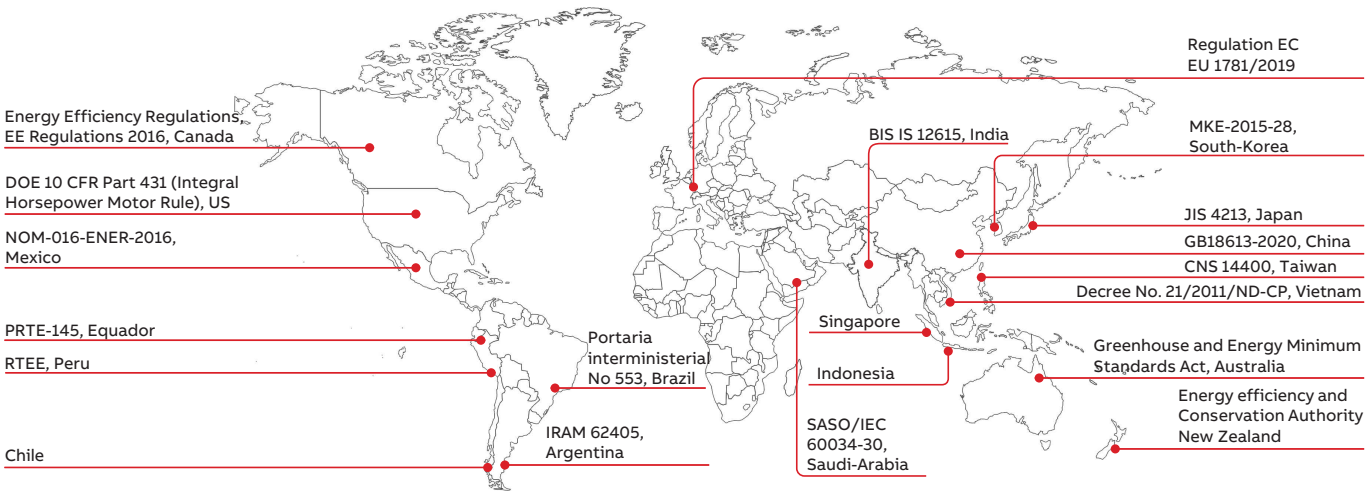
Low Voltage

IE4 Super Premium Efficiency
Cast iron motors

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

IE4 efficiency cast iron motors sizes 71 to 355

International motor efficiency standards and regulations



Since the validation of IEC 60034-30:2008 and its refined version IEC 60034-30-1:2014, a worldwide energy efficiency classification system has existed for low voltage three-phase asynchronous motors. These international standards have been created to enable and increase the level of harmonization in efficiency regulations around the world and to also cover motors for explosive atmospheres.

IEC 60034-30-1:2014 defines International Efficiency (IE) classes for single speed, three-phase, 50 Hz and 60 Hz induction motors. The efficiency levels defined in IEC 60034-30-1 are based on the test method specified in IEC 60034-2-1:2014. Both standards are part of an effort to unify motor testing procedures with CSA390-10 and IEEE 112 standards as well as efficiency and product labeling (IE) requirements to enable motor purchasers worldwide to easily recognize premium efficiency products.

To promote transparency in the market, IEC 60034-30-1 states that both the efficiency class and efficiency value must be shown on the motor rating plate and in product documentation. The documentation must clearly indicate the efficiency testing method used as different methods can produce differing results.

Minimum energy performance standards

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

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

To get the latest information please visit new.abb.com/motors-generators/energy-efficiency.

IEC 60034-30-1:2014
This standard defines four International Efficiency (IE) classes for single speed electric motors that are rated according to IEC 60034-1 or IEC 60079-0 (explosive atmospheres) and designed for operation on sinusoidal voltage.

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

IEC 60034-30-1 covers the power range from 0.12 kW up to 1000 kW. Most of the different technical constructions of electric motors are covered as long as they are rated for direct on-line operation. The coverage of the standard includes:

- Single speed electric motors (single and three-phase), 50 and 60 Hz
- 2, 4, 6 and 8 poles
- Rated output P_N from 0.12 kW to 1000 kW
- Rated voltage U_N above 50 V up to 1 kV
- Motors capable of continuous operation at their rated power with a temperature rise within the specified insulation temperature class
- Motors, marked with any ambient temperature within the range of –20 °C to +60 °C
- Motors, marked with an altitude up to 4000 m above sea level

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

Note: CFR is Code of Federal Regulations.

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

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

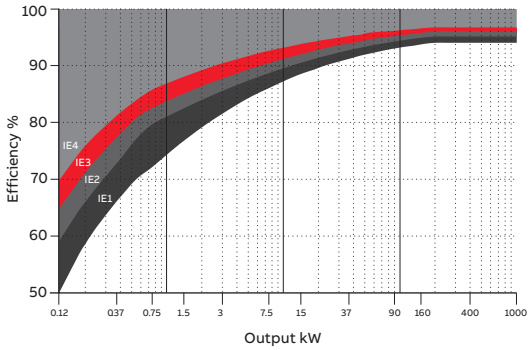


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ABB and efficiency standards
ABB determines efficiency values according to IEC 60034-2-1 using the low uncertainty method (i.e. summaration of losses), with additional load losses determined by the method of residual loss.

It is good to mention and emphasize that the IEC 60034-2-1 test method, which is known as an indirect method, is technically equivalent to the test methods in the standards CSA 390-10 and IEEE 112 Method B leading to the equivalent losses and thus efficiency values. Both test methods can be used by ABB and shall be used for both Canada and the US where IEC 60034-2-1 is not recognized yet.

As the world market leader, ABB offers the largest range of low voltage motors available. It has long advocated the need for efficiency in motors, and high efficiency products have formed the core of its portfolio for many years.

Green Initiative by Implementation of IS 12615

Considering MEPS initiatives world wide and to reduce cabon foot print ,Government of India has released a Gazette for IS 12615 as mandatory requirement for Line Operated Three Phase a.c motors.

This initiative was taken considering Electric motors are the most important type of electric load in every industry. The motor driven systems account for about seventy percent of the energy consumed by the industry. There is a large potential for cost effective solution in the use of energy efficient motor systems by about 20-30%. Electric motor systems include a number of energy using products, such as motors, drives, pumps or fans, compressors, blowers and other machines. Energy efficient motors form a major component in contributing to the energy saving by way of increased efficiency of the product itself .

Acknowledging the need for energy saving in view of the energy scarcity, climate change mitigations and the potential that exists with energy efficient motors, Government of India by releasing Gazette withdraw lower efficiency classes and adopt higher efficiency class motors as per IS 12615 thus defining minimum efficiency performance standards IE2 level in country.

This standard covers the efficiency classes and performance specifications of single-speed line operated a.c. motors that are rated according to IS 15999 (Part 1)/IEC 60034-1, rated for operation on a sinusoidal voltage supply.

ABB IEC Low Voltage motors with variable speed drives

Variable speed drives (VSD) provide significant benefits when used together with ABB IEC Low Voltage motors. The advantages include better process control and energy savings through a regulation of motor speed, and smooth starting with a reduced inrush current, reducing the stress on the equipment and supply network

Winding insulation, to ensure that motors operate reliably, the effects of non-sinusoidal output voltages from the converter must be taken into consideration when selecting the correct insulation system for the motor and output filters for the drive. The insulation and filters must be selected according below Table 1

to ensure trouble free operation of motors.

Winding Insulation and filters required	
$U_N \leq 500V$	Standard Insulation
$U_N \leq 600V$	Standard Insulation + dU/dt filters OR Special insulation (variant code 405)
$U_N \leq 690V$	Special Insulation (variant code 405) AND dU/dt-filters at converter output
$600V < U_N \leq 690V$ cable length > 150 m	Special Insulation (variant code 405)

Table 1

UN Rated motor terminal voltage

Payback Calculations

Benefits of moving towards energy efficient motors can be examined when we are compairing same kW of motors with different efficiency level such as IE4, IE3 and IE2 efficiency level.

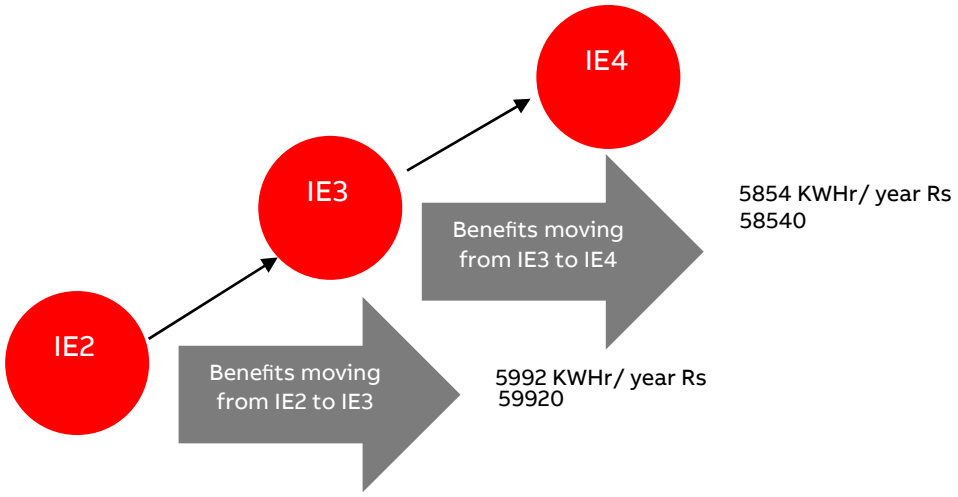
The same can be illustratedby considering 55KW, 4P, 50Hz motor

Efficiency value defined by Indian Standard for 55kw, 4Pole motor

IE2 – 93.5%, IE3 – 94.6%, IE4 – 95.7 %

Assumptions- Motor is running continusly for 24 hrs, 365 days operations ,while Per unit Electricity- Rs 10

Parameter	IE2	IE3	IE4
Rated Power (kW)	55	55	55
Full load efficiency	93.5%	94.6%	95.7%
Input Power(Rated KW/Eff.)	58.82	58.14	57.47
Operations(24*365)		8760	
Energy consumption per year (Input power*Operations)	515294	509302	503448
Energy Saving(kWh) IE2 to IE3 per year	515294 - 509302 = 5992		
Energy Saving(kWh) IE3 to IE4 per year	509302 - 503448 = 5854		
Energy Saving(kWh) IE4 to IE2 per year	515294 - 503448 = 11846		
Annual reduction in Energy bill from IE2 to IE3	5992*10 = 59,920 INR		
Annual reduction in Energy bill from IE3 to IE4	5854*10 = 58,540 INR		
Annual reduction in Energy bill from IE4 to IE2	11846*10 = 118,460 INR		



User get maximum benefit if they directly Opt for IE4 motors. To start with, one motor can start the movement

Mounting arrangements

Foot-mounted motor

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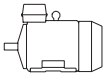
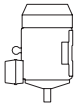
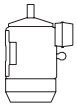
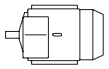
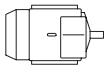
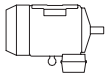
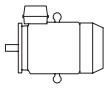
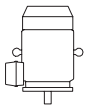
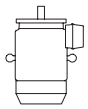
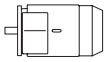
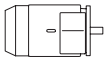
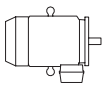
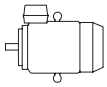
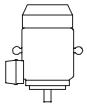
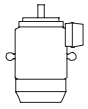
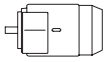
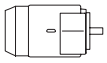
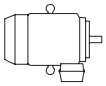
						A: foot-mounted, term. box top R: foot-mounted, term. box RHS L: foot-mounted, term. box LHS
IM B3	IM V5	IM V6	IM B6	IM B7	IM B8	
IM 1001	IM 1011	IM 1031	IM 1051	IM 1061	IM 1071	

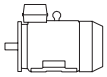
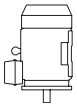
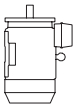
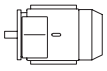
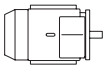
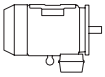
Flange-mounted motor, large flange

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

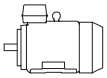
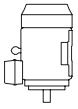
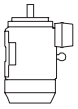
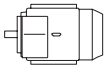
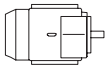
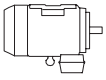
Flange-mounted motor, small flange

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

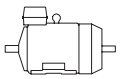
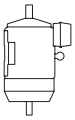
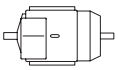
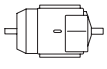
Foot- and flange-mounted motor with feet, large flange

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

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

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

Foot-mounted motor, shaft with free extensions

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

*) Not stated in IEC 60034-7.
Note: If the motor is mounted shaft upwards, take measures to prevent water or any other liquid from running down the shaft into the motor.

General information
Cooling

Designation system concerning methods of cooling refers to standard IS 6362 / IEC 60034-6.

Explanation of the product code

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

Position 1

0:	Free circulation (open circuit)
4:	Frame surface cooled

Position 2

A:	For air (omitted for simplifi ed designation)

Position 3

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

Position 4

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

Position 5

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

General information
Degrees of protection & Insulation

Classification of degrees of protection provided by enclosures of rotating machines are refers to:

– Standard IS/IEC 60034-5 for IP code

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

Explanation of the IP code

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

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

Position 2	
3:	Motors protected against spraying water
4:	Motors protected against splashing water
5:	Motors protected against water jets
6:	Motors protected against heavy seas

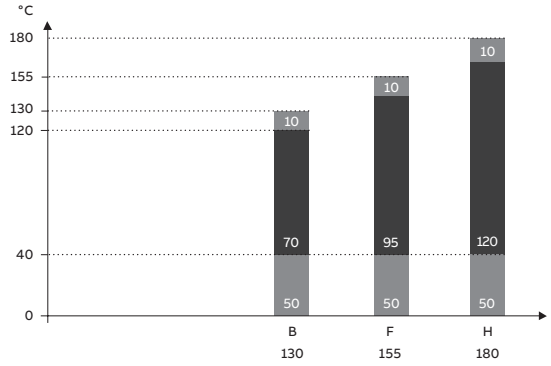
ABB uses class F insulation, which, with temperature rise B, is the most common requirement among industry today.

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

Thermal class 130 (B)
– Nominal ambient temperature 50 °C
– Max permissible temperature rise 70 K
– Hot spot temperature margin 10 K

Thermal class 155 (F)
– Nominal ambient temperature 50 °C
– Max permissible temperature rise 95 K
– Hot spot temperature margin 10 K

Thermal class 180 (H)
– Nominal ambient temperature 50 °C
– Max permissible temperature rise 120 K
– Hot spot temperature margin 10 K



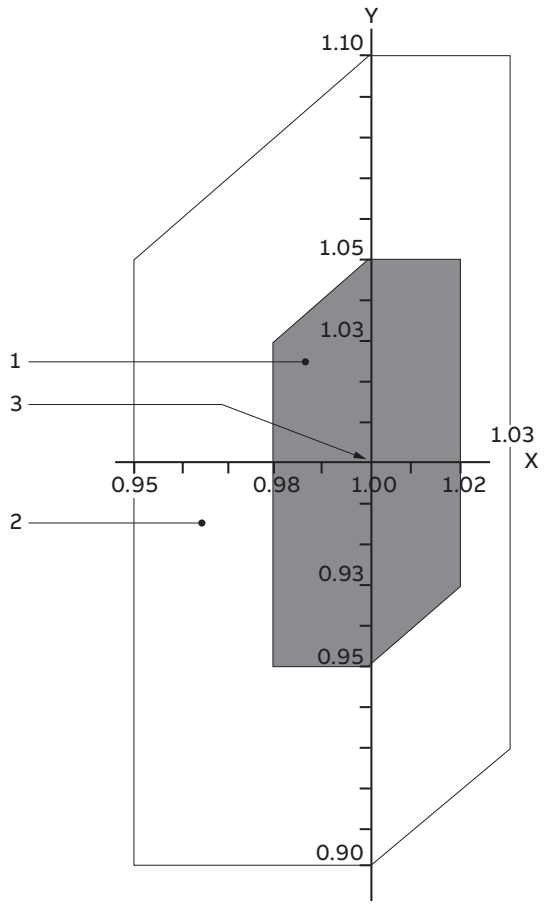
01

General information
Voltage and frequency

— 01 Voltage and frequency deviation in zones A and B

The impact on temperature rise caused by voltage and frequency fluctuation is defined in IEC 60034-1. The standard divides the combinations into two zones, A and B. Zone A is the combination of voltage deviation of +/-5 % and frequency deviation of +/-2 %. Zone B is the combination of voltage deviation of +/-10 % and frequency deviation of +3/-5 %. This is illustrated in figure below.

Motors are capable of supplying the rated torque in both zones A and B, but the temperature rise will be higher than at rated voltage and frequency. Motors can be run in zone B only for a short period of time.



01

Key

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

Technical data

IE4 cast iron 415V, 50Hz motors, 3000, 1500 & 1000 r/min

IP 55 - IC 411 - Insulation class F, temperature rise class B
IE4 efficiency class according to IEC 60034-30-1:2014, IS 12615:2018

Output KW	Frame Size	Speed r/min	Efficiency			Power factor cos Ø	Current		Torque			Moment of inertia J=1/4GD² kgm²	Weight kg
			Full load 100%	3/4 load 75%	1/2 load 50%		I_n, A	I_s/I_n	T_n Nm	T_s/T_n	T_b/T_n		
3000 r/min				415V, 50Hz									
0.37	M2BAX71MA2	2820	78.1	79.2	78.7	0.85	0.92	5	1.27	2.1	2.5	0.00035	9
0.55	M2BAX71MB2	2835	81.5	83	81.9	0.86	1.30	5	1.88	2.3	2.9	0.00047	10
0.75	M2BAX80MA2	2880	83.5	83.9	82.9	0.86	1.74	6.5	2.49	2.6	2.8	0.00117	15
1.1	M2BAX80MB2	2875	85.2	86.3	85.8	0.86	2.50	7	3.62	2.8	3.5	0.00145	17
1.5	M2BAX90SLA2	2880	86.5	87.1	86.2	0.86	3.20	7	4.97	2.9	3.5	0.00253	25
2.2	M2BAX90SLB2	2880	88	89.1	88.6	0.88	4.20	7.2	7.27	2.9	3.5	0.00346	30
3.7	M2BAX100LA2	2900	89.7	90.5	89.9	0.88	7.30	7.7	12.18	2.9	3.6	0.00606	41
5.5	M2BAX132SA2	2940	90.9	90.9	89.6	0.84	10.90	7	18.11	2.6	3.5	0.0197	66
7.5	M2BAX132SB2	2945	91.7	92.1	91.3	0.87	14.40	7.6	24.7	2.8	3.5	0.0248	73
9.3	M2BAX160MLJ2	2938	92.2	92.3	91.4	0.87	16.20	7.70	30.2	2.0	3.1	0.044	120
11	M2BAX160MLA2	2945	92.6	92.6	91.8	0.89	18.80	7.70	35.7	2.5	3.4	0.055	132
15	M2BAX160MLB2	2938	93.3	93.6	93.1	0.89	25.30	8.00	48.7	2.1	2.9	0.054	134
18.5	M2BAX160MLC2	2945	93.7	93.9	93.5	0.89	31.10	8.50	60.0	2.6	3.5	0.068	155
22	M2BAX180MLA2	2948	94.0	94.3	93.9	0.89	36.80	7.70	71.2	2.0	3.3	0.103	195
30	M2BAX200MLA2	2955	94.5	94.6	94.1	0.88	50.60	7.00	97.0	2.0	3.0	0.180	250
37	M2BAX200MLB2	2960	94.8	95.2	94.7	0.86	62.80	7.70	119.6	2.2	3.4	0.212	276
45	M2BAX225SMA2	2960	95.0	95.2	94.5	0.88	75.00	7.50	145.2	2.7	3.0	0.342	368
55	M2BAX250SMA2	2961	95.3	95.4	94.8	0.88	91.50	7.00	177.4	1.9	3.0	0.647	472

Output KW	Frame Size	Speed r/min	Efficiency			Power factor cos Ø	Current		Torque			Moment of inertia J=1/4GD² kgm²	Weight kg
			Full load 100%	3/4 load 75%	1/2 load 50%		I_n, A	I_s/I_n	T_n Nm	T_s/T_n	T_b/T_n		
1500 r/min				415V, 50Hz									
0.25	M2BAX71MA4	1440	77.9	77.7	75	0.75	0.66	5.5	1.65	2.4	3.3	0.00112	10
0.37	M2BAX71MLA4	1430	81.1	83.5	81.2	0.81	0.93	4.5	2.44	2.4	2.9	0.00153	13
0.55	M2BAX80MA4	1460	83.9	84.1	82.1	0.78	1.29	6.7	3.6	2.5	3	0.0024	17
0.75	M2BAX80MLA4	1455	85.7	85.6	83.8	0.76	1.90	6.5	4.92	2.5	3.5	0.00308	20
1.1	M2BAX90SLA4	1450	87.2	87.6	86.2	0.78	2.60	6.5	7.24	2.8	3.5	0.00526	27
1.5	M2BAX90SLB4	1455	88.2	88.5	86.9	0.77	3.56	6.8	9.88	2.8	3.5	0.00628	30
2.2	M2BAX100LA4	1455	89.5	90.3	89.7	0.8	4.80	6.7	14.34	2.4	3.1	0.012	41
3.7	M2BAX112MLA4	1460	90.9	91.4	90.6	0.79	8.10	6.5	24.1	2.4	3.5	0.0221	59
5.5	M2BAX132SA4	1475	91.9	92	91	0.79	11.70	8	35.61	2.8	3.5	0.0434	74
7.5	M2BAX132SMA4	1465	92.6	93.2	92.6	0.83	15.20	6.5	48.69	2.5	3.1	0.0573	93
9.3	M2BAX160MLJ4	1475	93.0	93.1	92.2	0.78	18.00	8.00	60.2	2.5	3.2	0.088	131
11	M2BAX160MLA4	1475	93.3	93.3	92.4	0.78	21.10	8.00	71.2	2.7	3.4	0.094	138
15	M2BAX160MLB4	1475	93.9	94.0	93.1	0.78	29.00	7.50	97.1	2.6	2.9	0.121	170
18.5	M2BAX180MLA4	1478	94.2	94.4	94.0	0.80	34.20	7.50	120.0	2.6	2.8	0.228	222
22	M2BAX180MLB4	1478	94.5	94.8	94.5	0.81	40.40	7.50	142.2	2.6	2.9	0.240	232
30	M2BAX200MLA4	1478	94.9	95.0	94.8	0.82	53.80	7.80	194.0	2.5	2.8	0.428	322
37	M2BAX225SMA4	1478	95.2	95.5	95.3	0.82	66.10	8.00	239.0	2.8	3.4	0.547	373
45	M2BAX225SMB4	1480	95.4	95.6	95.3	0.82	80.00	8.00	290.4	2.7	3.4	0.547	377
55	M2BAX250SMA4	1480	95.7	95.7	95.3	0.83	97.20	7.50	355.0	2.4	3.1	0.910	443

Note : All performance figures are subject to IS tolerances

Is / In = Starting current
Ts / Tn = Locked rotor torque
Tb / Tn = Breakdown

Technical data

IE4 cast iron 415V, 50Hz motors, 3000, 1500 & 1000 r/min

IP 55 - IC 411 - Insulation class F, temperature rise class B
IE4 efficiency class according to IEC 60034-30-1:2014, IS 12615:2018

Output KW	Frame Size	Speed r/min	Efficiency			Power factor cos Ø	Current		Torque			Moment of inertia J=1/4GD² kgm²	Weight kg
			Full load 100%	3/4 load 75%	1/2 load 50%		I_n, A	I_s/I_n	T_n Nm	T_s/T_n	T_b/T_n		
1000 r/min				415V, 50Hz									
0.18	M2BAX71MA6	920	70.1	71	68.8	0.70	0.65	3.5	1.86	2.1	2.3	0.00103	10
0.25	M2BAX71MLA6	935	74.1	73.8	70.4	0.71	0.81	3.9	2.54	2.5	2.9	0.0014	12
0.37	M2BAX80MA6	945	78	78.6	76.3	0.7	1.20	3.9	3.72	1.9	2.5	0.00226	16
0.55	M2BAX80MLA6	950	80.9	81.9	80.7	0.74	1.46	3.8	5.52	1.9	2.1	0.00322	20
0.75	M2BAX90SLA6	950	82.7	83.9	83.2	0.75	1.90	4.6	7.54	1.7	2.6	0.0043	25
1.1	M2BAX90SLB6	960	84.5	84.8	83.2	0.7	2.90	5.2	11.06	2.1	2.9	0.00612	29
1.5	M2BAX100LA6	975	85.9	85.4	82.8	0.7	3.90	6.7	14.75	2.6	3.5	0.0138	43
2.2	M2BAX112MA6	965	87.4	87.6	86.2	0.71	5.60	5.4	21.55	2	2.9	0.0161	47
3.7	M2BAX132SA6	980	89.3	89.4	87.3	0.67	8.80	5.4	36.02	2.1	2.6	0.0436	74
5.5	M2BAX132SMA6	980	90.5	90.8	89.5	0.7	12.80	6.3	53.49	2.2	2.7	0.057	94
7.5	M2BAX160MLA6	975	91.3	91.4	90.4	0.74	15.70	7.00	73.5	1.9	2.7	0.109	144
9.3	M2BAX160MLJ6	976	91.9	92.1	91.2	0.74	19.00	7.00	91.0	1.9	2.8	0.118	147
11	M2BAX160MLB6	976	92.3	92.4	91.6	0.74	23.00	7.00	107.7	2.1	2.8	0.304	172
15	M2BAX180MLA6	977	92.9	93.3	92.8	0.75	30.50	7.00	146.6	1.9	2.8	0.207	195
18.5	M2BAX200MLA6	985	93.4	93.5	92.8	0.77	35.70	7.80	179.4	2.4	3.0	0.397	227
22	M2BAX200MLB6	986	93.7	93.8	93.2	0.78	42.30	8.00	213.1	2.4	3.1	0.490	269
30	M2BAX225SMA6	986	94.2	94.4	94.0	0.79	56.00	7.50	290.6	2.6	3.0	0.807	350
37	M2BAX250SMA6	983	94.5	94.7	94.1	0.79	70.80	7.50	359.0	2.6	3.2	1.680	467

Note : All performance figures are subject to IS tolerances

Efficiency values are given according to IEC 60034-30-1: 2014.
Please note that the values are not comparable without knowing the testing method.
ABB has calculated the efficiency values according to indirect method, stray load losses (additional losses) determined from measuring.

Is / In = Starting current
Ts / Tn = Locked rotor torque
Tb / Tn = Breakdown

Technical data

Process performance IE4 efficiency cast iron motors
415V, 50Hz motors, 3000, 1500 & 1000 r/min

IIP55 - IC 411 - Insulation class F, Ambient 50°C (Temp. rise class B, 70°C), S1 Duty
IE4 efficiency class according to IS 12615:2018, IEC 60034-30-1, 2014, 415V ± 10%, 50 ± 5% Hz, Combined Variation of ± 10%

Output KW	Motor type	Product code	Speed r/min	Efficiency			Power factor			Current		Torque (Nm)			Moment of inertia J=1/4GD² kgm²	Weight kg	Sound pressure level LPA (dB)
				FL 100%	FL 75%	FL 50%	100%	75%	50%	I_n, A	I_s/I_n	T_n	T_s/T_n	T_{max}/T_n			
2 Pole, 3000 r/min																	
75	M3BP 280SMB 2	3GBP281220-ADM	2981	95.6	95.6	94.6	0.86	0.81	0.73	127	8.9	240	2.6	3.1	0.9	665	90
90	M3BP 280SMC 2	3GBP281230-ADM	2982	95.8	95.8	94.8	0.87	0.83	0.75	150	8.9	288	2.8	3.3	1.2	725	90
110	M3BP 315SMB 2	3GBP311220-ADM	2984	96.0	96.0	95.0	0.86	0.82	0.75	185	8.9	352	2.0	2.8	1.4	940	90
132	M3BP 315SMC 2	3GBP311230-ADM	2985	96.2	96.2	95.2	0.87	0.81	0.75	220	8.9	422	2.6	3.0	1.7	1025	90
160	M3BP 315MLA 2	3GBP311410-ADM	2985	96.3	96.3	95.3	0.88	0.83	0.78	263	8.9	512	2.4	2.9	2.1	1190	90
200	M3BP 315MLB 2	3GBP311420-ADM	2985	96.5	96.5	95.5	0.87	0.85	0.80	332	8.9	640	2.4	2.9	2.2	1220	90
200	M3BP 355SMA 2	3GBP351210-ADM	2985	96.5	96.5	95.5	0.87	0.85	0.80	332	8.9	640	2.4	3.3	3.0	1600	90
250	M3BP 315LKB 2	3GBP311820-ADM	2985	96.5	96.5	95.5	0.87	0.84	0.80	414	8.9	800	2.6	2.9	2.9	1540	90
250	M3BP 355SMB 2	3GBP351220-ADM	2985	96.5	96.5	95.5	0.87	0.84	0.80	414	8.9	800	2.5	3.2	3.4	1680	90
315	M3BP 355SMC 2	3GBP351230-ADM	2985	96.5	96.5	95.5	0.86	0.82	0.76	528	8.9	1008	2.5	3.0	3.6	1750	90
355	M3BP 355MLA 2	3GBP351410-ADM	2985	96.5	96.5	95.5	0.87	0.84	0.79	589	8.9	1136	2.5	2.8	4.1	2000	90
4 Pole, 1500 r/min																	
75	M3BP 280SMC 4	3GBP282230-ADM	1488	96.0	96.0	95.0	0.83	0.78	0.65	131	8.9	481	2.8	3.0	1.85	725	85
90	M3BP 280MLA 4	3GBP282410-ADM	1489	96.1	96.1	95.1	0.82	0.80	0.70	157	8.9	577	2.8	3.2	2.3	840	85
110	M3BP 315SMC 4	3GBP312230-ADM	1491	96.3	96.3	95.3	0.82	0.75	0.68	194	8.9	704	2.6	3.1	2.9	1000	85
132	M3BP 315SMD 4	3GBP312240-ADM	1491	96.4	96.4	95.4	0.82	0.75	0.65	233	8.9	845	2.7	3.4	3.2	1065	85
160	M3BP 315MLB 4	3GBP312420-ADM	1490	96.6	96.6	95.6	0.84	0.80	0.70	274	8.9	1025	2.9	3.1	3.9	1220	85
200	M3BP 315LKB 4	3GBP312820-ADM	1491	96.7	96.7	95.7	0.84	0.79	0.70	343	8.9	1281	2.7	3.1	5.0	1520	85
200	M3BP 355SMA 4	3GBP352210-ADM	1491	96.7	96.7	95.7	0.84	0.79	0.70	343	8.9	1281	2.3	2.9	5.9	1610	85
250	M3BP 315LKC 4	3GBP312830-ADM	1491	96.7	96.7	95.7	0.83	0.80	0.70	434	8.9	1601	2.5	3.2	5.5	1600	85
250	M3BP 355SMB 4	3GBP352220-ADM	1492	96.7	96.7	95.7	0.83	0.80	0.70	434	8.9	1600	2.7	3.1	6.9	1780	85
315	M3BP 355SMC 4	3GBP352230-ADM	1492	96.7	96.7	95.7	0.83	0.78	0.69	546	8.9	2016	2.9	3.1	7.2	1820	85
355	M3BP 355MLA 4	3GBP352410-ADM	1492	96.7	96.7	95.7	0.83	0.79	0.70	615	8.9	2272	2.9	3.1	8.4	2140	85
6 Pole, 1000 r/min																	
45	M3BP 280SMB 6	3GBP283220-ADM	991	94.8	94.8	92.8	0.83	0.78	0.68	80	8.3	434	2.5	2.8	2.2	680	85
55	M3BP 280SMC 6	3GBP283230-ADM	991	95.1	95.1	93.1	0.83	0.77	0.70	97	8.3	530	2.6	2.8	2.9	725	85
75	M3BP 315SMC 6	3GBP313230-ADM	994	95.4	95.4	93.4	0.80	0.75	0.68	137	8.9	720	2.4	3.0	4.9	1000	85
90	M3BP 315SMD 6	3GBP313240-ADM	994	95.6	95.6	93.6	0.78	0.72	0.61	168	8.9	865	2.6	3.0	4.9	1040	85
110	M3BP 315MLB 6	3GBP313420-ADM	994	95.8	95.8	93.8	0.80	0.75	0.65	200	8.9	1057	2.5	2.9	6.3	1200	85
132	M3BP 315LKA 6	3GBP313810-ADM	994	96.0	96.0	94.0	0.80	0.75	0.64	239	8.9	1268	2.6	2.9	7.3	1410	85
160	M3BP 315LKC 6	3GBP313830-ADM	994	96.2	96.2	94.2	0.80	0.73	0.62	289	8.9	1537	2.7	3.0	9.2	1600	85
160	M3BP 355SMB 6	3GBP353220-ADM	995	96.2	96.2	94.2	0.80	0.75	0.63	289	8.9	1536	2.2	2.9	9.7	1680	85
200	M3BP 355SMC 6	3GBP353230-ADM	995	96.6	96.6	94.6	0.81	0.75	0.64	356	8.9	1919	2.5	3.0	11.3	1820	85
250	M3BP 355MLB 6	3GBP353420-ADM	995	96.6	96.6	94.6	0.80	0.75	0.65	450	8.9	2399	2.5	2.9	13.5	2180	85
315	M3BP 355LKA 6	3GBP353810-ADM	995	96.6	96.6	94.6	0.80	0.75	0.65	567	8.9	3023	2.5	2.8	15.5	2500	85
355	M3BP 355LKB 6	3GBP353820-ADM	995	96.6	96.6	94.6	0.78	0.70	0.60	655	8.9	3407	2.7	3.0	16.5	2600	85

Note : 1. All performance figures are subject to IEC/IS tolerances.
2. Max. load GD² has been calculated assuming load torque is proportional to square of speed.
3. Higher kw can be offered on demand

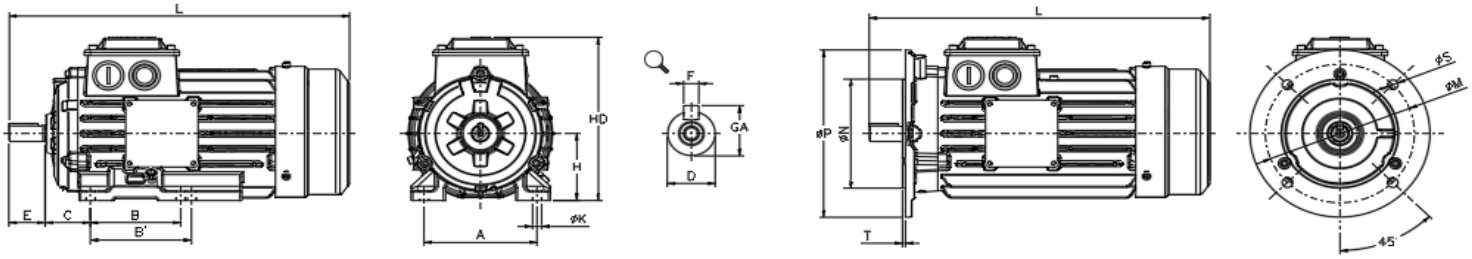
In = Nominal or rated current
Tn = Nominal or rated torque in Nm
Tmax = Maximum torque
Is = Starting current
Ts = Starting Torque

Dimension drawings

Super Premium Cast iron IE4 energy efficient motors

Foot-mounted motor IM1001, B3 and Flange-mounted motor IM 3001, B5

Size 71 to 132



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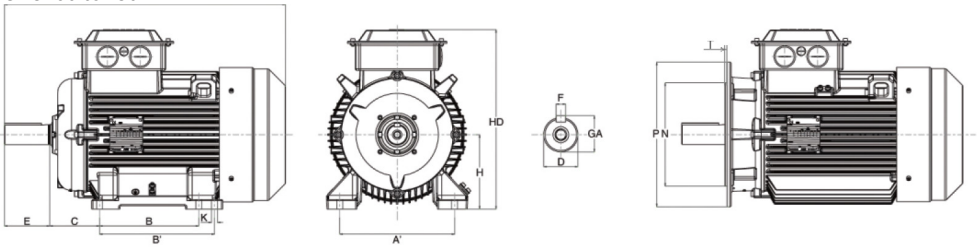
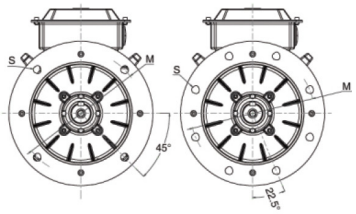


Size 160 to 200

Size 225 to 250



Motor Size	D Pole 2		GA Pole 2		F Pole 2		E Pole 2		Lmax Pole 2		A	B	B'	C	HD	K	H	M	N	P	S	T
		4-6		4-6		4-6		4-6		4-6												
General performance cast iron motors																						
71	14	14	16	16	5	5	30	30	272	272	112	90	-	45	175	7	71	130	110	160	10	3.5
71									322	322		90	-									
80	19	19	21.5	21.5	6	6	40	40	327	327	125	100	-	50	191	10	80	165	130	200	12	3.5
80ML									377	377	125	100	112									
90SL	24	24	27	27	8	8	50	50	405	405	140	100	125	56	217	10	90	165	130	200	12	3.5
90L									430	430	140	-	125									
100L	28	28	31	31	8	8	60	60	464	464	160	112	-	63	242	12	100	215	180	250	15	4
100LK									504	504	160	112	140									
112M	28	28	31	31	8	8	60	60	415	415	190	140	-	70	263	12	112	215	180	250	15	4
112ML									480	480	190	140	159									
132S	38	38	41	41	10	10	80	80	515	515	216	140	-	89	307	12	132	265	230	300	15	4
132SM									610	610	216	140	178									
160ML	42	42	45	45	12	12	110	110	696[1]	696[1]	254	210	254	108	414	15	160	300	250	350	19	5
180ML	48	48	51.5	51.5	14	14	110	110	798	798	279	241	279	121	454	15	180	300	250	350	19	5
200ML	55	55	59	59	16	16	110	110	809[2]	809[2]	318	267	305	113	515	19	200	350	300	400	19	5
225SM	55	60	59	64	16	18	110	140	942	972	356	286	311	149	560	19	225	400	350	450	19	5
250SM	60	65	64	69	18	18	140	140	913	913	406	311	349	168	613	24	250	500	450	550	19	5

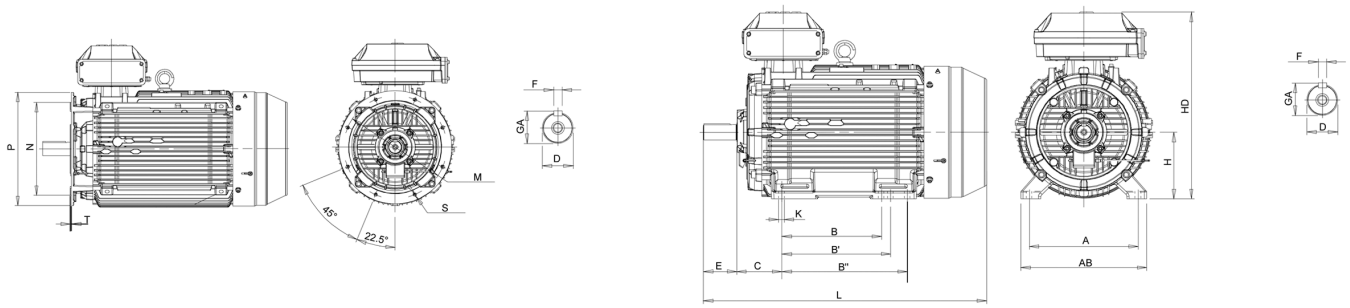
Above table gives the main dimensions in mm.

1) M2BAX 160ML C2, B4, B6: L = 746
2) M2BAX 200ML B2, A4, B6 = 899

Dimension drawings

Process performance IE4 efficiency cast iron motors

Foot-mounted motor IM1001, B3 and Flange-mounted motor IM 3001, B5



Motor Size	D Poles 2	D Poles 4-6	GA Poles 2	GA Poles 4-6	F Poles 2	F Poles 4-6	E Poles 2	E Poles 4-6	L max Poles 2	L max Poles 4-6	A	B	B'	B"	C	HD	K	H	M	N	P	S	T
Process performance cast iron motors																							
280	65	75	69	79.5	18	20	140	140	1088	1088	457	368	419	-	190	762	24	280	500	450	550	19	5
280ML	65	75	69	79.5	18	20	140	140	1189	1189	457	419	457	-	190	785	24	280	500	450	550	19	5
315SM	65	80	69	85	18	22	140	170	1174	1204	508	406	457	-	216	852	28	315	600	550	660	24	6
315ML	65	90	69	95	18	25	140	170	1285	1315	508	457	508	-	216	852	28	315	600	550	660	24	6
315LK	65	90	69	95	18	25	140	170	1491	1521	508	508	560	710	216	880	28	315	600	550	660	24	6
355SM	70	100	74.5	106	20	28	140	210	1409	1479	610	500	560	-	254	958	35	355	740	680	800	24	6
355ML	70	100	74.5	106	20	28	140	210	1514	1584	610	560	630	-	254	958	35	355	740	680	800	24	6
355LK	70	100	74.5	106	20	28	140	210	1764	1834	610	630	710	900	254	958	35	355	740	680	800	24	6

Above table gives the main dimensions in mm.

Motors in brief

Super Premium Cast iron IE4 energy efficient motors 71-132

Size		71	80	90	100	112	132
Stator	Material	Cast Iron Grade 150:ISO 185					
	Paint colour shade	Munsell blue 8B 4.5/3.25 / NCS 4822 B05G					
	Surface Treatment	C3 medium according to ISO / EN 12944-5					
Feet		Integrated with stator					
	Material	Cast iron grade 150 : ISO 185					
Bearing end shields	Material	Cast iron grade 200 : ISO 185					
	Paint colour shade	Munsell blue 8B 4.5/3.25/NCS 4822 B05G					
	Surface Treatment	C3 medium according to ISO / EN 12944-5					
Bearings	D-end	6203-2Z/C3	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6207-2Z/C3	6208-2Z/C3
	N-end	6202-2Z/C3	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6206-2Z/C3	6208-2Z/C3
Axially-locked	Retaining Ring	As standard, locked at D-end					
Bearing seals		Axial seal as standard, radial on request					
Lubrication		Permanently lubricated shielded bearings					
Rating plate	Material	Aluminium					
Terminal Box	Frame material	Cast Iron, Integral to stator frame					
	Cover material	Sheet of steel, Cold rolled					
	Cover screws material	Steel 8.8					
Connections	Cable entries	2xM16	2xM25	2xM32			
	Cable Sizes	2Rx3Cx4mm2	2Rx3Cx6mm2	2Rx3Cx10mm2			
	Terminal Stud Size	M4	M4	M5			
	Terminals	Upto 2HP- STAR / 3 Leads > 2 HP- DELTA / 6 Leads (Cable lugs not included)					
Fan	Material	Polypropylene, Reinforced with 20% glass fibre					
Fan Cover	Material	Sheet of steel, cold rolled					
	Paint Colour shade	Munsell blue 8B 4.5/3.25/NCS 4822 B05G					
	Surface Treatment	C3 medium according to ISO/EN 12944-5					
Stator winding	Material	Copper					
	Insulation	Insulation class F, Temperature rise class B unless otherwise stated					
	Winding protection	3PTC thermistors as a opition					
Rotor winding	Material	Pressure diecast aluminum					
Balancing method		Half Key Balancing as Standard					
Key way		Open Key Way					
Enclosure		IP 55, Higher protection on request					
Cooling method		IC 411					
Drain holes		Drain holes with closable plastic plugs, open on delivery					
Lifting lugs		Integrated with the stator					

Motors in brief

Super Premium Cast iron IE4 energy efficient motors 160 - 250

Output		160	180	200	225	250
Stator	Material	Cast Iron Grade 200:ISO 185				
	Paint colour shade	Munsell blue 8B 4.5/3.25 / NCS 4822 B05G				
	Surface Treatment	C3 medium according to ISO / EN 12944-5				
Bearing end shields	Material	Cast iron grade 200 : ISO 185				
	Paint colour shade	Munsell blue 8B 4.5/3.25/NCS 4822 B05G				
	Surface Treatment	C3 medium according to ISO / EN 12944-5				
Bearings	D-end	6309-2Z/C3	6310-2Z/C3	6312-2Z/C3	6313-2Z/C3	6315-2Z/C3
	N-end	6209-2Z/C3	6209-2Z/C3	6209-2Z/C3	6210-2Z/C3	6212-2Z/C3
Axially-locked	Inner Bearing Cover	**As standard, locked at D-end**				
Bearing seals		Axial seal standard, radial on request				
Lubrication		Permanently lubricated shielded bearings				
Measuring nipple		Not included				
Rating plate	Material	Aluminium				
Terminal Box	Frame material	Sheet of Steel, cold rolled				
	Cover material	Sheet of Steel, cold rolled				
	Cover screws material	Steel 8.8				
Connections	Cable entries	2xM40, 1xM16		2xM50, 1xM16		
	Terminals	6 terminals of connection (Cable lugs not included)				
	Cable gland	Suitable opening in terminal box, cable glands as option				
Fan	Material	Polypropylene, Reinforced with 20% glass fibre				
Fan Cover	Material	Sheet of steel, cold rolled				
	Paint Colour shade	Munsell blue 8B 4.5/3.25/NCS 4822 B05G				
	Surface Treatment	C3 medium according to ISO/EN 12944-5				
Stator winding	Material	Copper				
	Insulation	Insulation class F, Temperature rise class B unless otherwise stated.				
	Winding protection	**3 PTC thermistors as option**				
Rotor winding	Material	Pressure diecast aluminium				
Balancing method		Half Key Balancing as Standard				
Key way		Open Key Way				
Enclosure		IP 55, Higher protection on request				
Cooling method		IC 411				

Motors in brief

Process performance IE4 efficiency cast iron motors
sizes 280 - 355

Output			280	315	355
Stator and end shields	Material		Cast Iron		
	Paint colour shade		Munsell blue 8B 4.5/3.25		
	Corrosion class		C3 (medium)		
Feet	Material		Integrated cast iron feet		
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			Locked at D-end		
Bearing seals	D-end		V-ring or labyrinth seal		
	N-end		V-ring or labyrinth seal		
Lubrication			Regreasable bearings, regreasing nipples M10x1		
Measuring nipple for condition monitoring of the bearings			Included		
Rating plate	Material		Stainless steel		
Terminal box	Frame and cover		Cast iron		Cover steel
	Corrosion class		C3 (medium)		Steel
	Cover screws		Zinc-electroplated steel		
Connections	Cable entries	2-4-pole	2xM63+2xM20	2xM63, 2xØ48-60+2xM20	2xØ48-60, 60-80, 2xM20
		6-8-pole			2xØ32-49, 48-60, 2M20
			See section Standard terminal box for detailed information.		
	Terminals		6 terminals of connection (Cable lugs not included)		
	Cable gland		Suitable opening in terminal box, cable glands as option		
Fan	Material		Glass-fiber reinforced polypropylene		
Fan Cover	Material		Sheet		
	Paint Colour shade		Munsell blue 8B 4.5/3.25		
	Corrosion class		C3 (medium)		
Stator winding	Material		Copper		
	Insulation		Insulation class F, Temperature rise class B unless otherwise stated.		
	Winding protection		3 PTC thermistors, 155 °C		
Rotor winding	Material		Pressure diecast aluminium		
Balancing method			Half key balancing		
Key ways			Open key way		
Drain holes			Drain holes with closable plastic plugs, open on delivery		
Enclosure			IP 55		
Cooling method			IC 411		

Product note
IE4 efficiency cast iron motors, sizes 71 - 450

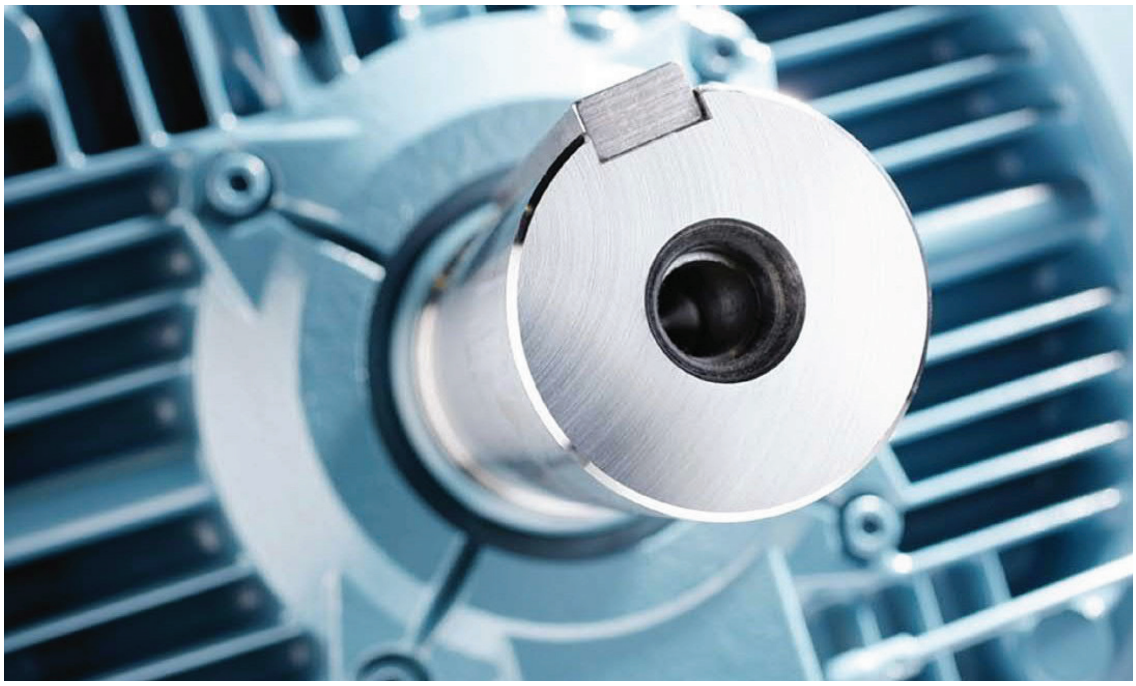


ABB is the first Global motor manufacturer with Make in India initiative to launch entire range of low voltage IE4 range based on induction technology. The motors cover 0.18 - 1000 kW .
frame sizes 71 - 450. They are available for 415 V, 50 Hz and 440/460 V, 60 Hz in 2-, 4- and 6-pole versions.

IE4 motors meet the energy efficiency requirements defined in IEC Technical Specification IEC/TS 60034-31 and draft IEC standard 60034-30 edition 2.

Platform
ABB's IE4 motors are based on the robust and well-proven induction platform. They have the same mechanical design as the other ABB high efficiency motors, and they meet IE4 requirements without using permanent magnets.

Benefits
IE4 motors deliver the highest efficiency currently available in the market, enabling motor users to maximize energy savings. As a result they are especially suited for applications with high operating hours.

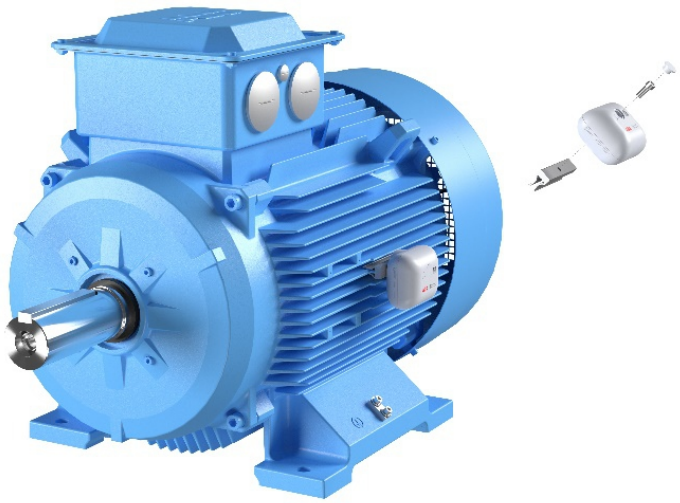
By using an IE4 motor in place of a lower efficiency product it is possible to achieve a significant efficiency improvement, which will produce substantial energy savings over the motor's lifetime.

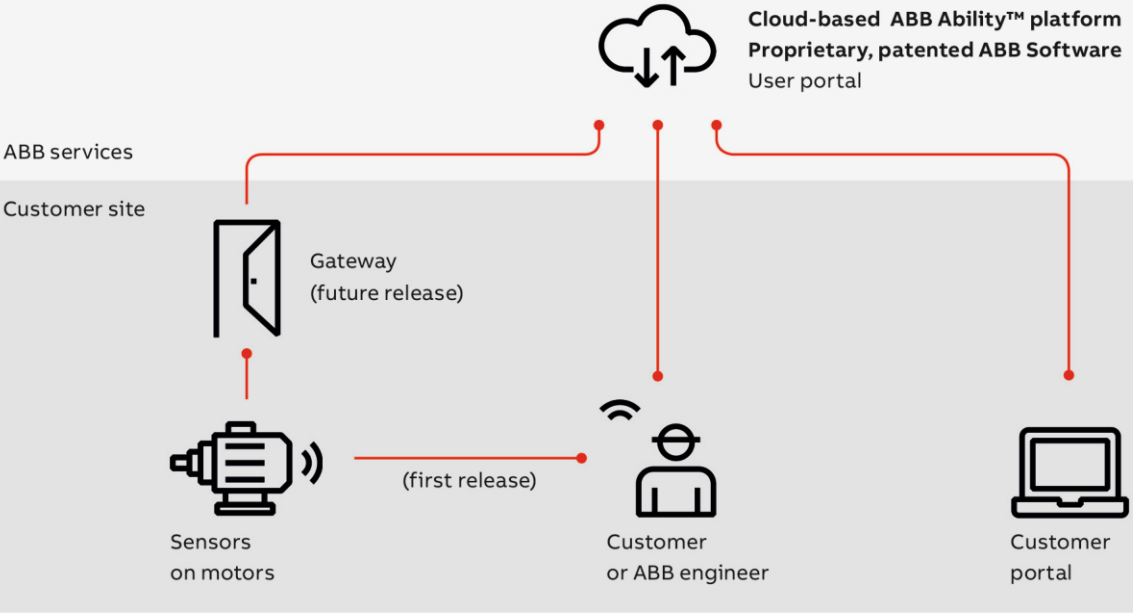
At the same time, the reduction in energy consumption means that overall carbon dioxide emissions are decreased – a factor which will help plants to meet their environmental commitments.

A further benefit of higher efficiency is cooler running, which means that these motors operate even more reliably than less efficient alternatives. The combination of high efficiency and reliability enables motor users to optimize the cost of motor ownership.

ABB Ability™ Smart Sensor
Condition monitoring solution for low voltage motors

ABB Ability™ Smart Sensor
is a condition monitoring solution that makes p
maintenance possible for almost all low voltage
monitoring and analyzing data on motor operat
parameters, it enables motor users to optimize
maintenance. The solution helps to reduce dov
as much as 70 percent, extend motor lifetimes
percent and reduce energy consumption by up





ABB's condition monitoring solution for LV motors. The ABB Ability™ Smart Sensor transmits data via a smartphone (first release) or gateway to a secure cloud service. Algorithms in the cloud analyze the data and convert it into meaningful information, which is then sent to the user's smartphone and customer portal.

ABB India Limited

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