA133260-CIN	965	86.0	85.9	83.9	0.74	12.50	5.8	54.0	1.7	2.5	0.0840	106
7.50	M2JAP 160MLA 6	3GJA163410-CIN	967	87.8	88.3	87.6	0.77	15.40	6.0	74.0	1.9	3.2	0.1260	253
9.30	M2JAP 160MLJ 6	3GJA163490-CIN	978	88.1	88.4	87.2	0.72	20.60	7.4	90.8	2.6	3.5	0.1160	253
11.00	M2JAP 160MLB 6	3GJA163420-CIN	970	88.7	89.2	88.4	0.76	22.60	7.4	108.0	2.6	3.3	0.1260	253
15.00	M2JAP 180MLB 6	3GJA183420-CIN	970	89.7	90.1	89.2	0.79	29.90	7.2	147.0	2.0	3.3	0.2500	304
18.50	M2JAP 200MLA 6	3GJA203410-CIN	984	91.0	91.2	90.2	0.80	35.60	6.5	180.0	2.6	3.0	0.3700	300
22.00	M2JAP 200MLB 6	3GJA203420-CIN	984	91.6	91.8	91.0	0.79	42.50	6.5	213.0	2.9	3.3	0.4300	320
30.00	M2JAP 225SMB 6	3GJA223220-CIN	986	92.2	92.4	91.6	0.78	58.00	6.0	291.0	2.5	3.2	0.6400	385
37.00	M2JAP 250SMA 6	3GJA253210-CIN	986	92.2	92.5	91.8	0.79	70.50	6.0	357.0	2.6	3.0	1.1600	455
45.00	M2JAP 280SMA 6	3GJA283210-CIN	991	92.7	92.7	91.7	0.81	84.00	7.0	433.0	2.5	2.7	1.8500	705
55.00	M2JAP 280SMB 6	3GJA283220-CIN	991	93.1	93.2	92.4	0.82	100.00	7.0	530.0	2.6	2.8	2.2000	645
75.00	M2JAP 315SMA 6	3GJA313210-CIN	993	93.7	93.6	92.5	0.79	141.00	7.0	721.0	2.5	3.0	3.2000	830
90.00	M2JAP 315SMB 6	3GJA313220-CIN	993	94.0	94.0	93.3	0.81	165.00	7.0	866.0	2.5	3.0	4.1000	930
110.00	M2JAP 315SMC 6	3GJA313230-CIN	992	94.3	94.4	93.7	0.81	201.00	7.0	1059.0	2.7	3.1	4.9000	1100
132.00	M2JAP 315MLA 6	3GJA313410-CIN	993	94.6	94.5	93.7	0.81	240.00	7.0	1269.0	2.7	3.1	5.8000	1150
160.00	M2JAP 355SMA 6	3GJA353210-CIN	993	94.8	94.9	94.2	0.81	290.00	7.0	1539.0	2.1	2.7	7.9000	1520
200.00	M2JAP 355SMB 6	3GJA353220-CIN	992	95.0	95.1	94.6	0.81	362.00	7.0	1925.0	2.6	2.8	9.7000	1680
250.00*	M2JAP 355SMC 6	3GJA353230-CIN	994	95.0	94.9	94.2	0.80	458.00	7.0	2402.0	2.6	3.0	11.3000	1820
315.00	M2JAP 355MLB 6	3GJA353420-CIN	993	95.0	95.0	94.3	0.83	556.00	7.0	3029.0	2.6	2.8	13.5000	2180
355.00	M2JAP 355LKA 6	3GJA353810-CIN	994	95.0	94.9	94.1	0.79	658.00	7.0	3410.0	2.8	3.0	15.5000	2690
75.00*(1)	M2JAP 280SMC 6	3GJA283230-CIN	991	93.7	93.9	93.3	0.82	137.00	7.9	723.0	3.0	2.9	2.8000	725
160.00(1)	M2JAP 315LKA 6	3GJA313810-CIN	993	94.8	94.8	94.1	0.82	286.00	8.0	1539.0	2.8	3.0	7.3000	1512
180.00*(1)	M2JAP 315LKB 6	3GJA313820-CIN	993	94.9	94.9	94.2	0.82	323.00	8.0	1732.0	2.9	3.1	8.3000	1608
200.00*(1)	M2JAP 315LKC 6	3GJA313830-CIN	991	95.0	95.2	94.8	0.84	351.00	7.3	1927.0	2.7	2.8	9.2000	1687

Technical data

IE2

M2JAP Flameproof Motor
Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 ˚C (Temp. rise class B, 70 ˚C), S1 Duty
IE2 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

8 Pole, 750 rev/min. IE2 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.18 *	M2JAP 80MA 8	3GJA084310-CIN	685	45.9	44.5	36.8	0.57	0.72	3.0	2.5	2.2	2.6	0.0019	45
0.25 *	M2JAP 80MB 8	3GJA084320-CIN	690	50.6	50.4	44.6	0.59	0.97	3.1	3.5	2.2	2.4	0.0024	46
0.37 *	M2JAP 90SLB 8	3GJA094020-CIN	695	56.1	53.9	46.1	0.56	1.50	3.0	4.9	2.0	2.4	0.0044	55
0.55 *	M2JAP 90SLC 8	3GJA094030-CIN	680	61.7	62.6	58.0	0.57	2.10	2.7	7.7	1.6	2.0	0.0049	56
0.75 *	M2JAP 100LA 8	3GJA104510-CIN	710	72.5	70.9	65.7	0.56	2.70	3.7	10.0	2.0	2.8	0.0072	64
1.10*	M2JAP 100LB 8	3GJA104520-CIN	705	74.9	74.5	70.8	0.61	3.50	3.5	14.8	2.0	2.4	0.0087	67
1.50*	M2JAP 112MC 8	3GJA114330-CIN	713	79.6	80.7	79.7	0.63	4.10	3.8	20.1	1.5	2.2	0.0198	81
2.20*	M2JAP 132SMA 8	3GJA134210-CIN	720	77.6	76.5	73.0	0.59	6.90	4.8	29.1	1.7	3.1	0.0299	106
3.70*	M2JAP 160MLJ 8	3GJA164490-CIN	723	81.4	81.4	79.5	0.67	9.80	6.0	48.8	1.7	2.7	0.1330	251
5.50*	M2JAP 160MLB 8	3GJA164420-CIN	725	86.3	86.5	85.0	0.68	13.60	6.1	72.5	2.1	3.4	0.1330	251
7.50*	M2JAP 160MLC 8	3GJA164430-CIN	721	85.3	85.3	83.5	0.63	19.80	6.0	99.4	1.8	2.6	0.1330	251
9.30*	M2JAP 180MLJ 8	3GJA184490-CIN	725	86.3	86.3	83.6	0.62	21.60	5.9	123.0	2.1	2.9	0.2260	298
11.00*	M2JAP 180MLB 8	3GJA184420-CIN	725	88.4	88.4	86.9	0.68	25.80	6.1	145.0	2.2	2.8	0.2450	298
15.00*	M2JAP 200MLA 8	3GJA204410-CIN	735	90.0	89.4	88.3	0.77	30.60	7.2	195.0	2.4	3.5	0.4500	315
18.50*	M2JAP 225SMA 8	3GJA224210-CIN	735	90.0	90.1	88.7	0.72	40.20	6.0	240.0	1.9	3.3	0.6100	370
22.00*	M2JAP 225SMB 8	3GJA224220-CIN	733	90.7	91.0	90.1	0.70	48.50	6.0	287.0	1.9	2.3	0.6800	350
30.00*	M2JAP 250SMA 8	3GJA254210-CIN	736	89.8	89.9	88.9	0.72	64.30	6.0	389.0	1.9	2.1	1.2500	420
37.00	M2JAP 280SMA 8	3GJA284210-CIN	743	90.3	90.0	88.7	0.76	75.00	6.0	476.0	1.8	3.1	1.8500	605
45.00	M2JAP 280SMB 8	3GJA284220-CIN	743	90.7	90.3	89.1	0.76	91.00	6.0	578.0	1.8	3.1	2.2000	645
55.00	M2JAP 315SMA 8	3GJA314210-CIN	743	91.0	91.0	90.1	0.79	106.00	6.0	707.0	1.7	2.8	3.2000	830
75.00	M2JAP 315SMB 8	3GJA314220-CIN	743	91.6	91.6	90.8	0.80	142.00	6.0	964.0	1.7	2.8	4.1000	930
90.00	M2JAP 315SMC 8	3GJA314230-CIN	742	91.9	91.9	91.1	0.81	168.00	6.0	1158.0	1.8	2.8	4.9000	1000
110.00	M2JAP 315MLA 8	3GJA314410-CIN	742	92.3	92.4	91.9	0.81	205.00	6.0	1416.0	1.8	2.8	5.8000	1150
132.00	M2JAP 355SMA 8	3GJA354210-CIN	745	92.6	92.5	91.6	0.78	254.00	6.0	1692.0	1.7	2.8	7.9000	1520
160.00	M2JAP 355SMB 8	3GJA354220-CIN	745	93.0	93.0	92.1	0.78	307.00	6.0	2052.0	1.8	2.8	9.7000	1680
200.00	M2JAP 355SMC 8	3GJA354230-CIN	744	93.5	93.5	92.8	0.78	382.00	6.0	2568.0	1.8	2.9	11.3000	1930
250.00*	M2JAP 355MLB 8	3GJA354420-CIN	743	93.5	93.5	92.9	0.78	477.00	6.0	3211.0	1.7	3.0	13.5000	2370
55.00*(1)	M2JAP 280SMC 8	3GJA284230-CIN	742	91.0	91.1	90.4	0.78	108.00	8.3	708.0	2.0	3.3	2.8500	725
132.00(1)	M2JAP 315LKA 8	3GJA314810-CIN	745	92.6	92.8	92.2	0.77	258.00	7.7	1692.0	1.9	2.8	7.3000	1410
150.00*(1)	M2JAP 315LKB 8	3GJA314820-CIN	745	92.9	93.0	92.4	0.77	292.00	8.3	1922.0	2.1	2.9	8.3000	1520
160.00*(1)	M2JAP 315LKC 8	3GJA314830-CIN	745	93.0	93.2	92.8	0.77	311.00	8.2	2051.0	2.1	3.0	9.2000	1600

* B Rise upto 45 Deg C ambient
(1) - High output rating
2 pole - Unidirection Fan - Direction of rotation must be stated when ordering, see variant codes 044 and 045.

For IECEx supply, use VC 068 - Light alloy metal fan must be stated when ordering
For IECEx supply: IP55 is offered by default and IP66 is offered on request

I_n = Nominal or rated current
T_n = Nominal or rated torque in Nm
T_{max} = Maximum torque

I_s = Starting current
T_s = Starting torque

Note:
1. All performance figures are subject to IEC/IS tolerances.
2. Max. load GD^2 has been calculated assuming load torque is proportional to square of speed.

Technical data

IE3

M2JAP Flameproof Motor

Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 ˚C (Temp. rise class B, 70 ˚C), S1 Duty
IE3 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

2 Pole, 3000 rev/min. IE3 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.75	M2JAP 80MD 2	3GJA081340-DIN	2872	80.7	81.6	80.3	0.86	1.58	7.6	2.5	3.3	4.0	0.0012	49
1.10	M2JAP 80MG 2	3GJA081370-DIN	2840	82.7	83.2	81.9	0.84	2.40	6.0	3.7	2.8	3.8	0.0012	49
1.50	M2JAP 90SLB 2	3GJA091020-DIN	2897	84.2	85.8	85.2	0.89	2.80	8.0	4.9	3.2	3.5	0.0031	60
2.20	M2JAP 90LC 2	3GJA091530-DIN	2908	88.0	88.4	87.3	0.89	3.90	8.0	7.3	3.0	3.5	0.0044	63
3.70	M2JAP 100LKB 2	3GJA101820-DIN	2900	87.8	87.6	87.0	0.89	6.60	8.5	12.2	2.8	2.9	0.0086	75
5.50	M2JAP 132SMF 2	3GJA131260-DIN	2909	90.8	91.4	90.8	0.90	9.30	7.8	18.2	2.6	3.6	0.0218	124
7.50	M2JAP 132SMG 2	3GJA131270-DIN	2914	91.6	92.3	92.1	0.90	12.90	8.0	24.7	2.8	3.7	0.0218	124
9.30	M2JAP 160MLJ 2	3GJA161490-DIN	2946	90.7	91.0	90.2	0.90	15.90	7.7	30.1	2.7	3.7	0.0513	213
11.00	M2JAP 160MLA 2	3GJA161410-DIN	2946	91.2	91.8	91.3	0.89	19.20	7.7	35.5	2.8	3.9	0.0570	225
15.00	M2JAP 160MLB 2	3GJA161420-DIN	2950	91.9	92.0	91.4	0.86	26.20	8.7	48.5	3.1	4.1	0.0630	232
18.50	M2JAP 160MLC 2	3GJA161430-DIN	2952	92.4	92.9	92.3	0.89	31.60	8.7	59.7	3.6	4.2	0.0760	246
22.00	M2JAP 180MLA 2	3GJA181410-DIN	2959	92.7	93.1	92.5	0.89	37.00	7.5	71.0	2.8	3.5	0.1100	282
30.00	M2JAP 200MLA 2	3GJA201410-DIN	2961	93.3	93.6	93.3	0.87	51.10	8.1	96.8	2.8	3.3	0.1820	332
37.00	M2JAP 200MLB 2	3GJA201420-DIN	2963	93.7	94.1	93.6	0.88	62.70	7.5	120.0	2.5	3.4	0.2220	359
45.00	M2JAP 225SMA 2	3GJA221210-DIN	2970	94.0	93.9	92.9	0.85	78.30	7.7	145.0	2.7	3.0	0.2960	405
55.00	M2JAP 250SMA 2	3GJA251210-DIN	2970	94.3	94.1	93.5	0.88	92.60	6.0	177.0	2.5	3.0	0.4260	470
75.00	M2JAP 280SMB 2	3GJA281220-DIN	2981	94.7	94.2	92.7	0.85	130.00	7.7	240.0	2.3	3.0	0.8000	766
90.00	M2JAP 280SMC 2	3GJA281230-DIN	2979	95.0	94.9	93.9	0.88	150.00	7.7	289.0	2.2	2.9	0.9000	836
110.00	M2JAP 315SMB 2	3GJA311220-DIN	2978	95.2	95.1	94.2	0.88	183.00	7.7	353.0	1.8	2.6	1.2000	1041
132.00	M2JAP 315SMC 2	3GJA311230-DIN	2985	95.4	95.1	94.0	0.87	220.00	7.7	422.0	1.8	2.8	1.5000	1116
160.00	M2JAP 315SMD 2	3GJA311240-DIN	2984	95.6	95.5	94.8	0.88	265.00	7.7	512.0	2.4	3.0	1.7000	116
200.00	M2JAP 315MLA 2	3GJA311410-DIN	2985	95.8	95.8	95.3	0.87	334.00	7.7	640.0	2.7	3.3	1.9000	1286
250.00	M2JAP 355SMA 2	3GJA351210-DIN	2984	95.8	95.5	94.5	0.87	417.00	7.7	800.0	2.3	3.5	3.0000	1781
315.00	M2JAP 355SMB 2	3GJA351220-DIN	2983	95.8	95.6	94.7	0.89	514.00	7.7	1009.0	2.3	3.2	3.4000	1878
355.00*	M2JAP 355SMC 2	3GJA351230-DIN	2985	95.8	95.7	95.0	0.88	586.00	7.7	1136.0	2.3	3.2	3.6000	1953
110.00(1)	M2JAP 280SMD 2	3GJA281240-DIN	2981	95.2	95.1	94.2	0.87	185.00	7.7	352.0	2.6	3.3	1.1000	836
250.00*(1)	M2JAP 315LKB 2	3GJA311820-DIN	2985	95.8	95.7	95.1	0.89	408.00	7.7	800.0	2.7	3.5	1.4000	1620
315.00*(1)	M2JAP 315LKC 2	3GJA311830-DIN	2984	95.8	95.8	95.1	0.88	520.00	7.7	1008.0	2.8	3.2	1.5000	1723
400.00*	M2JAP 355MLB 2	3GJA351420-DIN	2984	95.8	95.7	95.0	0.87	668.00	7.7	1280.0	2.7	3.6	2.6000	2190
450.00*	M2JAP 355MLC 2	3GJA351430-DIN	2986	95.8	95.7	95.1	0.89	734.00	7.7	1439.0	3.4	3.4	3.3000	2270
500.00*	M2JAP 355LKA 2	3GJA351810-DIN	2984	95.8	95.7	95.2	0.90	807.00	7.0	1600.0	2.2	4.0	4.8000	2510

Technical data

IE3

M2JAP Flameproof Motor

Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 °C (Temp. rise class B, 70 °C), S1 Duty
IE3 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

4 Pole, 1500 rev/min. IE3 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.55	M2JAP 80MLD 4	3GJA082440-DIN	1444	83.3	84.1	83.0	0.79	1.30	6.0	3.6	2.9	3.5	0.0028	49
0.75	M2JAP 80MLG 4	3GJA082470-DIN	1445	82.5	82.5	79.9	0.77	1.72	6.0	4.9	2.8	3.4	0.0033	50
1.10	M2JAP 90SLC 4	3GJA092030-DIN	1440	84.1	83.9	81.7	0.78	2.30	7.6	7.3	3.9	4.2	0.0067	61
1.50	M2JAP 90LD 4	3GJA092540-DIN	1446	85.3	86.0	85.0	0.76	3.30	6.0	10.0	3.6	4.0	0.0072	62
2.20	M2JAP 100LKA 4	3GJA102810-DIN	1455	86.7	86.9	85.5	0.84	4.20	8.0	14.4	3.5	4.3	0.0146	79
3.70	M2JAP 112MF 4	3GJA112360-DIN	1450	88.4	88.7	87.8	0.76	8.00	7.5	24.2	2.8	3.3	0.0188	81
5.50	M2JAP 132SMF 4	3GJA132260-DIN	1462	89.6	89.9	88.8	0.82	10.90	7.3	35.8	2.1	3.4	0.0401	119
7.50	M2JAP 132SMG 4	3GJA132270-DIN	1460	90.4	90.9	90.2	0.81	14.80	6.0	49.0	2.2	3.3	0.0401	119
9.30	M2JAP 160MLJ 4	3GJA162490-DIN	1470	91.0	90.6	89.1	0.81	18.10	8.2	60.4	2.7	3.4	0.0992	240
11.00	M2JAP 160MLA 4	3GJA162410-DIN	1479	91.4	91.6	90.7	0.79	21.60	8.2	71.2	2.9	3.6	0.1100	240
15.00	M2JAP 160MLB 4	3GJA162420-DIN	1478	92.1	92.1	91.1	0.81	28.50	8.8	96.9	3.3	3.5	0.1350	259
18.50	M2JAP 180MLA 4	3GJA182410-DIN	1482	92.6	93.1	92.6	0.81	34.80	7.5	119.0	2.8	3.0	0.2190	291
22.00	M2JAP 180MLB 4	3GJA182420-DIN	1482	93.0	93.6	93.4	0.80	41.30	8.0	142.0	3.0	3.3	0.2170	296
30.00	M2JAP 200MLA 4	3GJA202410-DIN	1485	93.6	93.8	93.1	0.83	54.00	7.5	193.0	2.9	3.2	0.3850	360
37.00	M2JAP 225SMA 4	3GJA222210-DIN	1483	93.9	93.9	93.4	0.81	67.70	6.0	238.0	2.4	3.3	0.4270	394
45.00	M2JAP 225SMB 4	3GJA222220-DIN	1483	94.2	94.3	93.8	0.82	81.00	6.5	290.0	3.2	3.3	0.5250	431
55.00	M2JAP 250SMA 4	3GJA252210-DIN	1484	94.6	94.5	93.7	0.82	98.60	6.5	354.0	2.8	3.0	0.6940	442
75.00	M2JAP 280SMB 4	3GJA282220-DIN	1486	95.0	95.0	93.0	0.85	129.00	7.7	482.0	2.5	3.0	1.1700	766
90.00	M2JAP 280SMC 4	3GJA282230-DIN	1486	95.2	95.2	93.2	0.86	153.00	7.7	578.0	2.7	3.1	1.4500	827
110.00	M2JAP 315SMB 4	3GJA312220-DIN	1490	95.4	95.4	94.4	0.85	189.00	7.7	705.0	2.2	3.2	2.4300	991
132.00	M2JAP 315SMC 4	3GJA312230-DIN	1486	95.6	95.6	94.5	0.86	223.00	7.7	848.0	2.3	3.1	2.9000	1093
160.00	M2JAP 315SMD 4	3GJA312240-DIN	1487	95.8	96.0	95.6	0.85	273.00	7.4	1027.0	2.3	3.2	3.2000	1149
200.00	M2JAP 315MLB 4	3GJA312420-DIN	1490	96.0	96.1	95.6	0.85	341.00	7.7	1282.0	2.6	3.2	3.9000	1308
250.00	M2JAP 355SMA 4	3GJA352210-DIN	1492	96.0	95.9	95.2	0.84	431.00	7.7	1600.0	2.3	3.1	5.7000	1794
315.00	M2JAP 355SMB 4	3GJA352220-DIN	1492	96.0	96.0	95.4	0.84	543.00	8.0	2016.0	2.7	3.6	6.2500	1950
355.00*	M2JAP 355SMC 4	3GJA352230-DIN	1491	96.0	96.0	95.4	0.86	599.00	7.6	2274.0	2.6	3.5	6.5400	1998
110.00(1)	M2JAP 280SMD 4	3GJA282240-DIN	1487	95.4	95.5	95.0	0.84	191.00	7.7	706.0	2.9	3.2	1.9500	852
250.00(1)	M2JAP 315LKC 4	3GJA312830-DIN	1490	96.0	96.0	95.6	0.84	431.00	7.7	1602.0	2.7	3.4	4.4000	1550
280.00*(1)	M2JAP 315LKD 4	3GJA312840-DIN	1489	96.0	96.2	95.8	0.84	483.00	7.7	1795.0	2.9	3.3	5.0000	1646
315.00(1)	M2JAP 315LKE 4	3GJA312850-DIN	1491	96.0	96.0	95.5	0.84	543.00	7.7	2018.0	3.2	3.5	5.5000	1727
400.00*	M2JAP 355MLB 4	3GJA352420-DIN	1491	96.0	96.0	95.4	0.84	690.00	7.0	2562.0	2.4	2.7	8.4000	2330
450.00*	M2JAP 355MLC 4	3GJA352430-DIN	1491	96.0	96.0	95.5	0.84	776.00	7.0	2882.0	2.4	3.0	8.4000	2330
500.00	M2JAP 355LKA 4	3GJA352810-DIN	1492	96.0	95.9	95.3	0.84	863.00	7.0	3199.0	2.1	3.2	10.0000	2690

Technical data

IE3

M2JAP Flameproof Motor

Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 °C (Temp. rise class B, 70 °C), S1 Duty
IE3 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

6 Pole, 1000 rev/min. IE3 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
0.25	M2JAP 80MA 6	3GJA083310-DIN	941	72.6	70.7	65.0	0.60	0.79	2.6	2.5	1.7	2.1	0.0019	44
0.37	M2JAP 80MD 6	3GJA083340-DIN	935	74.4	74.7	71.6	0.68	1.10	4.7	3.8	2.8	3.0	0.0028	47
0.55	M2JAP 80MLG 6	3GJA083470-DIN	941	77.2	76.7	73.4	0.68	1.58	4.6	5.6	2.3	2.8	0.0044	51
0.75	M2JAP 90SLD 6	3GJA093040-DIN	945	78.9	79.8	78.2	0.73	2.00	4.7	7.6	2.0	2.4	0.0056	58
1.10	M2JAP 90LF 6	3GJA093560-DIN	940	81.0	82.4	81.8	0.73	2.70	5.0	11.1	2.3	2.5	0.0068	61
1.50	M2JAP 100LE 6	3GJA103550-DIN	963	82.5	82.7	80.8	0.65	4.00	5.7	14.9	2.6	3.2	0.0120	74
2.20	M2JAP 112MJ 6	3GJA113390-DIN	964	84.3	84.2	82.0	0.66	5.30	6.0	21.8	2.3	3.6	0.0196	82
3.70	M2JAP 132SMJ 6	3GJA133290-DIN	975	86.5	86.7	86.0	0.68	8.80	6.0	36.2	1.9	2.7	0.0416	106
5.50	M2JAP 132SMH 6	3GJA133280-DIN	968	88.0	88.6	88.0	0.63	13.50	5.2	54.1	2.0	2.9	0.0654	118
7.50	M2JAP 160MLA 6	3GJA163410-DIN	976	89.1	89.7	89.4	0.76	15.40	6.0	73.1	2.0	3.0	0.0890	225
9.30	M2JAP 160MLJ 6	3GJA163490-DIN	970	89.8	90.1	89.3	0.77	19.00	7.1	92.0	2.1	3.0	0.1280	259
11.00	M2JAP 160MLB 6	3GJA163420-DIN	977	90.3	91.0	90.6	0.75	23.00	6.9	107.0	1.8	3.4	0.1380	259
15.00	M2JAP 180MLA 6	3GJA183410-DIN	980	91.2	91.7	91.1	0.74	31.00	5.5	146.0	1.7	2.9	0.2120	288
18.50	M2JAP 200MLA 6	3GJA203410-DIN	990	91.7	91.8	90.9	0.79	35.40	7.5	179.0	2.8	3.0	0.4960	340
22.00	M2JAP 200MLB 6	3GJA203420-DIN	990	92.2	92.2	91.0	0.78	42.50	7.5	212.0	2.9	3.5	0.5850	367
30.00	M2JAP 225SMA 6	3GJA223210-DIN	989	92.9	92.6	91.0	0.76	59.00	6.0	290.0	2.9	3.2	0.7240	419
37.00	M2JAP 250SMA 6	3GJA253210-DIN	990	93.3	93.6	93.2	0.79	69.80	6.0	357.0	2.7	2.8	1.3000	503
45.00	M2JAP 280SMB 6	3GJA283220-DIN	991	93.7	93.7	91.7	0.82	82.00	7.7	433.0	2.9	3.2	1.8700	777
55.00	M2JAP 280SMC 6	3GJA283230-DIN	991	94.1	94.1	92.1	0.83	98.00	7.7	530.0	3.0	3.2	2.5700	817
75.00	M2JAP 315SMB 6	3GJA313220-DIN	995	94.6	94.6	93.8	0.84	131.00	7.7	720.0	1.9	2.8	4.1000	990
90.00	M2JAP 315SMC 6	3GJA313230-DIN	993	94.9	94.9	92.9	0.82	161.00	7.7	866.0	2.2	3.2	4.6000	1089
110.00	M2JAP 315SMD 6	3GJA313240-DIN	992	95.1	95.2	94.5	0.83	194.00	7.7	1059.0	2.3	3.1	4.9000	1123
132.00	M2JAP 315MLB 6	3GJA313420-DIN	993	95.4	95.3	94.5	0.81	238.00	7.7	1269.0	2.4	3.2	6.3000	1288
160.00	M2JAP 355SMA 6	3GJA353210-DIN	993	95.6	95.6	93.6	0.83	281.00	7.7	1539.0	2.7	2.8	7.9000	1573
200.00	M2JAP 355SMB 6	3GJA353220-DIN	992	95.8	95.8	93.8	0.84	346.00	7.7	1925.0	2.8	2.7	9.7000	1720
250.00*	M2JAP 355SMC 6	3GJA353230-DIN	994	95.8	95.7	94.9	0.80	454.00	7.7	2401.0	2.8	3.2	11.3000	1921
315.00	M2JAP 355MLB 6	3GJA353420-DIN	993	95.8	95.8	95.1	0.82	558.00	7.7	3029.0	2.7	3.3	13.5000	2345
355.00	M2JAP 355LKB 6	3GJA353820-DIN	994	95.8	95.7	94.9	0.80	644.00	7.7	3410.0	3.0	3.1	15.5000	2770
75.00*(1)	M2JAP 280SMD 6	3GJA283240-DIN	992	94.6	94.7	94.1	0.82	135.00	7.7	722.0	2.8	3.2	3.0000	837
160.00(1)	M2JAP 315LKA 6	3GJA313810-DIN	995	95.6	95.5	94.9	0.79	295.00	7.7	1535.0	2.6	2.9	6.8000	1456
180.00(1)	M2JAP 315LKB 6	3GJA313820-DIN	995	95.7	95.6	95.0	0.80	327.00	7.7	1727.0	3.0	4.2	8.3000	1550
200.00(1)	M2JAP 315LKC 6	3GJA313830-DIN	994	95.8	95.9	95.4	0.82	354.00	7.7	1920.0	2.3	3.0	9.2000	1690

Technical data

IE3

M2JAP Flameproof Motor

Ex db IIB/IIC T4 Gb

IP66 - IC 411 - Insulation class F, Ambient 50 ˚C (Temp. rise class B, 70 ˚C), S1 Duty
IE3 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014,
415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

8 Pole, 750 rev/min. IE3 Ex db cast iron motors

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor 100%	Current		Torque (Nm)			Moment of inertia J=1/4GD ^{2} kgm ^{2}	Weight kg
				FL 100%	FL 75%	FL 50%		I_n, A	I_s/I_n %	T_n	T_s/T_n	Tmax/ Tn		
37.00	M2JAP 280SMA 8	3GJA284210-DIN	743	91.8	91.5	90.1	0.76	74.00	7.0	476.0	1.7	3.0	1.8500	605
45.00	M2JAP 280SMB 8	3GJA284220-DIN	743	92.2	91.8	90.5	0.76	89.00	7.0	578.0	1.8	3.1	2.2000	645
55.00	M2JAP 315SMA 8	3GJA314210-DIN	743	92.5	92.5	91.6	0.79	105.00	7.0	707.0	1.6	2.7	3.2000	830
75.00	M2JAP 315SMB 8	3GJA314220-DIN	743	93.1	93.1	92.3	0.80	140.00	7.0	964.0	1.7	2.7	4.1000	930
90.00	M2JAP 315SMC 8	3GJA314230-DIN	741	93.4	93.4	92.6	0.78	172.00	7.0	1158.0	1.8	2.7	4.9000	1000
110.00	M2JAP 315MLA 8	3GJA314410-DIN	742	93.7	93.8	93.3	0.81	202.00	7.0	1416.0	1.8	2.7	5.8000	1150
132.00	M2JAP 355SMA 8	3GJA354210-DIN	745	94.0	93.9	93.0	0.78	250.00	8.0	1692.0	1.6	3.3	7.4700	1520
160.00	M2JAP 355SMB 8	3GJA354220-DIN	745	94.3	94.2	93.4	0.78	303.00	7.9	2052.0	1.6	3.3	9.1300	1680
200.00	M2JAP 355SMC 8	3GJA354230-DIN	744	94.6	94.6	93.9	0.78	377.00	7.5	2568.0	1.6	3.1	10.6000	1930
250.00*	M2JAP 355MLB 8	3GJA354420-DIN	743	94.6	94.6	94.0	0.78	471.00	7.0	3211.0	1.6	2.7	13.5000	2370
55.00*(1)	M2JAP 280SMC 8	3GJA284230-DIN	742	92.5	92.6	91.9	0.78	106.00	7.0	708.0	2.5	3.8	2.8500	720
132.00(1)	M2JAP 315LKA 8	3GJA314810-DIN	745	94.0	94.2	93.6	0.77	254.00	7.0	1692.0	1.8	2.7	6.8000	1470
150.00*(1)	M2JAP 315LKB 8	3GJA314820-DIN	745	94.2	94.3	93.7	0.77	288.00	7.0	1922.0	1.9	2.8	7.7000	1560
160.00*(1)	M2JAP 315LKC 8	3GJA314830-DIN	745	94.3	94.5	94.1	0.77	307.00	8.2	2051.0	1.9	2.8	9.1000	1610

* B Rise upto 45 Deg C ambient
(1) - High output rating
2 pole - Unidirection Fan - Direction of rotation must be stated when ordering, see variant codes 044 and 045.

For IECEx supply, use VC 068 - Light alloy metal fan must be stated when ordering
For IECEx supply: IP55 is offered by default and IP66 is offered on request

I_n = Nominal or rated current
T_n = Nominal or rated torque in Nm
T_{max} = Maximum torque

I_s = Starting current
T_s = Starting torque

Note:
1. All performance figures are subject to IEC/IS tolerances.
2. Max. load GD^2 has been calculated assuming load torque is proportional to square of speed.

Mechanical design
Bearings

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

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

dispatch to prevent damage to bearings during transport. A warning label is attached to motors when transport locking is used.

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

Standard and alternative designs

		Standard design		Alternative designs		
		Deep groove ball bearings		Roller bearings (037)	Roller bearings (037)	Angular contact ball bearings (058)
Motor size	Number of poles	D-end	N-end	D-end, gas group IIB	D-end, gas group IIC	D-end
80	2 - 8	6205-2Z/C3	6204-2Z/C3	NA	NA	NA
90	2 - 8	6205-2Z/C3	6204-2Z/C3	NA	NA	NA
100	2 - 8	6206-2Z/C3	6205-2Z/C3	NA	NA	NA
112	2 - 8	206-2Z/C3	6206-2Z/C3	NA	NA	NA
132	2 - 8	6208-2Z/C3	6208-2Z/C3	NA	NA	NA
160	2 - 8	6309-2Z/C3	6309-2Z/C3	NU 309 ECP/C3	NU 309 ECP/C3	NA
180	2 - 8	6310-2Z/C3	6310-2Z/C3	NU 310 ECP/C3	NU 310 ECP/C3	NA
200	2	6312-2Z/C3	6310-2Z/C3	NU 312 ECP/C3	NU 312 ECP/C3	NA
	4 - 8	6312-2Z/C3	6310-2Z/C3	NU 312 ECP/C3	NU 312 ECP/C3	NA
225	2	6313-2Z/C3	6312-2Z/C3	NU 313 ECP/C3	NU 313 ECP/C3	NA
	4-8	6313-2Z/C3	6312-2Z/C3	NU 313 ECP/C3	NU 313 ECP/C3	NA
250	2	6315-2Z/C3	6313-2Z/C3	NU 315 ECP/C3	NA	NA
	4-8	6315-2Z/C3	6313-2Z/C3	NU 315 ECP/C3	NA	NA
280	2	6316/C3	6316/C3	[1]	NA	7316 B
	4 - 8	6316/C3	6316/C3	NU 316 ECP/C3	NA	7316 B
315	2	6316/C3	6316/C3	[1]	NA	7316 B
	4 - 8	6319/C3	6316/C3	NU 319 ECP/C3	NA	7319 B
355	2	6316M/C3	6316M/C3	NA	NA	7316 B
	4 - 8	6322/C3	6316/C3	NA	NA	7322 B

[1] On request

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

Transport locking
Motors with roller bearings or an angular-contact ball bearing are fitted with a transport lock before

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

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

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

Lubrication
On delivery, motors in frame size 280 and above are pre-lubricated with high-quality grease. Before first start-up, see instructions for re-lubrication and recommended grease in the installation, operation, maintenance and safety manual for low voltage motors for explosive atmospheres delivered together with the motor, or see the lubrication plate on the motor.

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

Motors with re-lubrication nipples
In frame sizes 280-355, the bearing system is provided with valve discs to ease lubrication. Motors are lubricated while running. The grease outlet opening has closing valves at both ends. These should be opened before greasing and closed 1-2 hours after re-greasing. This ensures that the construction is tight and bearings remain dust- and dirt-free.

A grease-collection method can be used optionally.

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

Lubrication intervals in duty hours for ball bearings

Frame size	Amount of grease g/bearing	Amount of grease g/N-end	Speed 3600 r/min	Speed 3000 r/min	Speed 1800 r/min	Speed 1500 r/min	Speed 1000 r/min	Speed 500-900 r/min
Ball bearings								
Lubrication intervals in duty hours								
280	35	35	1900	3200	-	-	-	-
280	40	40	-	-	7800	9600	13900	15000
315	35	35	1900	3200	-	-	-	-
315	55	40	-	-	5900	7600	11800	12900
355	35	35	1900	3200	-	-	-	-
355	70	40	-	-	4000	5600	9600	10 700

Lubrication intervals in duty hours for roller bearings

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

Mechanical design
Radial forces

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

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

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

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

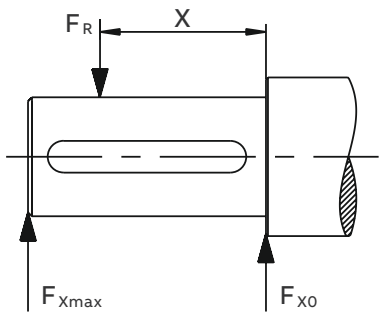
These calculated values further assume mounting position IM B3 (foot-mounted), with force directed sideways. In some cases, the strength of the shaft affects permissible forces.

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

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

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

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



Permissible radial forces

Motor size	No. of poles	Length of shaft extension E (mm)	Basic design with deep groove ball bearings L_{10h} = 40,000h				Roller bearing L_{10h} = 40,000h			
			Mounting arrangement IM B3				Mounting arrangement IM B3			
			Gas group IIB		Gas group IIC		Gas group IIB		Gas group IIC	
			F_{X0}(N)	F_{Xmax}(N)	F_{X0}(N)	F_{Xmax}(N)	F_{X0}(N)	F_{Xmax}(N)	F_{X0}(N)	F_{Xmax}(N)
80	2	40	638	557	638	557	NA		NA	
	4	40	804	702	804	702	NA		NA	
	6	40	920	804	920	804	NA		NA	
	8	40	1013	884	1013	884	NA		NA	
90	2	50	642	546	642	546	NA		NA	
	4	50	809	690	809	690	NA		NA	
	6	50	926	790	926	690	NA		NA	
	8	50	1019	870	1019	870	NA		NA	
100	2	60	886	751	886	751	NA		NA	
	4	60	1117	946	1117	751	NA		NA	
	6	60	1279	1083	1279	1083	NA		NA	
	8	60	1325	1122	1325	1122	NA		NA	

Permissible radial forces

Motor size	No. of poles	Length of shaft extension E (mm)	Basic design with deep groove ball bearings L_{10h} = 40,000h				Roller bearings L_{10h} = 40,000h			
			Mounting arrangement IM B3				Mounting arrangement IM B3			
			Gas group IIB		Gas group IIC		Gas group IIB		Gas group IIC	
			F_{X0}(N)	F_{Xmax}(N)	F_{X0}(N)	F_{Xmax}(N)	F_{X0}(N)	F_{Xmax}(N)	F_{X0}(N)	F_{Xmax}(N)
112	2	60	884	747	884	747	NA		NA	
	4	60	1114	941	1114	941	NA		NA	
	6	60	1276	1078	1276	1078	NA		NA	
	8	60	1321	1116	1321	1116	NA		NA	
132	2	80	1337	680	1337	680	NA		NA	
	4	80	1685	740	1685	740	NA		NA	
	6	80	1930	750	1930	750	NA		NA	
	8	80	1999	750	1999	750	NA		NA	
160 ML	2	110	2530	2120	2530	2120	6400	1800	6400	1800
	4	110	3180	2670	3180	2670	7600	1800	7600	1800
	6	110	3650	3040	3650	3040	7600	1800	7600	1800
	8	110	4020	3040	4020	3040	7600	1800	7600	1800
180 ML	2	110	2900	2440	2900	2440	6970	2700	6970	2700
	4	110	3660	3080	3660	3080	8500	2700	8500	2700
	6	110	4190	3520	4190	3520	8500	2700	8500	2700
	8	110	4620	3880	4620	3880	8500	2700	8500	2700
200 ML	2	110	3830	3150	3830	3150	9510	7000	9510	4200
	4	110	4820	3980	4820	3980	11710	7000	11710	4200
	6	110	5520	4550	5520	4550	13230	7000	13230	4200
	8	110	6080	5000	6080	5000	14420	7000	14420	4200
225 SM	2	110	4350	3660	4350	3660	11650	7000	9300	3000
	4	140	5490	2800	5490	2800	14340	7200	9300	2200
	6	140	6280	2800	6280	2800	16190	7200	9300	2200
	8	140	6920	2800	6920	2800	17300	7200	9300	2200
250 SM	2	140	5390	4350	5390	4350	15420	6700	NA	
	4	140	6790	5480	6790	5480	18980	9200	NA	
	6	140	7760	6270	3000	2800	21000	9200	NA	
	8	140	8550	6900	3000	2800	21000	9200	NA	
280 SM	2	140	5835	4900	[1]		16500	6000	NA	
	4	140	7360	6110	[1]		20100	9200	NA	
	6	140	8425	6980	[1]		22690	9200	NA	
	8	140	9165	7700	[1]		24740	9200	NA	
315 SM	2	140	5815	4960	[1]		16540	6000	NA	
	4 1	70	9025	7470	[1]		26590	9600	NA	
	6	170	10310	8530	[1]		30030	10160	NA	
	8	170	11370	9410	[1]		32740	10105	NA	
315 ML	2	140	5855	5080	[1]		16705	6205	NA	
	4	170	8980	7590	[1]		26550	13705	NA	
	6	170	10255	8665	[1]		29970	13710	NA	
	8	170	11335	9385	[1]		32730	9945	NA	
315 LK	2	140	5860	5195	[1]		16885	6080	NA	
	4	170	9185	7945	[1]		27225	13475	NA	
	6	170	10475	9060	[1]		30735	13500	NA	
355 SM	2	140	5790	5085	[1]		NA		NA	
	4	210	11930	9890	[1]		NA		NA	
	6	210	11930	9890	[1]		NA		NA	
	8	210	11930	9890	[1]		NA		NA	
355 ML	2	140	5770	5120	[1]		NA		NA	
	4	210	11980	10090	[1]		NA		NA	
	6	210	11980	10090	[1]		NA		NA	
	8	210	11980	10090	[1]		NA		NA	
355 LK	2	140	5500	5000	[1]		NA		NA	
	4	210	12050	10450	[1]		NA		NA	
	6	210	12050	10450	[1]		NA		NA	
	8	210	12050	10450	[1]		NA		NA	

[1] Only allowed for direct coupling duty

Mechanical design
Axial forces

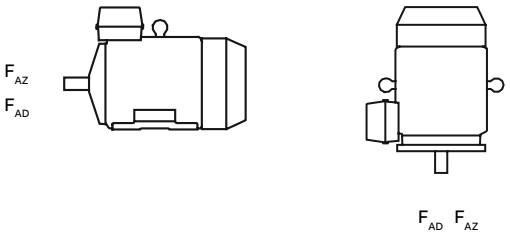
— 01 Mounting arrangement IM B3.

02 Mounting arrangement IM V1.

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

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

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



— 01 — 02

Permissible axial forces

Motor size	Poles	Length of shaft extension E (mm)	Mounting arrangement IM B3 Deep groove ball bearings L_{10} = 40,000 h		Mounting arrangement IM V1 Deep groove ball bearings L_{10} = 40,000 h	
			F_{AD}(N)	F_{AZ}(N)	F_{AD}(N)	F_{AZ}(N)
80	2	40	678	290	711	269
	4	40	835	447	888	411
	6	40	954	566	998	541
	8	40	1049	661	1093	636
90	2	50	676	286	727	252
	4	50	834	443	907	402
	6	50	950	559	1028	515
	8	50	1046	656	1114	614
100	2	60	969	339	1053	283
	4	60	1186	556	1301	489
	6	60	1346	716	1447	649
	8	60	1477	847	1576	788
112	2	60	962	330	1099	236
	4	60	1179	547	1331	445
	6	60	1337	705	1493	602
	8		1467	835	1624	731

Permissible axial forces

			Mounting arrangement IM B3		Mounting arrangement IM V1	
			Deep groove ball bearings		Deep groove ball bearings	
			L_{10} = 40,000 h		L_{10} = 40,000 h	
Motor size	Poles	Length of shaft extension E (mm)	F_{AD}(N)	F_{AZ}(N)	F_{AD}(N)	F_{AZ}(N)
132	2	80	1447	491	1577	405
	4	80	1763	807	1963	680
	6	80	1999	1043	2190	917
	8	80	2192	1236	2412	1110
160 ML	2	110	2050	1435	2440	1155
	4	110	2620	2005	3160	1635
	6	110	3055	2440	3590	2060
	8	110	3410	2790	3950	2430
180 ML	2	110	2570	1470	3075	1100
	4	110	3230	2130	3975	1630
	6	110	3730	2630	4420	2130
	8	110	4140	3040	4890	2550
200 ML	2	110	3295	2030	3960	1545
	4	110	4170	2910	5030	2290
	6	110	4800	3535	5820	2780
	8	110	5360	4100	6370	3430
225 SM	2	110	3710	2240	4515	1650
	4	140	4690	3225	5770	2495
	6	140	5405	3935	6660	3080
	8	140	6010	4540	7280	3700
250 SM	2	140	5200	2100	6175	1380
	4	140	6400	3310	7645	2410
	6	140	7260	4160	8930	3035
	8	140	8000	4900	9690	3780
280 SM	2	140	4870	2870	6330	1650
	4	140	6140	4140	7870	2760
	6	140	7040	5040	9150	3515
	8	140	7840	5840	10040	4150
315 SM	2	140	4780	2780	6620	1270
	4	170	7155	5155	9565	3240
	6	170	8205	6205	11230	3750
	8	170	9180	7180	11935	4780
315 ML	2	140	4730	2730	7210	940
	4	170	7055	5055	10300	2700
	6	170	8075	6075	12330	3070
	8	170	9060	7070	13310	4210
315 LK	2	140	4620	2620	7910	320
	4	170	6980	4980	10875	2300
	6	170	7980	5980	13005	2565
	8	170	8900	6900	14100	3450
355 SM	2	140	1660	5460	4970	2885
	4	210	5760	9390	10890	4840
	6	210	7055	10855	12370	6235
	8	210	8290	12090	14980	7530
355 ML	2	140	1570	5370	5860	2360
	4	210	5640	9440	11810	5130
	6	210	6870	10670	14718	5215
	8	210	8100	11900	15970	6540
355 LK	2	140	1440	5240	6600	1630
	4	210	5460	9260	12850	4080
	6	210	6680	10480	15450	4550
	8	210	[1]	[1]	[1]	[1]

[1] On request

Terminal box
Standard terminal box

Degree of protection and mounting options

The degree of protection for the standard terminal box is IP 66 for PESO certified motors and IP 55 for IECEx certified motors. It complies with the requirements of the type of protection 'd' flame proof and prevents the transmission of an internal explosion to the surrounding, potentially explosive atmosphere.

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

Turnability

The standard terminal boxes for motor sizes 80-250 can be turned 4x90° and in sizes 280-355 2x180° after delivery. For sizes 280-355 is also mounting of terminal box with opening towards D or N-end possible.

Cable entries

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

Cable type and terminations

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

Earthing bolts

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

Ordering

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

Standard delivery

Standard delivery if no other information is provided.

Cable entries for supply cables Motor size	Pole number	Terminal box type	Amount and size of threaded holes	Cable gland	Ex d plug	Max. connectable core cross-section mm² /phase	Number and size of terminal bolts, 6 x
IE2 motors							
80 - 90	2-8	-	1 x M25x1.5	-	-	10	M5
100 - 132	2-8	-	2 x M32x1.5	-	1 x M32	16	M5
160 - 180	2-8	-	2 x M40x1.5	-	1 x M40	50	M6
200 - 250	2-8	-	2 x M50x1.5	-	1 x M50	120	M10
280 SM_	2-8	210	2 x M63x1.5	-	1 x M63 2x	150	M12
315 SM_, ML_	2-8	370	2 x M75x1.5	-	1 x M75 2x	240	M12
355 SMA - SMC	2-4	750	2 x M75x1.5	-	1 x M75 4x	240	M12
355 SMA, SMB	6-8	370	2 x M75x1.5	-	1 x M75 2x	240	M12
355 SMC	6	750	2 x M75x1.5	-	1 x M75 4x	240	M12
355 SMC	8	370	2 x M75x1.5	-	1 x M75 2x	240	M12
355 ML_, LK_	2-8	750	2 x M75x1.5	-	1 x M75 4x	240	M12

IE3 motors							
80-90	2-8		1 x M25x1.5	-	-	0	M5
100-132	2-8		2 x M32x1.5	-	1 x M32	16	M5
160 - 180	2-8		2 x M40x1.5	-	1 x M40	50	M6
200 - 250	2-8		2 x M50x1.5	-	1 x M50	120	M10
280	2-8	210	2 x M63x1.5	-	1 x M63	2x150	M12
315	2-8	370	2 x M75x1.5	-	1 x M75	2x240	M12
355 SM	2-4	750	2 x M75x1.5	-	1 x M75	4x240	M12
355 SMA, SMB	6	370	2 x M75x1.5	-	1 x M75	2x240	M12
355 SMC	6	750	2 x M75x1.5	-	1 x M75	4x240	M12
355 ML, LK	2-6	750	2 x M75x1.5	-	1 x M75	4x240	M12

Auxiliary cable entries					
280-355	2-8	2 x M20x1.5	-	1xM20	1 x 2,5 mm2 per terminal

Motor size	Earthing on frame	Earthing in main terminal box
80 - 132	M6	M6
160 - 180	M6	M6
200 - 250	M8	M8
280 - 355	M10	2xM10

Terminal box

Terminal boxes and boards

01 Terminal box for motor sizes 80-132

02 Terminal board for motor sizes 80-132

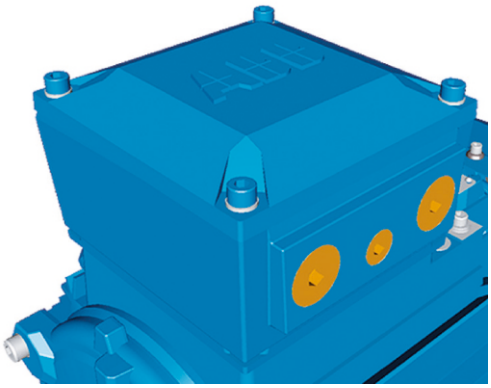
03 Terminal board for motor sizes 160-180

04 Terminal board for motor sizes 160-180

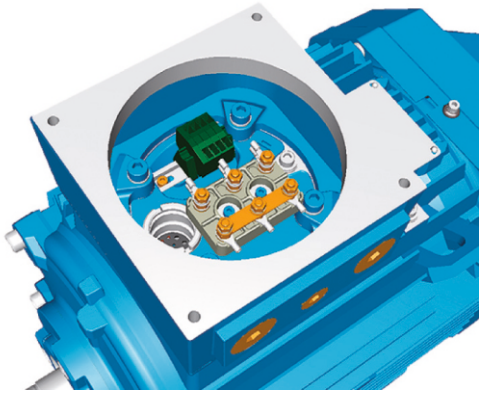
Note - Connection terminals for accessories and threaded openings for accessories cables shown in figure are not standard feature but are for variants.

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

Motor sizes 80-132

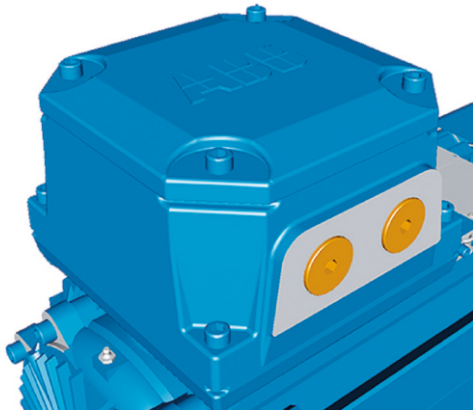


01

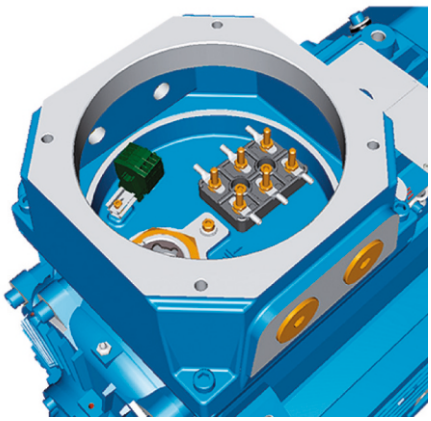


02

Motor sizes 160-180



03



04

05 Terminal box for motor sizes 200-250

06 Terminal box for motor sizes 200-250

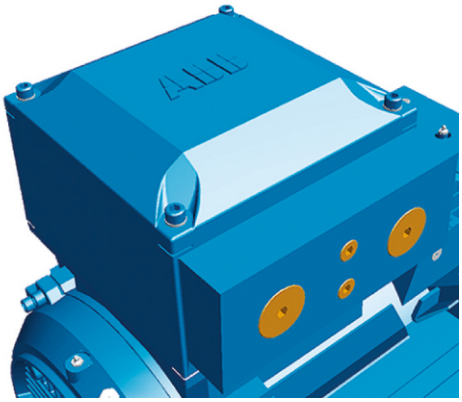
07 Terminal box for motor sizes 280-355, type 210 and 370

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

09 Terminal box for motor sizes 355, type 750

10 Terminal board for motor sizes 355, box type 750

Motor sizes 200-250



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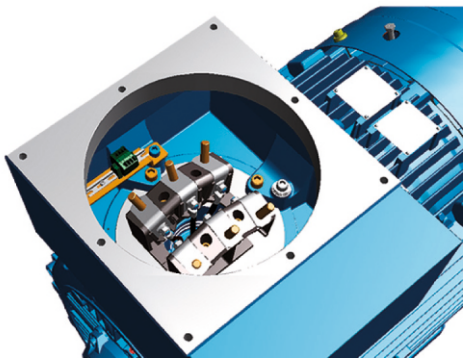

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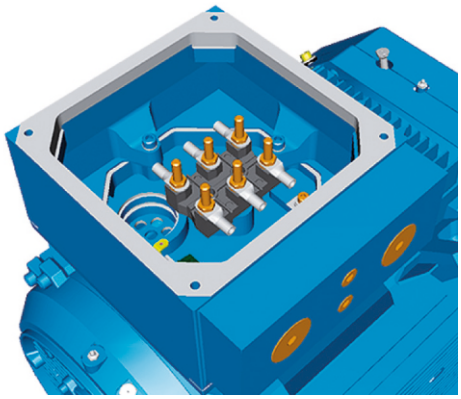
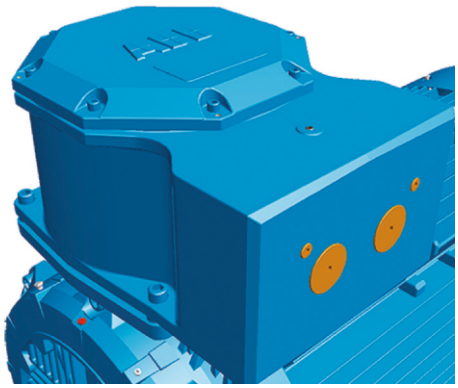
Motor sizes 355

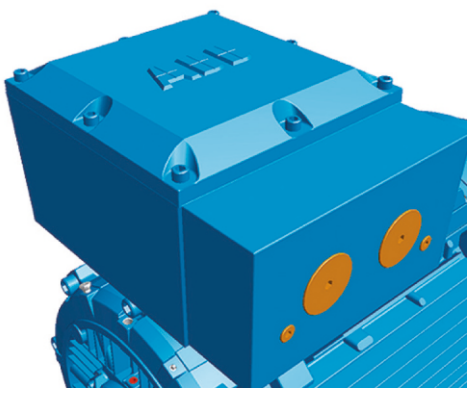


06



09

Motor sizes 280-355



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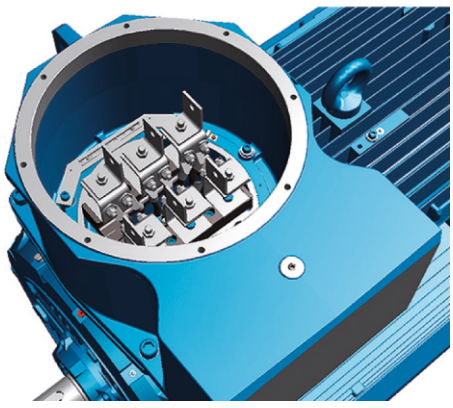


10

Terminal box

Terminal box alternatives

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

Cable glands

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

Motor frame size	Main cable entries	NPT plug
355	2 x 3”	1 x 3”

Motor frame size	Cable entries for auxiliaries	NPT plug
280-355	2 x ¾”	2 x ¾”

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

*) High capacity version, delivered as standard

Threaded openings for cable glands with NPT thread (variant)

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

Motor frame size	Main cable entries	NPT plug
280	2 x 2”	1 x 2”
315	2 x 2 1/2”	1 x 2 1/2”

Threaded openings for cable glands of nonstandard size

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

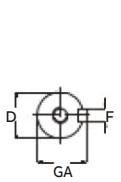
Motor frame size	Main cable entries, metric	Main cable entries, NPT
280-355	1 or 2 x M75	1 or 2 x 3”

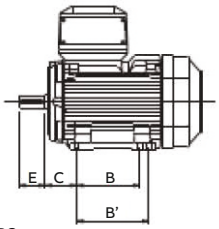
Auxiliary terminal box

It is possible to equip motors from frame size 132 upwards with one or several auxiliary terminal boxes for connection of auxiliaries like heaters or temperature detectors. The standard auxiliary terminal box is made of cast iron with Ex d type of protection. Connection terminals are of spring loaded type for quick and easy connection. These are suitable for up to 2.5 mm2 wires. The auxiliary terminal boxes are equipped with an earthing terminal. The first auxiliary terminal box is located on the right-hand side at D-end as standard. The standard cable entry is 2 x M20 with plugged entries. If cable glands are needed must these be ordered as variant.

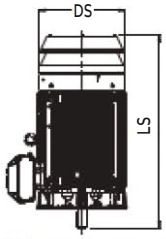
Dimension drawings

Flameproof motors, Ex db, Sizes 80 - 250

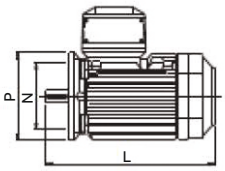




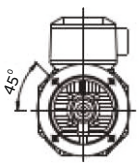
Foot-mounted motor IM 1001, IM B3



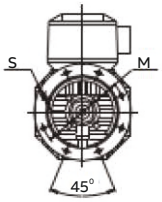
Motor with protection cover



Flange-mounted motor IM 3001, IM B5



Sizes 80 to 200



Sizes 225 to 250

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

Motor size	IM 1001, IM B3 AND IM 3001, IM B5										IM 1001, IM B3								IM 3001, IM B5				Protective roof		
	D poles		GA poles		F poles		E poles		L max poles		O [1]	A	B	B'	C	HD	K	H	M	N	P	S	DS	LS poles	
	2	4-8	2	4-8	2	4-8	2	4-8	2	4-8														2	4-8
80	19	19	21.5	21.5	6	6	40	40	409	409	20	125	100	112	50	296	10	80	165	130	200	12	157	444	444
90	24	24	27	27	8	8	50	50	440	440	20	140	100	125	56	315	10	90	165	130	200	12	185	475	475
100	28	28	31	31	8	8	60	60	501	501	25	160	140	160	63	343	12	100	215	180	250	14.5	200	536	536
112	28	28	31	31	8	8	60	60	485	485	25	190	140	–	70	355	12	112	215	180	250	14.5	213	526	526
132	38	38	41	41	10	10	80	80	531[3]	531[3]	30	216	140	178	89	392	12	132	265	230	300	14.5	274	582	582
132 [2]	38	38	41	41	10	10	80	80	576	576	30	216	140	178	89	392	12	132	265	230	300	14.5	274	627	627
160	42	42	45	45	12	12	110	110	808	808	45	254	210	254	108	495	14.5	160	300	250	350	18.5	328	852	852
180	48	48	51.5	51.5	14	14	110	110	826	826	50	279	241	279	121	535	14.5	180	300	250	350	18.5	359	876	876
200	55	55	59	59	16	16	110	110	774	774	70	318	267	305	133	616	18.5	200	350	300	400	18.5	414	844	844
200 [2]	55	55	59	59	16	16	110	110	824	824	70	318	267	305	133	616	18.5	200	350	300	400	18.5	414	844	844
225	55	60	59	64	16	18	110	140	841	871	80	356	286	311	149	663	18.5	225	400	350	450	18.5	462	921	951
225 [2]	55	60	59	64	16	18	110	140	871	901	80	356	286	311	149	663	18.5	225	400	350	450	18.5	462	921	951
250	60	65	64	69	18	18	140	140	875	875	90	406	311	349	168	726	24	250	500	450	550	18.5	506	965	965
250 [2]	60	65	64	69	18	18	140	140	895	895	90	406	311	349	168	726	24	250	500	450	550	18.5	506	965	965

[1] Required distance from fan cover air inlet to obstacle behind motor
[2] For IE3 version
[3] 576 for M2JAP132SMF6

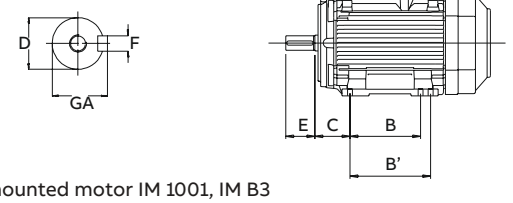
Available B14 alternatives

Flange size	Motor Size	Flange dimension			
		P	M	N	S
Ft100	80	120	100	80	M6
Ft115	90	140	115	95	M8
Ft130	100/112	160	130	110	M8
Ft165	132	200	165	130	M10

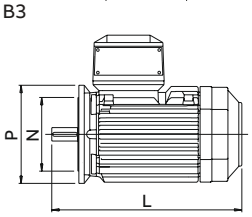
The above tables give the main dimensions in mm.

Dimension drawings

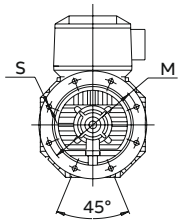
Flameproof motors, Ex db, Sizes 280 - 355



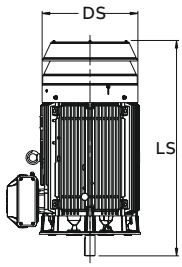
Foot-mounted motor IM 1001, IM B3



Flange-mounted motor IM 3001, IM B5



Sizes 280 to 355



Motor with protection cover

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

Motor size	IM 1001, IM B3 AND IM 3001, IM B5										IM 1001, IM B3								IM 3001, IM B5				Protective roof		
	D poles		GA poles		F poles		E poles		L max poles		O [1]	A	B	B'	C	HD	K	H	M	N	P	S	DS	LS poles	
	2	4-8	2	4-8	2	4-8	2	4-8	2	4-8														2	4-8
280	65	75	69	79.5	18	20	140	140	1090	1090	100	457	368	419	190	862	24	280	500	450	550	18	555	1190	1190
315 SM	65	80	69	85	18	22	140	170	1176	1206	115	508	406	457	216	929	28	315	600	550	660	23	624	1290	1320
315 ML	65	90	69	95	18	25	140	170	1287	1317	115	508	457	508	216	929	28	315	600	550	660	23	624	1401	1431
315 LK	65	90	69	95	18	25	140	170	1446	1475	115	590	508	560/ 710	216	929	28	315	600	550	660	23	624	1552	1589
355 SM	70	100	74.5	106	20	28	140	210	1409	1479	130	610	500	560	254	1124	35	355	740	680	800	23	590	1480	1550
355 ML	70	100	74.5	106	20	28	140	210	1514	1584	130	610	560	630	254	1124	35	355	740	680	800	23	590	1530	1600
355 LK	70	100	74.5	106	20	28	140	210	1764	1834	130	610	630	710	254	1124	35	355	740	680	800	23	590	1635	1705

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

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

The above tables give the main dimensions in mm.

Motors in brief

Flameproof motors Ex db, Sizes 80-180

Motor size		**80**	**90**	**100**	**112**	**132**	**160**	**180**
Stator	Material	Cast iron, EN-GJL-200 or better						
	Paint color shade	Blue, Munsell 8B 4.5/3.25						
	Corrosion class	C3						
Feet		Cast iron, EN-GJL-200 or better, integrated with stator						
Bearing end shields	Material	Cast iron, EN-GJL-200 or better						
	Paint colour shade	Blue, Munsell 8B 4.5/3.25						
	Corrosion class	C3						
Bearings	D-end 2-8 poles	6205-2Z/C3	6205-2Z/C3	6206-2Z/C3	6206-2Z/C3	6208-2Z/C3	6309-2Z/C3	6310-2Z/C3
	N-end 2-8 poles	6204-2Z/C3	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6208-2Z/C3	6309-2Z/C3	6310-2Z/C3
Axially locked bearings	Bearing cover	As standard, locked at D-end						
Bearing seals		Gamma ring						
Lubrication		Permanent grease lubrication						
SPM nipples		-					As option	
Rating plate	Material	Stainless steel						
Terminal box	Frame material	Cast iron, EN-GJL-200 or better						
	Cover material	Cast iron, EN-GJL-200 or better						
	Cover screws material	Steel 8.8, zinc electroplated and chromated						
Connections	Cable entries	1 x M25		2 x M32			2 x M40	
	Terminals	6 terminals for connection with cable lugs (not included)						
Fan	Material	Polypropylene. Reinforced with glass fibre.						
Fan cover	Material	Steel						
	Paint color shade	Munsell blue 8B 4.5/3.25						
	Corrosion class	C3						
Stator winding	Material	Copper						
	Insulation	Insulation class F						
	Winding protection	3 pcs thermistors as option						
Rotor winding	Material	Pressure die-cast aluminum						
Balancing		Half-key balancing						
Keyway		Closed						
Heating elements	On request	25 W						
Drain holes		-					Optional	
External earthing bolt		As standard						
Enclosure		IP 66						
Cooling method		IC 411						

Motors in brief

Flameproof motors Ex db, Sizes 200-250

Motor size		**200**	**225**	**250**
Stator	Material	Cast iron, EN-GJL-200 or better		
	Paint color shade	Munsell blue 8B 4.5/3.25		
	Corrosion class	C3		
Feet	Material	Cast iron, EN-GJL-200 or better, integrated with stator		
Bearing end shields	Material	Cast iron, EN-GJL-200 or better		
	Paint colour shade	Blue, Munsell 8B 4.5/3.25		
	Corrosion class	C3		
Bearings	D-end 2-8 pole	6312-2Z/C3	6313-2Z/C3	6315-2Z/C3
	N-end 2-8 pole	6310-2Z/C3	6312-2Z/C3	6313-2Z/C3
Axially locked bearings	Bearing cover	As standard, locked at D-end		
Bearing seals		Gamma ring		
Lubrication		Permanent grease lubrication		
SPM nipples		As option		
Rating plate	Material	Stainless steel		
Terminal box	Frame material	Cast iron, EN-GJL-200 or better		
	Cover material	Cast iron, EN-GJL-200 or better		
	Cover screws material	Steel 8.8, zinc electroplated and chromated		
Connections	Cable-entries	2 x M50		
	Terminals	6 terminals for connection with cable lugs (not included)		
Fan	Material	Polypropylene. Reinforced with glass fibre.		
Fan cover	Material	Steel		
	Paint color shade	Munsell blue 8B 4.5/3.25		
	Corrosion class	C3		
Stator winding	Material	Copper		
	Insulation	Insulation class F		
	Winding protection	3 pcs thermistors as option		
Rotor winding	Material	Pressure die-cast aluminum		
Balancing		Half key balancing		
Keyway		Closed		
Heating elements	On request	25 W	60 W	
Drain holes		Optional		
External earthing bolt		As standard		
Enclosure		IP 66		
Cooling method		IC 411		

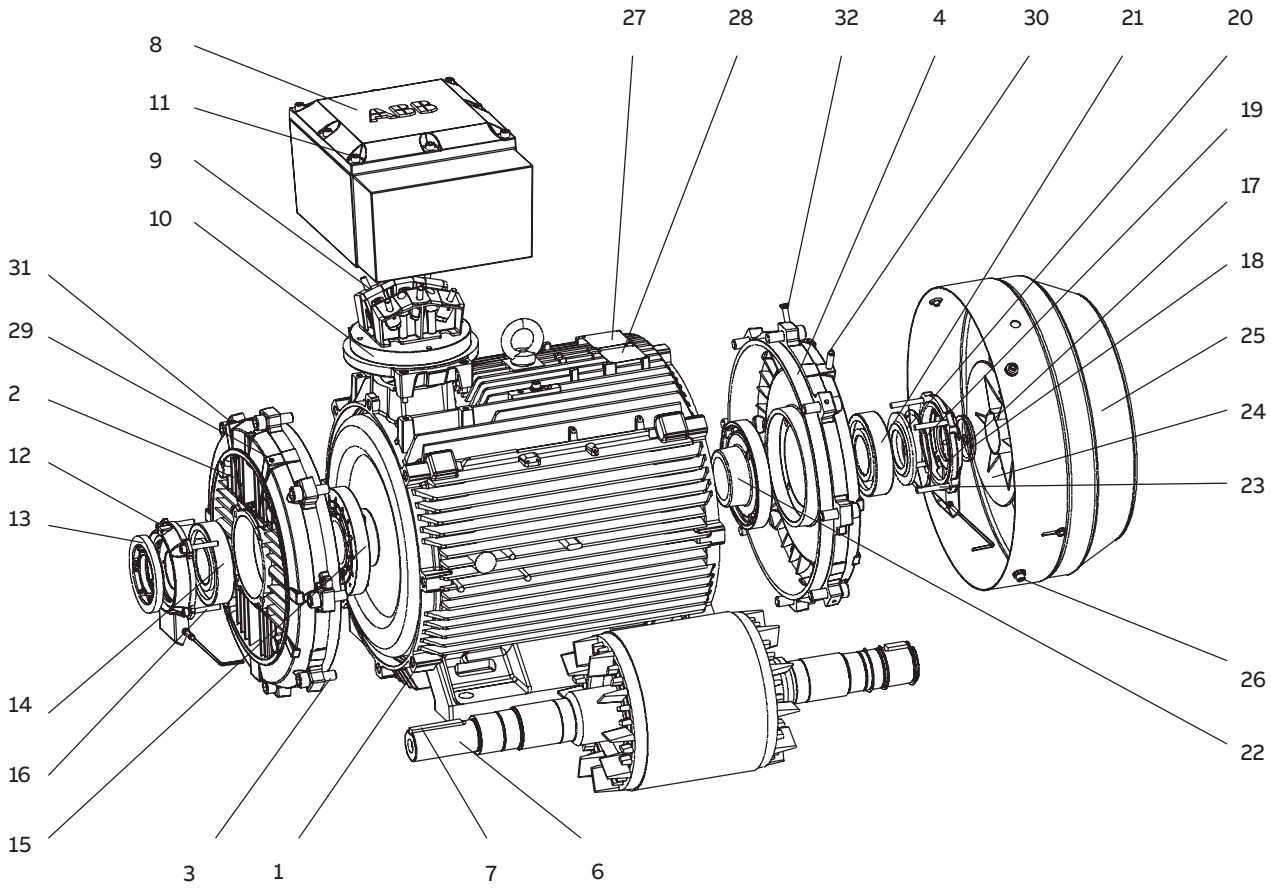
Motors in brief

Flameproof motors Ex db, sizes 280 to 355

Motor size			**280**	**315**	**355**
Stator	Material		Cast iron, EN-GJL-200 or better		
	Paint color shade		Munsell blue 8B 4.5/3.25		
	Corrosion class		C3		
Feet	Material		Cast iron, EN-GJL-200 or better, integrated with stator		
Bearing end shields	Material		Cast iron, EN-GJL-200 or better		
	Paint colour shade		Blue, Munsell 8B 4.5/3.25		
	Corrosion class		C3		
Bearings	D-end	2-pole	6316/C3	6316/C3	6316M/C3
		4-12-pole	6316/C3	6319/C3	6322/C3
	N-end	2-pole	6316/C3	6316/C3	6316M/C3
		4-12-pole	6316/C3	6316/C3	6316/C3
Axially locked bearings	Inner bearing cover		As standard, locked at D-end		
Bearing seals			V-ring or labyrinth seal		
Lubrication			Regreasable bearings		
SPM nipples			As standard		
Rating plate	Material		Stainless steel		
Terminal box	Frame material		Cast iron, EN-GJL-200 or better		
	Cover material		Cast iron, EN-GJL-200 or better		
	Cover screws material		Steel 8.8, zinc electroplated and chromated		
Connections	Cable-entries		2 x M63 + 2 x M20 plugged	2 x M75 + 2 x M20 plugged	
	Terminals		6 terminals for connection with cable lugs (not included)		
Fan	Material		Polypropylene. Reinforced with glass fibre. For IECEx: Light alloy metal fan		Polypropylene reinforced with glass fibre or aluminum. For IECEx: Light alloy metal fan
Fan cover	Material		Hot dip galvanized steel		
	Paint color shade		Munsell blue 8B 4.5/3.25		
	Corrosion class		C3		
Stator winding	Material		Copper		
	Insulation		Insulation class F		
	Winding protection		3 pcs thermistors as standard		
Rotor winding	Material		Pressure die-cast aluminum		
Balancing			Half key balancing		
Keyway			Open		
Heating elements	On request		60 W	120 W	
Drain holes			Optional		
External earthing bolt			As standard		
Enclosure			IP 66		
Cooling method			IC 411		

Motor construction

Cast iron flameproof motors, Ex db



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

*It is representation only; actual geometry of parts will be shown in GAD

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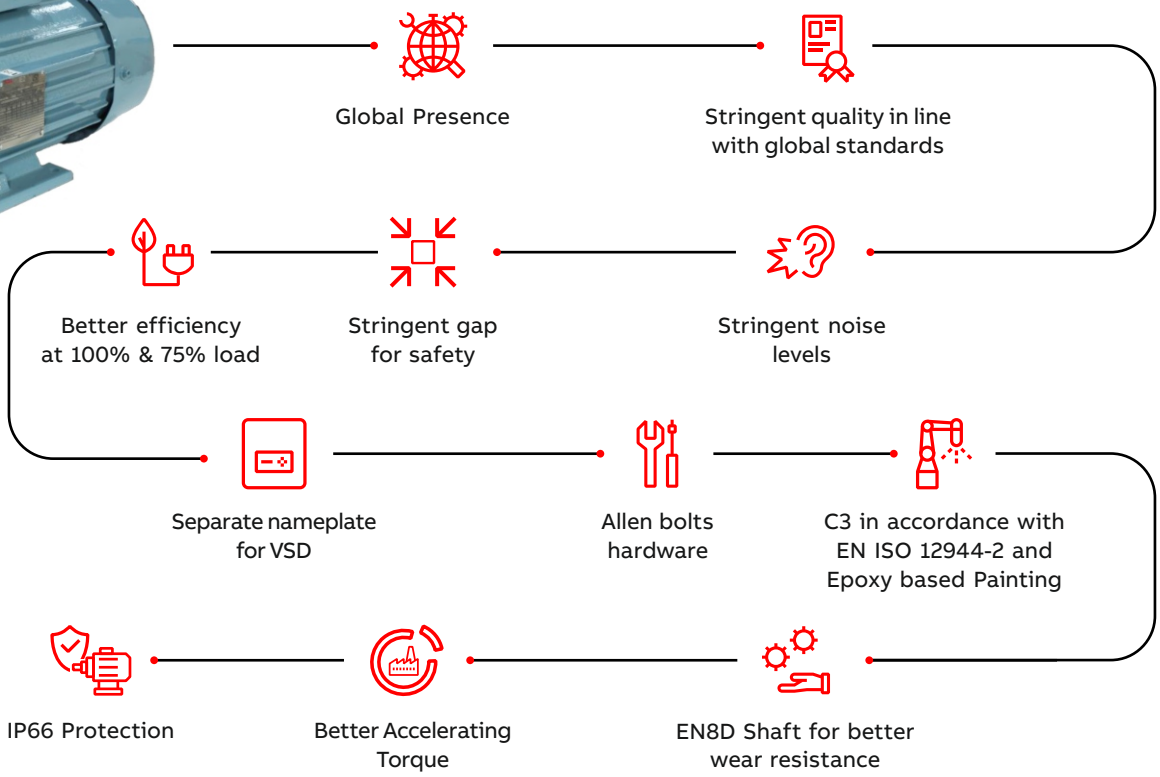

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