



Catalog | Mars 2014

Low voltage Brake motors



مرکز تخصصی فروش و خدمات انواع الکتروپمپ، گیربکس الکتروموتور

تلفن: ۰۳۱۳۲۳۵۲۸۶۱-۵

فکس: ۰۳۱۳۲۳۵۲۸۶۶

همراه: ۰۹۳۳۷۲۷۲۴۲۲

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Low voltage Brake Motors

Totally enclosed squirrel cage three phase low voltage motors,
 Sizes 63 - 180, 0.055 to 22 kW

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Mechanical design

Degrees of protection

The degrees of protection, as per IEC standards 60034-5, are: terminal box and electrical components of the brake – IP 55; other motor parts – IP 55.

Mechanical components of the brake – IP 23 S.
 Mechanical parts of the brake, protected with a rubber ring and V-ring – IP 55 (optional: variant code 213).

Mounting arrangements of brake motors

The design of the brake motor enables it to operate in any mounting position. Nevertheless, the position of the drain holes should be taken into account.

Vertically mounted motors with the shaft end downwards,

intended for outdoor operation, should be provided with a protective roof to avoid water ingress and the possibility of ice forming on the brake.

Operation

ABB's brake motor is a standard motor modified for braking duties, i.e. a three phase induction motor with standard dimensions and output rating.

The electro-magnetic disc brake is powered, by either DC current through a rectifier located in terminal box or three phase AC current.

When the brake coil is de-energised, the brake is actuated by spring pressure.

The axial movement of the brake disc performs a dual braking action against the moving electromagnet and the motor shield, without pressure or impact being transmitted to the bearings.

The brake linings withstand high temperatures, have great wear resistance and give long life. Because of the very low wear of the braking disc, the brakes of the ABB motor usually require only one-third of the maintenance required by other common brake types in the market.

Lubrication and bearings

The bearings incorporate two Z-type non-friction sealing plates. The amount of grease is sufficient for the life of the bearing.

The motors are fitted with the bearings listed in the table.

Motor size		D-end	N-end
M3VRF/S	63 A, B, BB	6202-2Z/C3	6202-2Z/C3
	71	6203-2Z/C3	6203-2Z/C3
	80	6204-2Z/C3	6204-2Z/C3
M3ARF/S	90	6205-2Z/C3	6205-2Z/C3
	100	6306-2Z/C3	6206-2Z/C3
	112	6206-2Z/C3	6206-2Z/C3
	132	6208-2Z/C3	6208-2Z/C3
	160	6309-2Z/C3	6209-2Z/C3
M3AA	180	6310-2Z/C3	6209-2Z/C3

Brake design

General

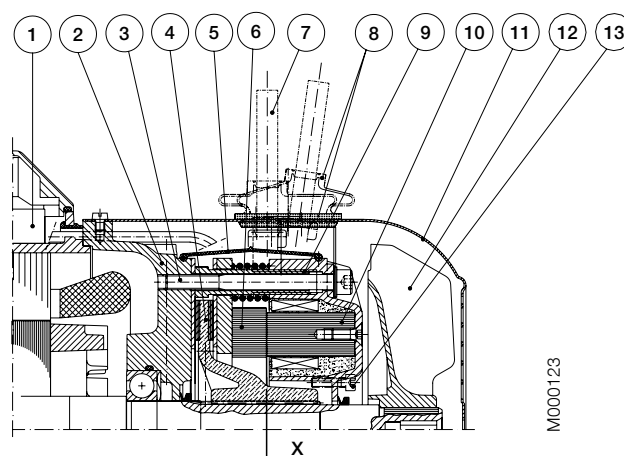
Electromagnetic disc brakes work by the action of a set of springs and are released when applying voltage to the brake coil.

This means that the motor will brake automatically in case of

any voltage failure, as a significant safety feature. The brake is always functional, irrespective of the mounting position of the brake motor. The external dimensions for both the DC and the three phase AC brake are identical.

Detailed view

- 1 Rectifier (DC brake only)
- 2 Motor N-end shield
- 3 Screw
- 4 Brake disc
- 5 Dust protection (optional)
- 6 Armature
- 7 Hand release
- 8 Hand release bellows
- 9 Air gap regulation screw
- 10 Magnet
- 11 Fan cover
- 12 Fan
- 13 Torque regulation screw

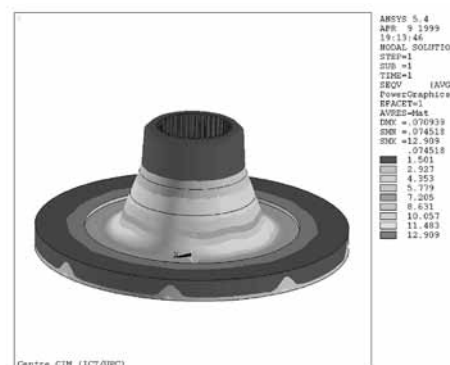


M000123

Brake disc

The brake lining is made from asbestos-free material. It is highly resistant to wear and has excellent thermal conductivity, thus giving consistent performance even at high temperatures.

The brake disc withstands a large number of braking operations and is insensitive to dust and moisture. The core of the brake disc is grooved and made of special polyamide that absorbs impacts, enabling it to work with high vibration applications.



M000124

Readjusting the air gap

The brakes are supplied with the air gap adjusted to its nominal value.

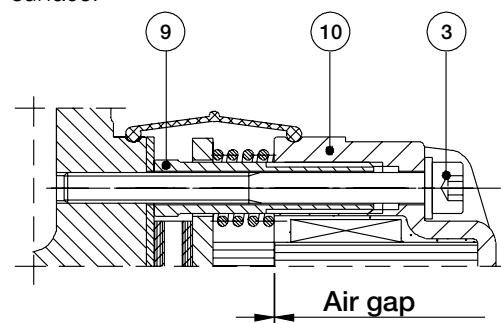
The air gap has to be readjusted to its nominal value when the wear of the lining reaches the readjustment value (Xn) stated in table 1.

For this operation, work on the bushings (9) after releasing the bolts (3).

Tighten up the bushings in the magnet support (10) as required to reach the rated air gap value stated in table 1.

Tighten the bolts (3) to the specific torque, C (see table 1).

At the end of the operation, check that the air gap complies with the specified value and is uniform across the whole surface.



M000125

Replacing the brake disc

The brake disc must be replaced when reaching the minimum permissible lining thickness stated in Table 1.

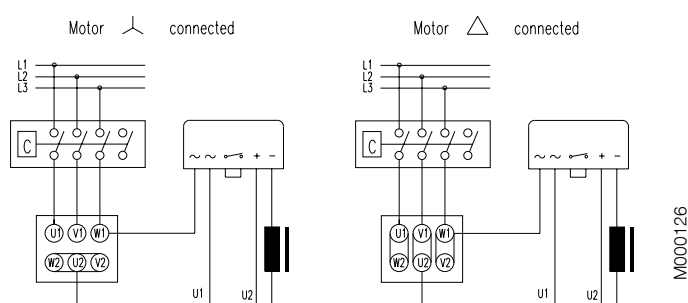
Rectifier

The rectifier is a device for DC brake applications. It is highly resistant to temperature as well as to voltage peaks, and it includes an additional protection of the auxiliary contact of contactor. Its compact design enables it to be placed in the motor terminal box.

Connection for DC brake¹⁾

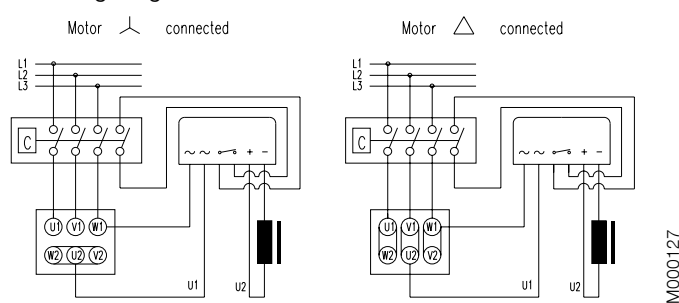
The brake is fed via a rectifier. The voltage stated on the brake rating plate is that of the brake coil on the DC side of the rectifier.

Standard connection (t'21~)



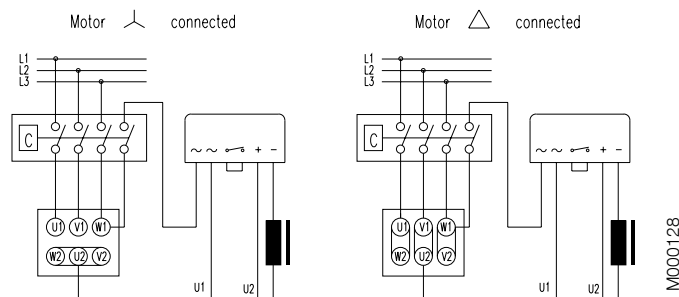
Reconnection (t21=)

To obtain instant braking, please see table 2 (t21=), use the following diagram.



Reconnection (t21~)

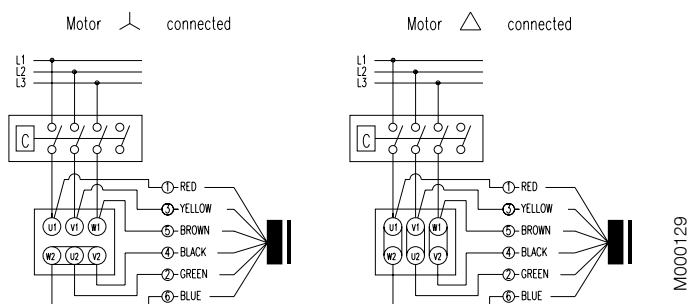
When it is necessary to reduce the braking time, the connections should be modified according to the following diagram. The breaking of the circuit on the AC side is controlled by using an auxiliary contact of the contactor.



Connection of AC brake¹⁾

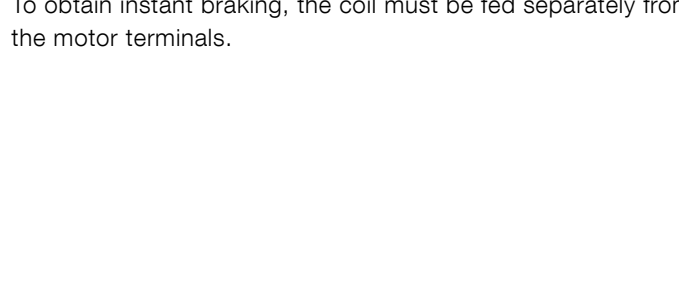
The coil should only be used between 90 % – 110 % of its rated voltage.

Standard connection (t21)



Reconnection (t21f)

To obtain instant braking, the coil must be fed separately from the motor terminals.



¹⁾ Remark:

Regardless of whether a DC or AC brake is used, the brake is usually connected to the motor terminals of single-speed motors. It can, however, also be delivered with a separate

brake supply (variant code 086). In case of two-speed motors, the brake is always connected separately. Separate brake connection is compulsory when the motor is driven by a frequency converter.

Hand release

The device is a lever used to override the action of the brake springs for as long as it is applied.

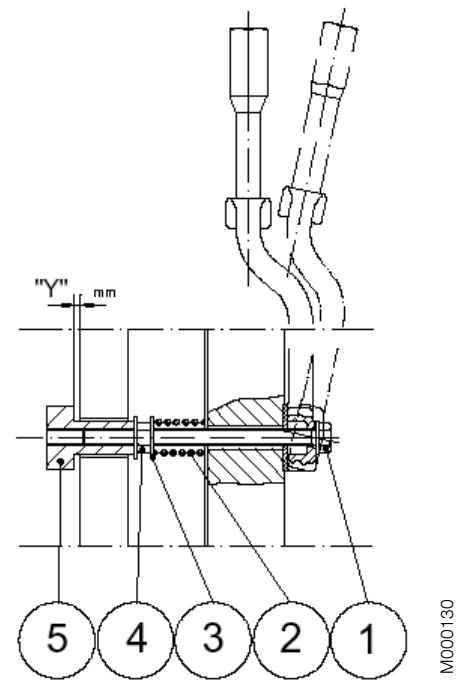
Hand release is included as standard, except for frame size 63, where it is available as option, see variant code 088.

When installing the release lever, please proceed as follows:

Remove the rubber protection, if fitted. Insert the screw (1) with its washer, position the spring (2) and washer (3) and tighten the nut (4) firmly. Fit the other washer and the square-head nut (5); adjust the position of the nut in relation to the moving magnet (Y value) with the central screw (1). When the required value is reached, tighten the inner nut (4) while holding nut (5) fixed.

Important: The use of the release lever needs periodic checking of the Y value and the air gap. The air gap should never exceed the maximum values stated in brake data table 1. Failure to check could result in malfunction due to mechanical locking of the armature.

Size	Y
FM 075.5	1
FM 088.6	1
FM 100.6	1
FM 120.6	1
FM 140.6	1.5
FM 155.6	1.5
FM 170.6	1.5
FM 206.6	1.5

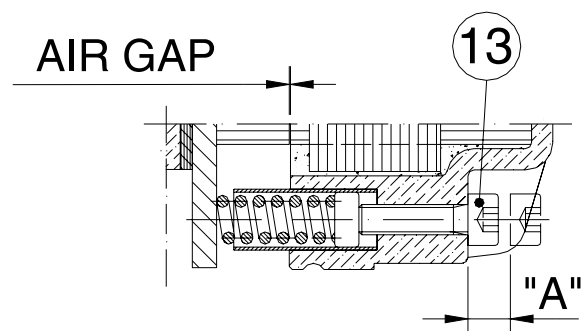


Torque adjustment

In brake motors from frame size 71 up to 180, the braking torque can be adjusted from 100 % up to 55 % of the nominal torque as standard.

Instructions for how to regulate torque are delivered with the brake motor. These instructions describe how to loosen the torque regulation screw (13), as well as the relation between dimension A and torque.

Reduced braking torque, from 60 % up to 33 %, is available by using variant code 087 (applies for frame sizes 71 - 180).



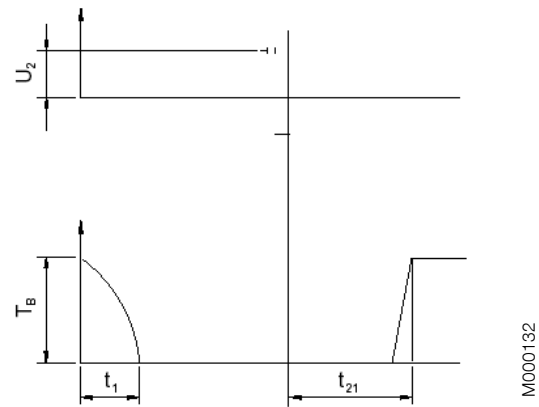
Brake operating times

The operating times stated in brake data table 2 are valid for the nominal air gap and warmed-up brake coil.

- t_1 = Brake release time.
 t_{21} = Braking time.
 U_2 = Rated voltage.
 T_B = Nominal braking torque.

Brake release time = the time from when voltage is applied to the brake coil up to the ceasing of braking action.

Braking time = the time from when the current is switched off up to the starting of braking action.



Special brakes (with DC brake)

Two-speed motors with one or two windings, motors with 9 or 12 terminals, and motors that have to be started with star-delta connection, with brake coil for DC, are supplied with the rectifier fitted in the motor terminal box, without the two wires that normally connect it to the motor terminal. The AC supply to the rectifier is independent to the motor supply and should be fed by the main contactor.

The standard brake coil connection voltages for 50 and 60 Hz will be those stated in the following table, unless stated otherwise in the order:

¹⁾ H.W. = Half-wave rectifier, F.W. = Full-wave rectifier

²⁾ Special coil on request

³⁾ Available using variant code 285

Rectifier input voltage (V_{AC})	Rectifier type ¹⁾	D.C. coil brake voltage (V)
110	F.W.	102 ²⁾
220	F.W.	205
230	F.W.	205
240	F.W.	205
250	F.W.	223 ²⁾
254	F.W.	223 ²⁾
380	H.W.	178
400	H.W.	178
415	H.W.	178
420	H.W.	178
440	H.W.	205
500	H.W.	223 ²⁾
24 V _{DC}	None	24 ³⁾

Brake data tables

Table 1.

Brake motor size		63	71	80	90	100	112	132	160/180	
		A/B							2 p	4-8 p
Brake type		75.5	88.6	100.6	120.6	140.6	155.6	170.6	206.6	
Rated torque ¹⁾	T_{Bnom} (Nm)	7.5	10	24	35	44	86	130	200	230
Delivered torque ²⁾	T_{Bdel} (Nm)	4	8	21	30	38	72	120	130	200
Nominal air gap	X (mm)	0.2	0.2	0.25	0.35	0.4	0.4	0.4	0.4	
Minimum permissible brake disc thickness	(mm)	3.5	3.5	5	5.5	6	6	7.5	8.5	
Recommended air gap readjustment	X_n (mm)	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.9	
Thickness of new brake disc	E_m (mm)	5.5	6	7.5	8.5	9.5	9.5	11	13	
Tightening torque: bolt	C_s (Nm)	6	6	12	12	30	30	30	50	
Input coil:										
- AC brake motor	(VA)	60	110	160	250	500	700	990	2000	
- DC brake motor	(W)	30	32	45	72	91	100	120	170	
Friction work per operation	WR_{max} (J)	1×10^3	1.5×10^3	2×10^3	3.5×10^3	6.6×10^3	8×10^3	1.1×10^4	2×10^4	
Friction work	PR_{max} (J/h)	3×10^5	3.5×10^5	4.5×10^5	7×10^5	9×10^5	9.5×10^5	1×10^6	1.2×10^6	
Operation for thickness wear of 0.1 mm	$WR_{0.1}$ (J)	7×10^6	10×10^6	15×10^6	17×10^6	31×10^6	31.5×10^6	48×10^6	80×10^6	
Moment of inertia	J (kgm ²)	1.5×10^{-5}	3.7×10^{-5}	7.5×10^{-5}	2×10^{-4}	3.7×10^{-4}	6.2×10^{-4}	10.4×10^{-4}	26.4×10^{-4}	
Weight	(kg)	0.8	1	1.6	2.7	4	5.2	9	16.2	

¹⁾ Braking torque after performing 10.000–15.000 operations.

²⁾ Delivered torque: Torque value marked on rating plate corresponding to the braking torque when the brake motor leaves the ABB factory. Tolerance of +/-10% of this value is accepted. Ambient conditions, temperature on friction surfaces, brake motor positioning and transport applied on the product can affect this value.

In general, all the variables mentioned above can affect the braking torque values, so if an accurate value is needed, ABB recommends it is measured in the real application. This allows adjustment to the required value by using the torque regulation facility.

Table 2.

Braking (t_{21}) and release (t_1) times

Brake motor sizes		63	71	80	90	100	112	132	160/180
		A/B							
Brake type		75.5	88.6	100.6	120.6	140.6	155.6	170.6	206.6
AC brake coil									
- release time	t1 (ms)	5	6.6	5	5.1	5.5	5	5	5.5
- standard braking time	t21 (ms)	25	25	30	40	50	50	65	105
- fast braking time	t21f (ms)	10	10	10	10	10	10	10	10
DC brake coil									
- release time	t1 (ms)	20	20	25	35	40	50	60	100
- std connection time	t'21 (ms)	150	170	210	330	420	720	850	930
- reconnection time	t21 (ms)	30	35	45	70	90	155	190	150
- fast reconnection time	t21= (ms)	10	10	15	20	35	45	55	

When fast braking in AC brake is used, the contactor that is operating the coil of the brake has to be over dimensioned taking in consideration a high inductive load.

Calculations

Maximum number of connections per hour

The connection frequency that may be achieved with the motors is limited by the temperature rise that they undergo both in the coil and in the rotor. The brakes are designed so that they may withstand the kinds of duty for which these motors are intended.

The maximum number of connections per hour depends on:

- the power P_2 required after reaching the rated speed, i.e. the relative load P with regard to the rated power P_n .

$$P = \frac{P_2}{P_n} \times 100 \%$$

- the total inertia J in kgm^2 of the mass to be accelerated (inertia of the rotor J_m as per catalogue, plus the additional inertia J_b of the driven machine) in relation to the motor shaft, that is, J_b multiplied by the square of the coefficient of the load speed divided by the motor speed.

$$J = J_m + J_b \times \left[\frac{n_b}{n_m} \right]^2$$

- the relative duration factor for service S4.

$$S4 = \frac{\text{connection time}}{\text{connection time} + \text{downtime}} \times 100 \text{ in } \%$$

For calculations of the maximum number of connections/hour, please consult ABB.

Required data:

- Type of brake motor
- Load inertia reduced at motor shaft
- Required power P_2
- Type of service

Permitted friction work per operation

Friction work per operation must not exceed the $WR_{\max}$ values stated in brake data table 1.

$$WR = \frac{1}{2} \times J \times \left[\frac{\pi \times n_m}{30} \right]^2 \text{ in joules}$$

Friction work per hour

The friction work can be calculated if the number of operations per hour is known.

This value must be equal to or less than the $PR_{\max}$ stated in brake data table 1.

$$PR = WR \times c/h$$

Braking time

The total braking time from the disconnecting of brake until the machine is stopped is calculated as follows:

$$t = 104.6 \times \frac{J \times n_m}{T_B} + t_{21}$$

t and t_{21} are in ms

Maximum number of operations until wear of 0.1 mm

The service life, expressed in switching operations, can be calculated with the aid of the values $WR_{0.1}$ given in brake data table 1.

$$L_{0.1} = \frac{WR_{0.1}}{WR}$$

Number of operations before readjusting the air gap

With the X_n values in table 1 we can calculate the number of required operations until the readjustment of air gap becomes necessary.

$$L_n = \frac{X_n - X}{0.1} \times L_{0.1}$$

Options

Separate brake supply

For brakes which need an independent supply, please note the variant code 086 and the voltage for feeding the brake. When the motor is supplied via a frequency converter, both in the case of DC and AC, the brake should be supplied separately at rated voltage (constant). The separate brake supply can be connected directly, no separate terminal box is needed.

Dust protection

To protect the brake disc against dust, the brake can be supplied with a rubber protection ring and V-ring.

Variant code 213 should be stated in the order.

Braking torque reduction

Reduced braking torque range, from 60 % up to 33 %, is available by using variant code 087.

Protective roof

To protect motors from accumulation of water, ice or snow when installed outdoors in the vertical position and with the shaft downwards, the assembly should be fitted with a protective roof.

Variant code 005 should in this case be stated in the order.

Ordering information

When placing an order, please state the following minimum data in the order, as in the example.

The product code of the motor is composed in accordance with the following example.

Motor type	M3ARF 112M
Pole number	4
Mounting arrangement (IM-code)	IM B3 (IM 1001)
Rated output	4 kW
Product code	3GAR112401-ADE
Variant codes if needed	
Brake information	

A	B	C	D	E	F	G	
M3ARF 112 M 3GAR 11 2 401 - ADE, 088 etc.							A = Motor type M3VRF/M3ARF (DC brake) M3VRS/M3ARS (AC brake) B = Motor size C = Product code D = Mounting arrangement code E = Voltage/frequency code F = Generation code G = Variant code
		1 2 3 4	5 6	7	8 9 10 11	12 13 14	

Positions 1 to 4

3GAA = Totally enclosed motor, aluminum frame

3GVA = Totally enclosed motor, aluminum frame, alternative design

Position 4

R = Brake motor

Positions 5 and 6

IEC-size

06 = 63 12 = 112

07 = 71 13 = 132

08 = 80

09 = 90

10 = 100

Position 7

Speed (Pole pairs)

1 = 2 poles 6 = 12 poles

2 = 4 poles 7 = > 12 poles

3 = 6 poles 8 = Two-speed motors

4 = 8 poles 9 = Multi-speed motors

5 = 10 poles

Position 8 to 10

Serial number

Position 11

- (dash)

Position 12

Mounting arrangement

A = Foot-mounted.

B = Flange-mounted. Large aluminum flange with clearance holes, sizes 63-100.

C = Flange-mounted. Small aluminum flange with tapped holes, sizes 63-100.

E = Flange-mounted. Large cast iron flange with clearance holes, sizes 112-132.

H = Foot- and flange-mounted. Large aluminum flange with clearance holes, sizes 63-100.

J = Foot- and flange-mounted. Small aluminum flange with tapped holes, sizes 63-100.

K = Foot- and flange-mounted. Large cast iron flange with clearance holes, sizes 112-132.

N = Flange mounted. Two piece cast iron flange (IEC-1) with clearance holes, sizes 90-132.

P = Foot- and flange-mounted. Two piece cast iron flange (IEC) with clearance holes, sizes 90-132.

Position 13

Voltage and frequency code

See table below

Position 14

Generation code = C (size 63), E (sizes 71-132)

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

Technical data

Single-speed DC brake motors

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

					Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg
					rated	braking						Power factor cos φ	I _N A	I _S /I _N	c/h ²⁾		
Out- put kW	Motor type	Product code			Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾	100 %	75 %						
3000 r/min = 2 pole					400 V 50 Hz					Basic design							
0.37	M3VRF	71 A	3GVR	071 401-CSE	2840	1.25	10	3.8	7.6	77.1	76.5	0.72	1	5.5	2600	0.00051	7
0.55	M3VRF	71 B	3GVR	071 402-ASE	2830	1.86	10	3.6	5.26	79.2	78.2	0.76	1.35	5.7	2600	0.0006	8
0.75	M3VRF	80 A	3GVR	081 401-BSE	2870	2.49	24	2.9	9.6	81.2	79.3	0.75	1.8	6.2	2000	0.00074	11
1.5	M3ARF	90 S	3GAR	091 401-••E	2870	5	35	2.4	7	80.1	76.2	0.82	3.35	5.5	1300	0.0021	19
2.2	M3ARF	90 L	3GAR	091 402-••E	2880	7.5	35	2.7	4.7	83.6	83.9	0.87	4.37	7.0	1200	0.0026	22
3	M3ARF	100 L	3GAR	101 401-••E	2900	10	44	2.7	4.4	86.0	84.1	0.88	5.95	7.5	1000	0.00453	32
4	M3ARF	112 M	3GAR	111 401-••E	2850	13.4	86	2.8	6.41	86.0	86.2	0.91	7.4	7.5	500	0.01078	38
5.5	M3ARF	132 SA	3GAR	131 401-••E	2855	18.4	130	3.2	7.06	86.0	86.6	0.88	10.5	7.8	600	0.01657	57
7.5	M3ARF	132 SB	3GAR	131 402-••E	2860	25.1	130	3.4	5.17	88.0	86.2	0.89	13.9	8.5	500	0.01857	62
3000 r/min = 2 pole					400 V 50 Hz					High-output design							
0.75	M3VRF	71 BC	3GVR	071 404-CSE	2800	2.57	10	3.1	3.84	78.5	77.9	0.85	1.7	5.1	2400	0.0006	8
2.7	³⁾ M3ARF	90 LB	3GAR	091 403-••E	2860	9	35	2.6	3.88	80.7	83.5	0.86	5.7	7.0	1200	0.0029	24
4	³⁾ M3ARF	100 LB	3GAR	101 402-••E	2900	13	44	2.7	3.38	85.0	84.3	0.86	8.1	7.5	1000	0.00543	36
5.5	³⁾ M3ARF	112 MB	3GAR	111 402-••E	2855	18.4	86	2.7	4.67	86.5	87.1	0.93	9.9	7.3	500	0.01273	66
9.2	³⁾ M3ARF	132 SBB	3GAR	131 404-••E	2825	31.1	130	3.2	4.18	86.0	88.2	0.93	16.6	7.3	500	0.02457	77
11	³⁾ M3ARF	132 SC	3GAR	131 403-••E	2835	37	130	3.2	3.51	87.0	87.4	0.93	19.6	8.0	500	0.02383	77

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S			D			X
	Motor	Brake (input rectifier voltage/brake voltage)		Motor	Brake (input rectifier voltage/brake voltage)		
	50 Hz	60 Hz		50 Hz	60 Hz		
63-132	220-240 VΔ	250-280 VΔ	220-240 V/205 V d.c.	380-420 VΔ	440-480 VΔ	380-420 V/178 V d.c.	Any other rated voltage or frequency, 690 V maimum connection for motor and 500 V for brake (input rectifier)
	380-420 VY			660-690 VY	–		
Motor size	E			F			
	Motor	Brake (input rectifier voltage/brake voltage)		Motor	Brake (input rectifier voltage/brake voltage)		
	50 Hz			50 Hz			
63-80	–	–		500 VY	500 V/223 V d.c.		
90-132	500 VΔ	500 V/223 V d.c.		500 VY	500 V/223 V d.c.		

Technical data

Single-speed DC brake motors

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

					Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg
					rated	braking				Power factor cos φ	I _N A	I _S /I _N	c/h ²⁾				
Out-put kW	Motor type	Product code			Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾					100 %	75 %		
1500 r/min = 4 pole					400 V 50 Hz					Basic design							
0.18	M3VRF	63 B	3GVR	062 402-BSC	1380	1.25	7.5	2.5	5.76	65.6	62.1	0.64	0.63	3.1	7100	0.00036	5.5
0.25	M3VRF	71 A	3GVR	072 401-CSE	1410	1.71	10	2.7	5.88	70.4	69.1	0.71	0.74	4.3	6500	0.00081	7
0.37	M3VRF	71 B	3GVR	072 402-ASE	1420	2.51	10	2.6	4	74.6	72.1	0.69	1.05	4.4	6500	0.00104	8
0.37	M3VRF	71 B	3GVR	072 402-BSE	1420	2.51	10	2.6	4	74.6	72.1	0.69	1.05	4.4	6500	0.00104	8
0.37	M3VRF	71 B	3GVR	072 402-CSE	1420	2.51	10	2.6	4	74.6	72.1	0.69	1.05	4.4	6500	0.00104	8
0.55	M3VRF	80 A	3GVR	082 401-ASE	1390	3.75	24	2.6	6.31	75.3	73.1	0.76	1.4	4.6	5000	0.00128	11
0.55	M3VRF	80 A	3GVR	082 401-BSE	1390	3.75	24	2.6	6.31	75.3	73.1	0.76	1.4	4.6	5000	0.00128	11
0.75	M3VRF	80 B	3GVR	082 402-ASE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
0.75	M3VRF	80 B	3GVR	082 402-BSE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
0.75	M3VRF	80 B	3GVR	082 402-CSE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
0.75	M3VRF	80 B	3GVR	082 402-CFE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
1.1	M3ARF	90 S	3GAR	092 401-••E	1410	7.5	35	2.2	4.66	77.5	76.4	0.81	2.59	5.0	3200	0.0034	19
1.5	M3ARF	90 L	3GAR	092 402-••E	1420	10	35	2.4	3.5	80.3	78.1	0.79	3.45	5.0	3200	0.0045	22
2.2	M3ARF	100 LA	3GAR	102 401-••E	1430	15	44	2.4	2.93	83.0	82.7	0.81	4.8	5.5	2700	0.00733	32
3	M3ARF	100 LB	3GAR	102 402-••E	1430	20	44	2.5	2.2	85.0	83.9	0.81	6.48	5.5	2700	0.00863	35
4	M3ARF	112 M	3GAR	112 401-••E	1435	26.6	86	2.9	3.23	84.5	83.9	0.80	8.6	7.0	2500	0.01578	40
5.5	M3ARF	132 S	3GAR	132 401-••E	1450	36.2	130	2.2	3.59	87.0	87.7	0.83	11.1	7.3	1800	0.03357	60
7.5	M3ARF	132 M	3GAR	132 402-••E	1450	49.4	130	2.5	2.63	88.0	88.6	0.83	14.8	7.9	1400	0.04057	68
1500 r/min = 4 pole					400 V 50 Hz					High-output design							
0.55	M3VRF	71 C	3GVR	072 404-BSE	1410	3.74	10	2.7	2.7	77.3	76.9	0.73	1.45	4.8	6500	0.00125	9
1.85	M3ARF	90 L	3GAR	092 403-••E	1390	13	35	2.2	2.69	79.5	78.1	0.80	4.4	4.5	3200	0.0045	22
2.2	M3ARF	90 LB	3GAR	092 404-••E	1390	15	35	2.2	2.33	80.3	81.0	0.83	4.85	4.5	3200	0.0048	23
4	M3ARF	100 LC	3GAR	102 403-••E	1420	27	44	2.5	1.62	81.0	81.7	0.82	8.65	5.5	2700	0.009	36
5.5	M3ARF	112 MB	3GAR	112 402-••E	1425	36.9	86	2.8	2.33	84.5	83.5	0.83	11.4	7.1	2500	0.018	47
9.2	M3ARF	132 MBA	3GAR	132 404-••E	1450	60	130	2.0	2.14	88.0	88.6	0.85	17.8	7.3	1400	0.05	83
11	M3ARF	132 MB	3GAR	132 403-••E	1450	72	130	2.5	1.79	88.0	89.4	0.86	21	8.3	500	0.05	83

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S			D			X
	Motor	Brake (input rectifier voltage/brake voltage)		Motor	Brake (input rectifier voltage/brake voltage)		
	50 Hz	60 Hz		50 Hz	60 Hz		
63-132	220-240 VΔ	250-280 VΔ	220-240 V/205 V d.c.	380-420 VΔ	440-480 VΔ	380-420 V/178 V d.c.	Any other rated voltage or frequency, 690 V maimum connection for motor and 500 V for brake (input rectifier)
	380-420 VY			660-690 VY	–		
Motor size	E			F			
	Motor	Brake (input rectifier voltage/brake voltage)		Motor	Brake (input rectifier voltage/brake voltage)		
	50 Hz			50 Hz			
63-80	–	–		500 VY	500 V/223 V d.c.		
90-132	500 VΔ	500 V/223 V d.c.		500 VY	500 V/223 V d.c.		

Technical data

Single-speed DC brake motors

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

Out-put kW					Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg
					rated		braking			Power factor cos φ		I _N A	I _S /I _N	c/h ²⁾			
					Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾								
Motor type	Product code	Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾	100 %	75 %	Power factor cos φ	I _N A	I _S /I _N	c/h ²⁾	J=1/4GD ² kgm ²	Weight foot mounted kg			
1000 r/min = 6 pole					400 V 50 Hz					Basic design							
0.25	M3VRF 71 B	3GVR 073 402-BSE	920	2.61	10	2.5	3.84	64.9	62.3	0.65	0.86	3.2	7500	0.00096	8		
0.37	M3VRF 80 A	3GVR 083 401-CSE	925	3.82	24	3.1	6.28	72.9	70.8	0.72	1.04	3.8	7000	0.00186	11		
0.55	M3VRF 80 B	3GVR 083 402-BSE	925	5.68	24	2.9	4.22	73.3	71.9	0.71	1.55	3.4	7000	0.0022	12		
0.75	M3ARF 90 S	3GAR 093 401-••E	930	7.5	35	1.9	4.66	71.5	70.7	0.67	2.36	4.0	3800	0.0034	19		
1.1	M3ARF 90 L	3GAR 093 402-••E	930	11	35	2.1	3.18	74.4	72.5	0.69	3.25	4.0	3900	0.0045	22		
1.5	M3ARF 100 L	3GAR 103 401-••E	950	15	44	1.9	2.93	80.0	77.0	0.71	3.92	4.5	3300	0.0086	34		
2.2	M3ARF 112 M	3GAR 113 401-••E	940	22.3	86	2.1	3.85	80.5	79.3	0.74	5.4	5.6	3200	0.015	40		
3	M3ARF 132 S	3GAR 133 401-••E	960	29.8	130	2.0	4.36	84.5	82.7	0.75	6.9	6.1	2400	0.033	59		
4	M3ARF 132 MA	3GAR 133 402-••E	960	39.7	130	2.0	3.27	85.5	83.1	0.78	8.7	7.1	1900	0.04	66		
5.5	M3ARF 132 MB	3GAR 133 403-••E	955	55	130	2.2	2.36	86.0	85.0	0.78	11.9	6.9	1900	0.047	74		
1000 r/min = 6 pole					400 V 50 Hz					High-output design							
1.3	³⁾ M3ARF 90 LB	3GAR 093 403-••E	910	13.5	35	1.9	2.59	69.0	69.0	0.71	3.85	4.0	3800	0.005	24		
2.2	³⁾ M3ARF 100 LC	3GAR 103 402-••E	940	22	44	1.9	2	77.0	72.8	0.71	5.9	4.5	3300	0.009	37		
3	³⁾ M3ARF 112 MB	3GAR 113 402-••E	935	30.6	86	2.0	2.81	80.0	79.9	0.76	7.2	5.5	3200	0.018	46		
6.5	³⁾ M3ARF 132 MC	3GAR 133 404-••E	960	64	130	2.0	2.01	85.0	84.5	0.75	14.8	6.6	2400	0.051	79		

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

	S			D			X
	Motor	Brake	(input rectifier voltage/brake voltage)	Motor	Brake	(input rectifier voltage/brake voltage)	
Motor size	50 Hz 60 Hz			50 Hz 60 Hz			
63-132	220-240 VΔ 380-420 VY	250-280 VΔ	220-240 V/205 V d.c.	380-420 VΔ 660-690 VY	440-480 VΔ –	380-420 V/178 V d.c.	Any other rated voltage or frequency, 690 V maximum connection for motor and 500 V for brake (input rectifier)
	E			F			
	Motor	Brake	(input rectifier voltage/brake voltage)	Motor	Brake	(input rectifier voltage/brake voltage)	
Motor size	50 Hz			50 Hz			
63-80	–	–	–	500 VY	500 V/223 V d.c.	500 V/223 V d.c.	
90-132	500 VΔ	500 V/223 V d.c.		500 VY	500 V/223 V d.c.		

Technical data

Single-speed DC brake motors

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

Out-put kW	Motor type	Product code	Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg	
			Speed r/min	rated		braking		K ¹⁾	100 %	75 %	Power factor cos φ	I _N A	I _S /I _N			c/h ²⁾
				T _N Nm	T _B Nm	T _S / T _N										
750 r/min = 8 pole			400 V 50 Hz								Basic design					
0.37	M3ARF 90 S	3GAR 094 401-••E	700	5	35	1.9	7	61.5	43.4	0.56	1.6	3.0	4100	0.0032	19	
0.55	M3ARF 90 L	3GAR 094 402-••E	690	7.5	35	1.7	4.66	62.9	56.4	0.57	2.35	3.0	4100	0.0045	22	
0.75	M3ARF 100 LA	3GAR 104 401-••E	700	10	44	2.1	4.4	72.0	63.6	0.59	2.55	3.5	3600	0.0073	31	
1.1	M3ARF 100 LB	3GAR 104 402-••E	700	15	44	2.1	2.93	73.0	68.8	0.64	3.35	3.5	3700	0.0086	34	
1.5	M3ARF 112 M	3GAR 114 401-••E	695	20.6	86	1.9	4.17	74.5	75.9	0.65	4.5	4.1	3600	0.016	41	
2.2	M3ARF 132 S	3GAR 134 401-••E	720	29.2	130	1.6	4.45	80.5	77.8	0.67	5.9	5.3	3000	0.04	66	
3	M3ARF 132 M	3GAR 134 402-••E	720	39.8	130	1.8	3.26	82.0	79.2	0.68	7.8	5.5	2600	0.047	73	

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S			D			X
	Motor	Brake (input rectifier voltage/brake voltage)		Motor	Brake (input rectifier voltage/brake voltage)		
63-132	50 Hz 60 Hz	220-240 VΔ 250-280 VΔ	220-240 V/205 V d.c.	50 Hz 60 Hz	380-420 VΔ 440-480 VΔ	380-420 V/178 V d.c.	Any other rated voltage or frequency, 690 V mainum connection for motor and 500 V for brake (input rectifier)
		380-420 VY			660-690 VY –		
Motor size	E			F			
	Motor	Brake (input rectifier voltage/brake voltage)		Motor	Brake (input rectifier voltage/brake voltage)		
63-80	50 Hz	–		50 Hz	500 V/223 V d.c.		
90-132	–	500 VΔ	500 V/223 V d.c.	500 VY	500 V/223 V d.c.		

Technical data

Two-speed DC brake motors

IP 55 – IC 411 – Insulation class F, temperature rise class F – Brake IP 23 S

Out-put kW			Motor type		Product code		Speed r/min	Torque				Effi- ciency %	Power factor cos φ	Current		Moment of inertia J=1/4GD ² kgm ²	Weight IM 1001 kg		
								rated	braking					I _N	I _S /I _N				
								T _N Nm	T _B Nm	T _S / T _N	K ¹⁾								
3000/1500 r/min = 2/4 poles								400 V 50 Hz				Constant torque, two separate windings							
1.1/0.55	M3ARF	90 S	3GAR	098 401-••E	2900/1450	3.6/3.6	35	1.4/1.5	9.7/9.7	74/62	0.85/0.64	2.5/2	5.1/3.6	0.0019	20				
1.5/0.75	M3ARF	90 L	3GAR	098 402-••E	2900/1450	4.9/4.9	35	1.5/1.5	7.1/7.1	77/70	0.87/0.67	3.3/2.4	5.7/4.1	0.0024	23				
2.0/1.0	M3ARF	100 L	3GAR	108 401-••E	2900/1460	6.5/6.5	44	1.9/1.4	7.7/7.7	76/67	0.89/0.66	4.3/3.3	6.2/4	0.0041	32				
2.6/1.3	M3ARF	112 M	3GAR	118 401-••E	2900/1460	8.6/8.5	86	1.6/1.6	10/9.9	80/75	0.92/0.72	5.1/3.5	6.4/5	0.012	45				
4.4/2.2	M3ARF	132 SB	3GAR	138 401-••E	2925/1450	14.4/14.5	130	2/1.3	10.4/10	81/74	0.86/0.73	9.1/5.9	7.3/4.5	0.016	55				
5.6/2.8	M3ARF	132 M	3GAR	138 402-••E	2885/1440	18.5/18.6	130	1.8/1.4	8.1/8.1	82/77	0.93/0.75	10.6/7	6.7/5	0.022	76				
3000/1500 r/min = 2-4 poles								400 V 50 Hz				Constant torque, Dahlander connection							
1.3/1	M3ARF	90 S	3GAR	098 403-••E	2730/1400	4.5/6.8	35	2/1.5	7.8/5.1	71/71	0.88/0.8	3.1/2.6	3.9/3.8	0.0032	20				
1.9/1.5	M3ARF	90 L	3GAR	098 404-••E	2820/1420	6.4/10	35	2.8/2	5.5/3.5	74/75	0.82/0.76	4.4/3.9	5.1/4.4	0.0043	23				
2.5/2.1	M3ARF	100 LA	3GAR	108 402-••E	2800/1430	8.5/14	44	2.2/1.6	5.9/3.6	68/76	0.88/0.81	6/5	4.8/4.4	0.0069	32				
3.4/2.5	M3ARF	100 LB	3GAR	108 403-••E	2810/1430	11.5/18	44	2.2/1.9	4.3/2.7	78/80	0.88/0.85	7.2/5.9	5.3/5.4	0.0082	35				
4/2.6	M3ARF	112 M	3GAR	118 402-••E	2865/1430	13.3/17.4	86	1.8/2.3	10/9.9	82/77	0.93/0.76	7.6/6.5	6.3/6.2	0.012	45				
4.7/3.1	M3ARF	132 SB	3GAR	138 403-••E	2820/1420	15.9/20.8	130	1.8/2.2	10.4/10	79/77	0.92/0.76	9.2/7.7	5.5/5.7	0.016	55				
6.3/4.4	M3ARF	132 SA	3GAR	138 411-••E	2895/1445	20.8/29	130	1.7/1.6	7.2/5.2	85/84	0.94/0.8	11.4/9.5	6.5/5.7	0.0155	58				
7.2/4.8	M3ARF	132 M	3GAR	138 404-••E	2870/1435	24/31.9	130	2.4/2.5	6.3/4.7	84/81	0.92/0.76	13.3/11.5	7.1/6.2	0.022	76				
8/6.2	M3ARF	132 SC	3GAR	138 412-••E	2910/1440	26.2/41.1	130	1.9/1.6	6.9/3.6	87/85	0.95/0.83	14/12.7	7.8/5.6	0.0215	78				
9.6/7	M3ARF	132 MD	3GAR	138 413-••E	2900/1440	31.6/46.4	130	1.8/1.7	4.7/3.2	87/85	0.95/0.85	16.8/14.1	7.6/5.9	0.026	85				
1500/1000 r/min = 4/6 poles								400 V 50 Hz				Constant torque, two separate windings							
0.8/0.5	M3ARF	90 S	3GAR	098 405-••E	1430/940	5.3/5	35	1.5/1.4	7/6.6	68/57	0.8/0.66	2.2/2	3.9/2.8	0.0032	20				
1.2/0.75	M3ARF	90 L	3GAR	098 406-••E	1430/940	8/7.6	35	1.7/1.5	4.6/4.4	73/63	0.81/0.67	3/2.6	4.4/3.1	0.0043	23				
1.5/0.9	M3ARF	100 LA	3GAR	108 404-••E	1440/960	9.9/8.9	44	1.5/1.5	5.6/5.1	75/69	0.84/0.65	3.5/3	4.7/3.8	0.0069	32				
1.8/1.1	M3ARF	100 LB	3GAR	108 405-••E	1460/960	11/11	44	2.1/1.6	4.5/4.5	77/70	0.78/0.64	4.4/3.6	5.8/3.9	0.0082	35				
2.6/1.7	M3ARF	112 M	3GAR	118 403-••E	1445/960	17.2/16.9	86	1.5/1.5	5/4.9	80/70	0.85/0.76	5.5/4.4	5.9/5.2	0.018	45				
3.3/2.2	M3ARF	132 S	3GAR	138 405-••E	1470/980	21.4/21.4	130	1.4/1.2	7/7	82/76	0.8/0.65	7.1/6.4	6.8/4.6	0.038	61				
4.5/3	M3ARF	132 M	3GAR	138 406-••E	1470/980	29.2/29.2	130	1.4/1.5	5.1/5.1	82/77	0.81/0.7	9.8/8	7.2/5.6	0.048	79				
5.5/3.7	M3ARF	132 MD	3GAR	138 414-••E	1460/960	36/36.8	130	1.9/1.8	4.2/4.2	85/81	0.88/0.8	10.7/8.3	8/6.3	0.036	84				

¹⁾ Braking-torque ratio

Technical data

Two-speed DC brake motors

IP 55 – IC 411 – Insulation class F, temperature rise class F – Brake IP 23 S

Out-put kW			Motor type			Product code			Torque				Power		Current		Moment of inertia J=1/4GD ² kgm ²	Weight IM 1001 kg
									rated	braking					I _N	I _S /I _N		
Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾	Efficien- cy %	factor cos φ	I _N	I _S /I _N A	J=1/4GD ² kgm ²	Weight IM 1001 kg								
3000/750 r/min = 2/8 poles									400 V 50 Hz				Constant torque, two separate windings					
0.75/0.18	M3ARF 90 LA	3GAR 098 411-••E	2875/720	2.5/2.4	35	2.3/1.3	14/14	71.2/46.3	0.8/0.51	1.9/1.1	5.7/2.4	0.0043	23					
1.3/0.33	M3ARF 90 LB	3GAR 098 412-••E	2780/690	4.4/4.5	35	1.8/1.2	8/8	71/52	0.92/0.62	2.9/1.5	4.5/2.3	0.0043	23					
1.8/0.5	M3ARF 100 LB	3GAR 108 410-••E	2860/705	6.6/6.7	44	1.7/1.3	8.3/7.4	80/54	0.93/0.64	3.5/2.1	5.3/2.6	0.0082	35					
2.2/0.59	M3ARF 112 MC	3GAR 118 406-••E	2900/720	7.2/7.8	86	2.4/1.6	11.8/11	78/62	0.87/0.55	4.9/2.5	7/3.5	0.015	42					
3.3/0.95	M3ARF 132 SA	3GAR 138 415-••E	2940/730	10.7/12.4	130	2.6/1.2	14/12	81/72	0.95/0.52	6.2/3.7	9.5/4.3	0.0215	65					
4.4/1.3	M3ARF 132 MC	3GAR 138 416-••E	2920/725	14.4/17.1	130	2.2/1.3	10.7/8.8	82/74	0.94/0.62	8.3/4.1	8.6/4	0.03	77					
1500/750 r/min = 4/8 poles									400 V 50 Hz				Constant torque, two separate windings					
0.55/0.25	M3ARF 90 S	3GAR 098 407-••E	1450/700	3.6/3.4	35	1.3/1.4	10.3/9.7	62/51	0.78/0.59	1.9/1.2	4.2/2.3	0.0032	20					
0.75/0.37	M3ARF 90 L	3GAR 098 408-••E	1450/700	4.9/5	35	1.4/1.5	7.1/7	66/57	0.75/0.57	2.2/1.7	4.1/2.5	0.0043	23					
1.1/0.55	M3ARF 100 LA	3GAR 108 406-••E	1460/710	7.2/7.4	44	1.2/1.2	6.9/6.8	68/62	0.77/0.61	3.1/2.2	4.2/2.6	0.0069	32					
1.5/0.75	M3ARF 100 LB	3GAR 108 407-••E	1440/700	9.8/10	44	1.3/1.2	5.1/5	72/60	0.82/0.6	3.7/2.9	4.6/2.7	0.0082	35					
1.8/0.9	M3ARF 112 M	3GAR 118 404-••E	1460/715	11.7/12	86	1.2/1.6	7.3/7.1	77/65	0.76/0.66	4.4/3	6.5/4	0.018	45					
2.5/1.3	M3ARF 132 S	3GAR 138 407-••E	1480/735	16.2/17	130	1.6/1.4	9.3/8.8	80/67	0.79/0.56	5.8/6	6/3.7	0.038	61					
3.3/1.7	M3ARF 132 M	3GAR 138 408-••E	1470/725	21.4/22.4	130	1.6/1.4	7/6.7	81/71	0.79/0.58	7.5/6	7/4.2	0.048	79					
1500/750 r/min = 4-8 poles									400 V 50 Hz				Constant torque, Dahlander connection					
0.7/0.37	M3ARF 90 S	3GAR 098 409-••E	1420/700	4.7/5.1	35	1.6/1.6	7.4/6.9	72/50	0.8/0.57	1.8/1.9	4.4/2.3	0.0032	20					
1.1/0.55	M3ARF 90 L	3GAR 098 410-••E	1390/685	7.4/7.5	35	1.4/1.5	4.7/4.7	70/55	0.84/0.58	2.6/2.6	4.1/2.3	0.0043	23					
1.5/0.75	M3ARF 100 LA	3GAR 108 408-••E	1440/710	10/10	44	1.4/1.5	5/5	76/62	0.85/0.57	3.4/3.2	4.6/2.8	0.0069	32					
2/0.95	M3ARF 100 LB	3GAR 108 409-••E	1440/710	13/12	44	1.4/1.6	4.2/3.8	78/64	0.86/0.55	4.4/4	4.8/2.9	0.0082	35					
2.5/1.5	M3ARF 112 M	3GAR 118 405-••E	1410/705	16.9/20.3	86	1.4/1.5	5/4.2	78/67	0.9/0.66	5.1/4.9	5.5/4.1	0.018	45					
3.8/1.9	M3ARF 132 S	3GAR 138 409-••E	1450/730	25/24.9	130	1.4/1.3	6/6	82/70	0.84/0.52	7.7/7.6	5.6/3.7	0.038	61					
5/2.5	M3ARF 132 M	3GAR 138 410-••E	1455/730	32.8/32.7	130	1.7/2	4.6/4.6	85/73	0.88/0.52	9.6/9.6	6.9/4.8	0.048	79					

¹⁾ Braking-torque ratio

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

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	A		B		S	
	Motor	Brake (input rectifier voltage/brake voltage)	Motor	Brake (input rectifier voltage/brake voltage)	Motor	Brake (input rectifier voltage/brake voltage)
63-132	–	–	–	–	220-230 V	220-230 V/205 V d.c.
Motor size	D		E		X	
	Motor	Brake (input rectifier voltage/brake voltage)	Motor	Brake (input rectifier voltage/brake voltage)	Any other rated voltage or frequency, 690 V maimum connection for motor and 500 V for brake (input rectifier)	
63-132	380-400 V	380-400 V/178 V d.c.	500 V	500 V/223 V d.c.		

Technical data

Single-speed motors with three phase AC brake

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

			Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg		
Out- put kW	Motor type	Product code	Speed r/min	rated		braking		K ¹⁾	100 %	75 %	Power factor cos φ	I _N A	I _S /I _N			c/h ²⁾	
				T _N Nm	T _B Nm	T _S / T _N											
3000 r/min = 2 pole			400 V 50 Hz					Basic design									
0.55	M3VRS	71 B	3GVR	071 452-CSE	2830	1.86	10	3.6	5.26	79.2	78.2	0.76	1.35	5.7	2600	0.0006	8
0.75	M3VRS	80 A	3GVR	081 451-BSE	2870	2.49	24	2.9	9.6	81.2	79.3	0.75	1.8	6.2	2000	0.00074	11
1.1	M3VRS	80 B	3GVR	081 452-ASE	2850	3.69	24	2.3	6.48	81.4	79.5	0.78	2.5	6.1	2000	0.00078	12
1.1	M3VRS	80 B	3GVR	081 452-BSE	2850	3.69	24	2.3	6.48	81.4	79.5	0.78	2.5	6.1	2000	0.00078	12
1.5	M3ARS	90 S	3GAR	091 451-••E	2870	5	35	2.4	7	80.1	76.2	0.82	3.35	5.5	1300	0.0021	19
2.2	M3ARS	90 L	3GAR	091 452-••E	2880	7.5	35	2.7	4.6	83.6	83.9	0.87	4.37	7.0	1200	0.0026	22
3	M3ARS	100 L	3GAR	101 451-••E	2900	10	44	2.7	4.4	86.0	84.1	0.88	5.95	7.5	1000	0.00453	32
4	M3ARS	112 M	3GAR	111 451-••E	2850	13.4	86	2.8	6.41	86.0	86.2	0.91	7.4	7.5	500	0.01078	38
5.5	M3ARS	132 SA	3GAR	131 451-••E	2855	18.4	130	3.2	7.06	86.0	86.6	0.88	10.5	7.8	600	0.01657	57
7.5	M3ARS	132 SB	3GAR	131 452-••E	2860	25.1	130	3.4	5.17	88.0	86.2	0.89	13.9	8.5	500	0.01857	62
3000 r/min = 2 pole			400 V 50 Hz					High-output design									
2.7	³⁾ M3ARS	90 LB	3GAR	091 453-••E	2860	9	35	2.6	3.9	80.7	83.5	0.86	5.7	7.0	1200	0.0029	24
4	³⁾ M3ARS	100 LB	3GAR	101 452-••E	2900	13	44	2.7	3.38	85.0	84.3	0.86	8.1	7.5	1000	0.00543	36
5.5	³⁾ M3ARS	112 MB	3GAR	111 452-••E	2855	18.4	86	2.7	4.67	86.5	87.1	0.93	9.9	7.3	500	0.01273	66
9.2	³⁾ M3ARS	132 SBB	3GAR	131 454-••E	2825	31.1	130	3.2	4.18	86.0	88.2	0.93	16.6	7.3	500	0.02457	77
11	³⁾ M3ARS	132 SC	3GAR	131 453-••E	2835	37	130	3.2	3.51	87.0	87.4	0.93	19.6	8.0	500	0.02383	77

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S				D				G		H		X
	Motor 50 Hz	Motor 60 Hz	Brake 50 Hz	Brake 60 Hz	Motor 50 Hz	Motor 60 Hz	Brake 50 Hz	Brake 60 Hz	Motor 50 Hz	Brake 50 Hz	Motor 50 Hz	Brake 50 Hz	
63-132	220-240 VΔ	250-280 VΔ	230 VΔ	265 VΔ	380-420 VΔ	440-480 VΔ	400 VΔ	460 VΔ	–	–	–	–	Any other rated voltage or frequency, 690V maximum
	380-420 VY	440-480 VY	400 VY	460 VY	660-690 VY	–	690 VY	–					

Technical data

Single-speed motors with three phase AC brake

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

Out-put kW					Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg
					rated		braking			Power factor cos φ							
					Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾								
Motor type	Product code				400 V 50 Hz					100 %	75 %		I _N A	I _S /I _N	c/h ²⁾		
1500 r/min = 4 pole					400 V 50 Hz					Basic design							
0.12	M3VRS	63 A	3GVR	062 451-BSC	1400	0.82	7.5	2.6	9.37	63.7	58.4	0.59	0.46	3.1	7100	0.00029	5
0.12	M3VRS	63 A	3GVR	062 451-CSC	1400	0.82	7.5	2.6	9.37	63.7	58.4	0.59	0.46	3.1	7100	0.00029	5
0.18	M3VRS	63 B	3GVR	062 452-BSC	1380	1.25	7.5	2.5	5.76	65.6	62.1	0.64	0.63	3.1	7100	0.00036	5.5
0.18	M3VRS	63 B	3GVR	062 452-CSC	1380	1.25	7.5	2.5	5.76	65.6	62.1	0.64	0.63	3.1	7100	0.00036	5.5
0.25	M3VRS	71 A	3GVR	072 451-BSE	1410	1.71	10	2.7	5.88	70.4	69.1	0.71	0.74	4.3	6500	0.00081	7
0.25	M3VRS	71 A	3GVR	072 451-CSE	1410	1.71	10	2.7	5.88	70.4	69.1	0.71	0.74	4.3	6500	0.00081	7
0.37	M3VRS	71 B	3GVR	072 452-ASE	1420	2.51	10	2.6	4	74.6	72.1	0.69	1.05	4.4	6500	0.00104	8
0.37	M3VRS	71 B	3GVR	072 452-BSE	1420	2.51	10	2.6	4	74.6	72.1	0.69	1.05	4.4	6500	0.00104	8
0.37	M3VRS	71 B	3GVR	072 452-CSE	1420	2.51	10	2.6	4	74.6	72.1	0.69	1.05	4.4	6500	0.00104	8
0.55	M3VRS	80 A	3GVR	082 451-ASE	1390	3.75	24	2.6	6.31	75.3	73.1	0.76	1.4	4.6	5000	0.00128	11
0.55	M3VRS	80 A	3GVR	082 451-BSE	1390	3.75	24	2.6	6.31	75.3	73.1	0.76	1.4	4.6	5000	0.00128	11
0.55	M3VRS	80 A	3GVR	082 451-CSE	1390	3.75	24	2.6	6.31	75.3	73.1	0.76	1.4	4.6	5000	0.00128	11
0.75	M3VRS	80 B	3GVR	082 452-ASE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
0.75	M3VRS	80 B	3GVR	082 452-BSE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
0.75	M3VRS	80 B	3GVR	082 452-CSE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
0.75	M3VRS	80 B	3GVR	082 452-BFE	1410	5.08	24	3.5	4.7	78.2	75.6	0.74	1.9	4.7	5000	0.00159	12
1.1	M3ARS	90 S	3GAR	092 451-••E	1410	7.5	35	2.2	4.66	77.5	76.4	0.81	2.59	5.0	3200	0.0034	19
1.5	M3ARS	90 L	3GAR	092 452-••E	1420	10	35	2.4	3.5	80.3	78.1	0.79	3.45	5.0	3200	0.0045	22
2.2	M3ARS	100 LA	3GAR	102 451-••E	1430	15	44	2.4	2.93	83.0	82.7	0.81	4.8	5.5	2700	0.00733	32
3	M3ARS	100 LB	3GAR	102 452-••E	1430	20	44	2.5	2.2	85.0	83.9	0.81	6.48	5.5	2700	0.00863	35
4	M3ARS	112 M	3GAR	112 451-••E	1435	26.6	86	2.9	3.23	84.5	83.9	0.80	8.6	7.0	2500	0.01578	40
5.5	M3ARS	132 S	3GAR	132 451-••E	1450	36.2	130	2.2	3.59	87.0	87.7	0.83	11.1	7.3	1800	0.03357	60
7.5	M3ARS	132 M	3GAR	132 452-••E	1450	49.4	130	2.5	2.63	88.0	88.6	0.83	14.8	7.9	1400	0.04057	68
1500 r/min = 4 pole					400 V 50 Hz					High-output design							
0.25	M3VRS	63 BB	3GVR	062 453-BSC	1370	1.75	7.5	2.5	4.28	70.3	67.4	0.67	0.78	3.2	7100	0.0004	6
0.55	M3VRS	71 C	3GVR	072 454-BSE	1410	3.74	10	2.7	2.7	77.3	76.9	0.73	1.45	4.8	6500	0.00125	9
0.95	M3VRS	80 C	3GVR	082 453-BSE	1410	6.44	24	2.9	3.75	78.9	77.9	0.75	2.35	4.3	500	0.00197	13
1.85	³⁾ M3ARS	90 L	3GAR	092 453-••E	1390	13	35	2.2	2.69	79.5	78.1	0.80	4.4	4.5	3200	0.0045	22
2.2	³⁾ M3ARS	90 LB	3GAR	092 454-••E	1390	15	35	2.2	2.33	80.3	81.0	0.83	4.85	4.5	3200	0.0048	23
4	³⁾ M3ARS	100 LC	3GAR	102 453-••E	1420	27	44	2.5	1.62	81.0	81.7	0.82	8.65	5.5	2700	0.009	36
5.5	³⁾ M3ARS	112 MB	3GAR	112 452-••E	1425	36.9	86	2.8	2.14	84.5	83.5	0.83	11.4	7.1	2500	0.018	47
9.2	³⁾ M3ARS	132 MBA	3GAR	132 454-••E	1450	60	130	2.0	2.14	88.0	88.6	0.85	17.8	7.3	1400	0.05	83
11	³⁾ M3ARS	132 MB	3GAR	132 453-••E	1450	72	130	2.5	1.79	88.0	89.4	0.86	21	8.3	500	0.05	83

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S				D				G		H		X
	Motor	Brake	Motor	Brake	Motor	Brake	Motor	Brake	Motor	Brake	Motor	Brake	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	50 Hz	50 Hz	50 Hz	
63-132	220-240 VΔ	250-280 VΔ	230 VΔ	265 VΔ	380-420 VΔ	440-480 VΔ	400 VΔ	460 VΔ	-	-	-	-	Any other rated voltage or frequency, 690V maximum
	380-420 VY	440-480 VY	400 VY	460 VY	660-690 VY	-	690 VY	-					

Technical data

Single-speed motors with three phase AC brake

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

Out-put kW					Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg	
					rated		braking			Power factor cos φ								
					Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾									
Motor type	Product code	Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ¹⁾	100 %	75 %		I _N A	I _S /I _N	c/h ²⁾						
1000 r/min = 6 pole					400 V 50 Hz					Basic design								
0.25	M3VRS 71 B	3GVR 073 452-ASE	920	2.61	10	2.5	3.84	64.9	62.3	0.65	0.86	3.2	7500	0.00096	8			
0.25	M3VRS 71 B	3GVR 073 452-BSE	920	2.61	10	2.5	3.84	64.9	62.3	0.65	0.86	3.2	7500	0.00096	8			
0.37	M3VRS 80 A	3GVR 083 451-BSE	925	3.82	24	3.1	6.15	72.9	70.8	0.72	1.04	3.8	7000	0.00186	11			
0.55	M3VRS 80 B	3GVR 083 452-ASE	925	5.68	24	2.9	4.06	73.3	71.9	0.71	1.55	3.4	7000	0.0022	12			
0.55	M3VRS 80 B	3GVR 083 452-BSE	925	5.68	24	2.9	4.06	73.3	71.9	0.71	1.55	3.4	7000	0.0022	12			
0.75	M3ARS 90 S	3GAR 093 451-••E	930	7.5	35	1.9	4.66	71.5	70.7	0.67	2.36	4.0	3800	0.0034	19			
1.1	M3ARS 90 L	3GAR 093 452-••E	930	11	35	2.1	3.18	74.4	72.5	0.69	3.25	4.0	3900	0.0045	22			
1.5	M3ARS 100 L	3GAR 103 451-••E	950	15	44	1.9	2.93	80.0	77.0	0.71	3.92	4.5	3300	0.0086	34			
2.2	M3ARS 112 M	3GAR 113 451-••E	940	22.3	86	2.1	3.85	80.5	79.3	0.74	5.4	5.6	3200	0.015	40			
3	M3ARS 132 S	3GAR 133 451-••E	960	29.8	130	2.0	4.36	84.5	82.7	0.75	6.9	6.1	2400	0.033	59			
4	M3ARS 132 MA	3GAR 133 452-••E	960	39.7	130	2.0	3.27	85.5	83.1	0.78	8.7	7.1	1900	0.04	66			
5.5	M3ARS 132 MB	3GAR 133 453-••E	955	55	130	2.2	2.36	86.0	85.0	0.78	11.9	6.9	1900	0.047	74			
1000 r/min = 6 pole					400 V 50 Hz					High-output design								
1.3	³⁾ M3ARS 90 LB	3GAR 093 453-••E	910	13.5	35	1.9	2.59	69.0	69.0	0.71	3.85	4.0	3800	0.005	24			
2.2	³⁾ M3ARS 100 LC	3GAR 103 452-••E	940	22	44	1.9	2	77.0	72.8	0.71	5.9	4.5	3300	0.009	37			
3	³⁾ M3ARS 112 MB	3GAR 113 452-••E	935	30.6	86	2.0	2.81	80.0	79.9	0.76	7.2	5.5	3200	0.018	46			
6.5	³⁾ M3ARS 132 MC	3GAR 133 454-••E	960	64	130	2.0	2.01	85.0	84.5	0.75	14.8	6.6	2400	0.051	79			

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

³⁾ Temperature rise class F.

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S				D				G		H		X
	Motor 50 Hz	Motor 60 Hz	Brake 50 Hz	Brake 60 Hz	Motor 50 Hz	Motor 60 Hz	Brake 50 Hz	Brake 60 Hz	Motor 50 Hz	Brake 50 Hz	Motor 50 Hz	Brake 50 Hz	
63-132	220-240 VΔ	250-280 VΔ	230 VΔ	265 VΔ	380-420 VΔ	440-480 VΔ	400 VΔ	460 VΔ	–	–	–	–	Any other rated voltage or frequency, 690V maximum
	380-420 VY	440-480 VY	400 VY	460 VY	660-690 VY	–	690 VY	–					

Technical data

Single-speed motors with three phase AC brake

IP 55 – IC 411 – Insulation class F, temperature rise class B – Brake IP 23 S

Out-put kW					Motor type					Product code					Torque					Efficiency			Current			Moment of inertia J=1/4GD ² kgm ²	Weight foot mounted kg					
															rated		braking			Speed r/min	T _N Nm	T _B Nm	T _S / T _N	K ⁽¹⁾	100 %			75 %	Power factor cos φ	I _N A	I _S /I _N	c/h ⁽²⁾
750 r/min = 8 pole															400 V 50 Hz					Basic design												
0.25	M3VRS	80 B	3GVR	084 452-ASE	700	24	3.52	2.9	6.85	70.7	67.4	0.62	0.85	3.1	7500	0.00245	12															
0.37	M3ARS	90 S	3GAR	094 451-••E	700	35	5	1.9	7	61.5	43.4	0.56	1.6	3.0	4100	0.0034	19															
0.55	M3ARS	90 L	3GAR	094 452-••E	690	35	7.5	1.7	4.66	62.9	56.4	0.57	2.35	3.0	4100	0.0045	22															
0.75	M3ARS	100 LA	3GAR	104 451-••E	700	44	10	2.1	4.4	72.0	63.6	0.59	2.55	3.5	3600	0.0073	31															
1.1	M3ARS	100 LB	3GAR	104 452-••E	700	44	15	2.1	2.93	73.0	68.8	0.64	3.35	3.5	3700	0.0086	34															
1.5	M3ARS	112 M	3GAR	114 451-••E	695	86	20.6	1.9	4.17	74.5	75.9	0.65	4.5	4.1	3600	0.016	41															
2.2	M3ARS	132 S	3GAR	134 451-••E	720	130	29.2	1.6	4.45	80.5	77.8	0.67	5.9	5.3	3000	0.04	66															
3	M3ARS	132 M	3GAR	134 452-••E	720	130	39.8	1.8	3.26	82.0	79.2	0.68	7.8	5.5	2600	0.047	73															

¹⁾ Braking-torque ratio

²⁾ No-load (shaft-free) operations/hour

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

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	S				D				G		H		X
	Motor		Brake		Motor		Brake		Motor	Brake	Motor	Brake	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	50 Hz	50 Hz	50 Hz	
63-132	220-240 VΔ	250-280 VΔ	230 VΔ	265 VΔ	380-420 VΔ	440-480 VΔ	400 VΔ	460 VΔ	–	–	–	–	Any other rated voltage or frequency, 690V maximum
	380-420 VY	440-480 VY	400 VY	460 VY	660-690 VY	–	690 VY	–					

Technical data

Two-speed motors with three phase AC brake

IP 55 – IC 411 – Insulation class F, temperature rise class F – Brake IP 23 S

Out-put kW	Motor type	Product code	Speed r/min	Torque				Effi- ciency %	Power factor cos φ	Current		Moment of inertia J=1/4GD ² kgm ²	Weight IM 1001 kg	
				T _N Nm	T _B Nm	T _S / T _N	K ¹⁾			I _N	I _S /I _N A			
3000/1500 r/min = 2-4 poles				400 V 50 Hz				Constant torque, two separate windings						
1.1/0.55	M3ARS	90 S	3GAR 098 451-••E	2900/1450	3.6/3.6	35	1.4/1.5	9.7/9.7	74/62	0.85/0.64	2.5/2	5.1/3.6	0,0019	20
1.5/0.75	M3ARS	90 L	3GAR 098 452-••E	2900/1450	4.9/4.9	35	1.5/1.5	7.1/7.1	77/70	0.87/0.67	3.3/2.4	5.7/4.1	0,0024	23
2/1	M3ARS	100 L	3GAR 108 451-••E	2900/1460	6.5/6.5	44	1.9/1.4	7.7/7.7	76/67	0.89/0.66	4.3/3.3	6.2/4	0,0041	32
2.6/1.3	M3ARS	112 M	3GAR 118 451-••E	2900/1460	8.6/8.5	86	1.6/1.6	10/9.9	80/75	0.92/0.72	5.1/3.5	6.4/5	0,012	45
4.4/2.2	M3ARS	132 SB	3GAR 138 451-••E	2925/1450	14.4/14.5	130	2/1.3	8.1/8.1	81/74	0.86/0.73	9.1/5.9	7.3/4.5	0,016	55
5.6/2.8	M3ARS	132 M	3GAR 138 452-••E	2885/1440	18.5/18.6	130	1.8/1.4	10.4/10	82/77	0.93/0.75	10.6/7	6.7/5	0,022	76
3000/1500 r/min = 2-4 poles				400 V 50 Hz				Constant torque, Dahlander connection						
1.3/1	M3ARS	90 S	3GAR 098 453-••E	2730/1400	4.5/6.8	35	2/1.5	7.8/5.1	71/71	0.88/0.8	3.1/2.6	3.9/3.8	0.0032	20
1.9/1.5	M3ARS	90 L	3GAR 098 454-••E	2820/1420	6.4/10	35	2.8/2	5.4/3.5	74/75	0.82/0.76	4.4/3.9	5.1/4.4	0.0043	23
2.5/2.1	M3ARS	100 LA	3GAR 108 452-••E	2800/1430	8.5/14	44	2.2/1.6	5.9/3.6	68/76	0.88/0.81	6/5	4.8/4.4	0.0069	32
3.4/2.5	M3ARS	100 LB	3GAR 108 453-••E	2810/1430	11.5/18	44	2.2/1.9	4.3/2.7	78/80	0.88/0.85	7.2/5.9	5.3/5.4	0.0082	35
4.26	M3ARS	112 M	3GAR 118 452-••E	2865/1430	13.3/17.4	86	1.8/2.3	10/9.9	82/77	0.93/0.76	7.6/6.5	6.3/6.2	0.012	45
6.3/4.4	M3ARS	132 SA	3GAR 138 461-••E	2895/1445	20.8/29	130	1.7/1.6	7.2/5.2	85/84	0.94/0.8	11.4/9.5	6.5/5.7	0.0155	58
4.7/3.1	M3ARS	132 SB	3GAR 138 453-••E	2820/1420	15.9/20.8	130	1.8/2.2	10.4/10	79/77	0.92/0.76	9.2/7.7	5.5/5.7	0.016	55
8/6.2	M3ARS	132 SC	3GAR 138 462-••E	2910/1440	26.2/41.1	130	1.9/1.6	6.9/3.6	87/85	0.95/0.83	14/12.7	7.8/5.6	0.0215	78
7.2/4.8	M3ARS	132 M	3GAR 138 454-••E	2870/1435	24/31.9	130	2.4/2.5	6.3/4.7	84/81	0.92/0.76	13.3/11.5	7.1/6.2	0.022	76
9.6/7	M3ARS	132 MD	3GAR 138 463-••E	2900/1440	31.6/46.4	130	1.8/1.7	4.7/3.2	87/85	0.95/0.85	16.8/14.1	7.6/5.9	0.026	85
1500/1000 r/min = 4/6 poles				400 V 50 Hz				Constant torque, two separate windings						
0.8/0.5	M3ARS	90 S	3GAR 098 455-••E	1430/940	5.3/5	35	1.5/1.4	7/6.6	68/57	0.8/0.66	2.2/2	3.9/2.8	0.0032	20
1.2/0.75	M3ARS	90 L	3GAR 098 456-••E	1430/940	8/7.6	35	1.7/1.5	4.6/4.4	73/63	0.81/0.67	3/2.6	4.4/3.1	0.0043	23
1.5/0.9	M3ARS	100 LA	3GAR 108 454-••E	1440/960	9.9/8.9	44	1.5/1.5	5.6/5.1	75/69	0.84/0.65	3.5/3	4.7/3.8	0.0069	32
1.8/1.1	M3ARS	100 LB	3GAR 108 455-••E	1460/960	11/11	44	2.1/1.6	4.5/4.5	77/70	0.78/0.64	4.4/3.6	5.8/3.9	0.0082	35
2.6/1.7	M3ARS	112 M	3GAR 118 453-••E	1445/960	17.2/16.9	86	1.5/1.5	5/4.9	80/70	0.85/0.76	5.5/4.4	5.9/5.2	0.018	45
3.3/2.2	M3ARS	132 S	3GAR 138 455-••E	1470/980	21.4/21.4	130	1.4/1.2	4.5/3.0	82/76	0.8/0.65	7.1/6.4	6.8/4.6	0,038	61
3.3/2.2	M3ARS	132 M	3GAR 138 456-••E	1470/980	29.2/29.2	130	1.4/1.5	5.1/5.1	82/77	0.81/0.7	9.8/8	7.2/5.6	0,048	79
5.5/3.7	M3ARS	132 MD	3GAR 138 464-••E	1460/960	36/36.8	130	1.9/1.8	4.2/4.2	85/81	0.88/0.8	10.7/8.3	8/6.3	0,036	84

¹⁾ Braking-torque ratio

Technical data

Two-speed motors with three phase AC brake

IP 55 – IC 411 – Insulation class F, temperature rise class F – Brake IP 23 S

Out-put kW	Motor type	Product code	Speed r/min	Torque				Efficien- cy %	Power factor cos φ	Current		Moment of inertia J=1/4GD ² kgm ²	Weight IM 1001 kg
				rated	braking					I _N	I _s /I _N		
				T _N Nm	T _B Nm	T _s / T _N	K ⁽¹⁾			A			
3000/750 r/min = 2/8 poles			400 V 50 Hz				Constant torque, two separate windings						
0.75/0.18	M3ARS 90 LA	3GAR 098 461-●●E	2875/720	2.5/2.4	35	2.3/1.3	14/14	71.2/46.3	0.8/0.51	1.9/1.1	5.7/2.4	0,0043	23
1.3/0.33	M3ARS 90 LB	3GAR 098 462-●●E	2780/690	4.4/4.5	35	1.8/1.2	8/8	71/52	0.92/0.62	2.9/1.5	4.5/2.3	0,0043	23
1.8/0.5	M3ARS 100 LB	3GAR 108 460-●●E	2860/705	6.0/6.7	44	1.7/1.3	8.3/7.4	80/54	0.93/0.64	3.5/2.1	5.3/2.6	0,0082	35
2.2/0.59	M3ARS 112 MC	3GAR 118 456-●●E	2900/720	7.2/7.8	86	2.4/1.6	11.8/11	78/62	0.87/0.55	4.9/2.5	7/3.5	0,015	42
3.3/0.95	M3ARS 132 SA	3GAR 138 465-●●E	2940/730	10.7/12.4	130	2.6/1.2	14/12	81/72	0.95/0.52	6.2/3.7	9.5/4.3	0,0215	65
4.4/1.3	M3ARS 132 MC	3GAR 138 466-●●E	2920/725	14.4/17.1	130	2.2/1.3	10.7/8.8	82/74	0.94/0.62	8.3/4.1	8.6/4	0,03	77
1500/750 r/min = 4/8 poles			400 V 50 Hz				Constant torque, two separate windings						
0.55/0.25	M3ARS 90 S	3GAR 098 457-●●E	1450/700	3.6/3.4	35	1.3/1.4	10.3/9.7	62/51	0.78/0.59	1.9/1.2	4.2/2.3	0.0032	20
0.75/0.37	M3ARS 90 L	3GAR 098 458-●●E	1450/700	4.9/5	35	1.4/1.5	7.1/7	66/57	0.75/0.57	2.2/1.7	4.1/2.5	0.0043	23
1.1/0.55	M3ARS 100 LA	3GAR 108 456-●●E	1460/710	7.2/7.4	44	1.2/1.2	6.9/6.8	68/62	0.77/0.61	3.1/2.2	4.2/2.6	0.0069	32
1.5/0.75	M3ARS 100 LB	3GAR 108 457-●●E	1440/700	9.8/10	44	1.3/1.2	5.1/5	72/60	0.82/0.6	3.7/2.9	4.6/2.7	0.0082	35
1.8/0.9	M3ARS 112 M	3GAR 118 454-●●E	1460/715	11.7/12	86	1.2/1.6	7.3/7.1	77/65	0.76/0.66	4.4/3	6.5/4	0.018	45
2.5/1.3	M3ARS 132 S	3GAR 138 457-●●E	1480/735	16.2/17	130	1.6/1.4	9.3/8.8	80/67	0.79/0.56	5.8/6	6/3.7	0.038	61
3.3/1.7	M3ARS 132 M	3GAR 138 458-●●E	1470/725	21.4/22.4	130	1.6/1.4	7/6.7	81/71	0.79/0.58	7.5/6	7/4.2	0.048	79
1500/750 r/min = 4-8 poles			400 V 50 Hz				Constant torque, Dahlander connection						
0.7/0.37	M3ARS 90 S	3GAR 098 459-●●E	1420/700	4.7/5.1	35	1.6/1.6	7.4/6.9	72/50	0.8/0.57	1.8/1.9	4.4/2.3	0.0032	20
1.1/0.55	M3ARS 90 L	3GAR 098 460-●●E	1390/685	7.4/7.5	35	1.4/1.5	4.7/4.7	70/55	0.84/0.58	2.6/2.6	4.1/2.3	0.0043	23
1.5/0.75	M3ARS 100 LA	3GAR 108 458-●●E	1440/710	10/10	44	1.4/1.5	5/5	76/62	0.85/0.57	3.4/3.2	4.6/2.8	0.0069	32
2/0.95	M3ARS 100 LB	3GAR 108 459-●●E	1440/710	13/12	44	1.4/1.6	4.2/3.8	78/64	0.86/0.55	4.4/4	4.8/2.9	0.0082	35
2.5/1.5	M3ARS 112 M	3GAR 118 455-●●E	1410/705	16.9/20.3	86	1.4/1.5	5/4.2	78/67	0.9/0.66	5.1/4.9	5.5/4.1	0.018	45
3.8/1.9	M3ARS 132 S	3GAR 138 459-●●E	1450/730	25/24.9	130	1.4/1.3	6/6	82/70	0.84/0.52	7.7/7.6	5.6/3.7	0.038	61
5/2.5	M3ARS 132 M	3GAR 138 460-●●E	1455/730	32.8/32.7	130	1.7/2	4.6/4.6	85/73	0.88/0.52	9.6/9.6	6.9/4.8	0.048	79

¹⁾ Braking-torque ratio

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

Code letters for supplementing product code for mounting arrangement:

Foot-mounted	A	
Flange-mounted, 1 flange	B for frame sizes 63-100	E for frame sizes 112-132.
Flange-mounted, 2 flanges	N for frame sizes 90-132	
Flange-mounted, small flange	C for frame sizes 63-100	

Code letters for supplementing product code for voltage and frequency (pos 13):

Motor size	A		B		S		D	
	Motor	Brake	Motor	Brake	Motor	Brake	Motor	Brake
50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
63-132	–	–	–	–	220-230 V	230 VΔ	380-400 V	400 VΔ
Motor size	E		H		X			
	Motor	Brake	Motor	Brake	Any other rated voltage or frequency, 690 V maximum			
63-132	500 V	500 VΔ	415 V	415 VΔ				

Variant codes

Code / Variant		M3VRF/S			M3ARF/S					
		63	71	80	90	100	112	132	160	180
Brakes										
086	Separate brake supply	M	M	M	M	M	M	M	R	R
087	Brake with reduced torque, torque range 60 % – 33 % of nominal torque.	NA	NA	NA	P	P	P	P	P	P
088	Hand release	M	S	S	S	S	S	S	S	S
213	Brake with increased degree of protection. Rubber ring and V-ring for IP55 protection.	M	M	M	M	M	M	M	M	M
285	Reconnection of brake for separate dc supply at 24 V.	R	M	M	M	M	M	M	M	M
288	Brake motor with voltage code S for the motor and separate supply of the brake for voltage corresponding to code D.	R	M	M	M	M	M	M	M	M
289	Brake motor with voltage code D for the motor and separate supply of the brake for voltage corresponding to code S.	R	M	M	M	M	M	M	M	M
290	Brake motor with a.c. brake, change into d.c. brake keeping the voltage code.	R	M	M	M	M	M	M	M	M
291	Brake motor with d.c. brake, change into a.c. brake keeping the voltage code.	R	M	M	M	M	M	M	M	M
Special voltage										
209	Non-standard voltage or frequency (special winding). Different brake coil (e.g. 25 Vdc), max. 500 Vac.	R	R	R	P	P	P	P	P	P
Protection										
005	Protective roof, for vertical mounting with shaft end downwards.	M	M	M	M	M	M	M	M	M

For other variant codes please see section for standard aluminum motors or consult ABB.

- S** = Included as standard
P = New manufacture only.
M = On modification of a stocked motor or on new manufacture, the number per order may be limited.
R = On request.
NA = Not applicable.

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Brake rating plates

The brake rating plates have the following arrangement:

ABB Motors		CE
ELECTROBRAKE D.C.		IP
Type	Nm	
N°		
	U ₁ =	V ~
	U ₂ =	V -

M000133

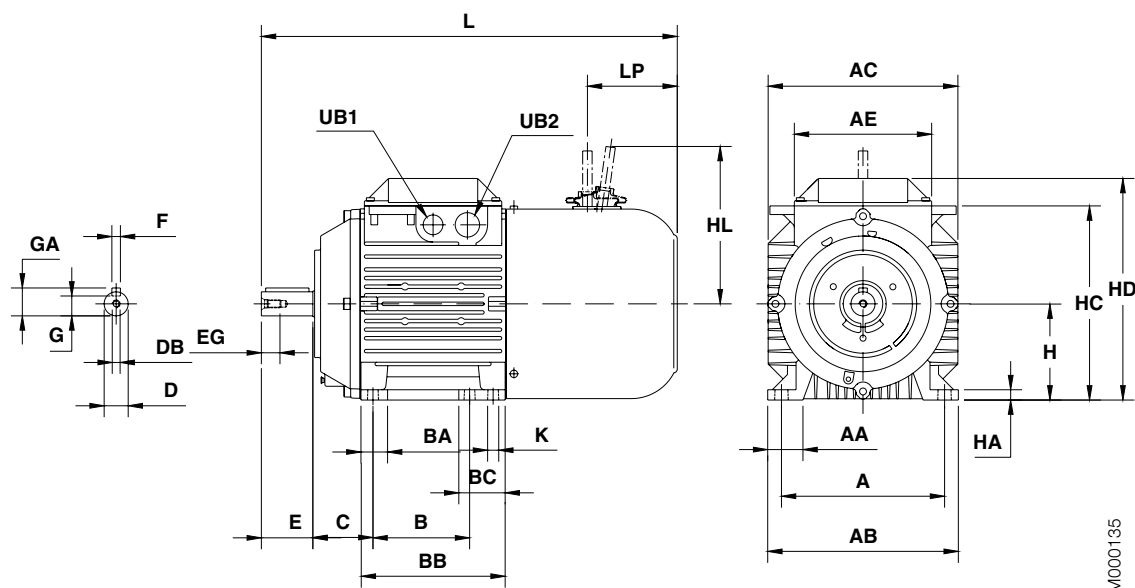
ABB Motors			CE
ELECTROBRAKE A.C.		IP	
Type		Nm	
N°			
	VΔ	Hz	A
	Vλ	Hz	A

M000134

Dimension drawings

Brake motors, sizes 63 - 132

IM B3 (IM 1001)



Motor size	A	AA	AB	AC	AE	B	BA	BB	BC	C	D	DB	E	EG
63 A/B	100	26	120	123	85	80	21	96	21	40	11	M4	23	10
71	112	24	136	139	85	90	31	110	31	45	14	M5	30	13
80	125	28	154	156	97	100	34	125	34	50	19	M6	40	16
90S	140	27	170	177	110	100	30	125	30	56	24	M8	50	19
90 L	140	27	170	177	110	125	30	150	30	56	24	M8	50	19
100 L	160	32	197	197	110	140	34	172	34	63	28	M10	60	22
112 M	190	41	222	221	160	140	31	168	31	70	28	M10	60	22
132 S	216	47	262	261	160	140	40	212	76	89	38	M12	80	28
132 M	216	47	262	261	160	178	40	212	76	89	38	M12	80	28

Motor size	F	GA	H	HA	HC	HD	HL	K	L	LP	UB1	UB2
63 A/B	4	12.5	63	10	-	180	107	7	270	66	M16	Pg11
71	5	16	71	9	-	176	114	7	316	76	M20	Pg16
80	6	21.5	80	10	-	190	124	10	360	70	M20	Pg16
90S	8	27	90	10	177	217	161	10	370	70	M20	M25
90 L	8	27	90	10	177	217	161	10	395	70	M20	M25
100 L	8	31	100	12	197	237	173	12	453	105	M20	M25
112 M	8	31	112	12	226	258	184	12	487	105	M20	M25
132 S	10	41	132	14	264	296	225	12	606	119	M20	M25
132 M	10	41	132	14	264	296	225	12	606	119	M20	M25

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Tolerances:

D ISO j6 ($\leq 28 \text{ } \varnothing$)

D ISO k6 (38-42 $\varnothing$)

F ISO h9

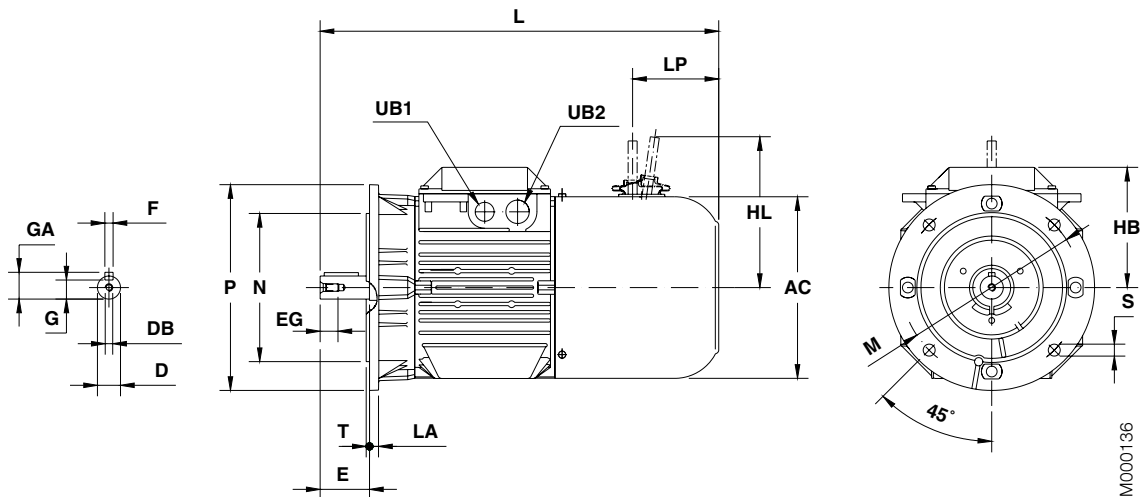
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Above table gives the main dimensions in mm. For detailed drawings please see our web-pages 'www.abb.com/motors&generators' or contact us.

Dimension drawings

Brake motors, sizes 63 - 132

IM B5 (IM 3001), IM V1 (IM 3011), IM B14 (IM 3601)



IM B5 (IM 3001)

Motor													
size	AC	D	DB	E	EG	F	GA	HB	HL	L	LP	UB1	UB2
63 A/B	123	11	M4	23	10	4	12.5	117	107	270	66	M16	Pg 11
71	139	14	M5	30	13	5	16	105	114	316	76	M20	Pg 16
80	156	19	M6	40	16	6	21.5	110	124	360	70	M20	Pg16
90S	178	24	M8	50	19	8	27	127	161	370	70	M20	M25
90 L	178	24	M8	50	19	8	27	127	161	395	70	M20	M25
100 L	198	28	M10	60	22	8	31	137	173	453	105	M20	M25
112 M	223	28	M10	60	22	8	31	146	184	487	105	M20	M25
132 S,M	264	38	M12	80	28	10	41	164	225	606	119	M20	M25

IM B5 (IM 3001)

Motor	IEC						
size	flange	LA	M	N	P	S ¹⁾	T
63 A/B	FF115	10	115	95	140	M8	3
71	FF130	10	130	110	160	M8	3.5
80	FF165	12	165	130	200	M10	3.5
90	FF165	11	165	130	200	M10	3.5
100	FF215	11	215	180	250	M12	4
112	FF215	11	215	180	250	M12	4
132	FF265	12	265	230	300	M12	4

IM B14 (IM 3601)

Motor	IEC						
size	flange	LA	M	N	P	S	T
63 A/B	FT75	10	75	60	90	M5	2.5
71	FT85	10	85	70	105	M6	2.5
80	FT100	10	100	80	120	M6	3
90	FT115	14	115	95	140	M8	3
100	FT130	16	130	110	160	M8	3.5
112 ²⁾	FT130	9.5	130	110	160	M8	3.5
132	FT165	14.5	165	130	200	M8	3.5

Tolerances:

- D ISO j6 ($\leq 28 \text{ } \varnothing$)
- D ISO k6 (38-42 $\varnothing$)
- F ISO h9

¹⁾ Clearance holes for bolt.

²⁾ Two pieces modular flange.

Modular flanges:

Brake motors sizes 71 - 132 can be supplied with several non standard modular flange dimensions

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors with variant code 412.

Above table gives the main dimensions in mm. For detailed drawings please see our web-pages 'www.abb.com/motors&generators' or contact us.

Brake motors in brief

Basic design

Motor size		63	71	80	90	100	112	132	
Stator and feet		Die-cast aluminum alloy.							
		Material		Detachable feet			Feet integrated with stator		
		Paint colour shade		Munsell blue 8B 4.5/3.25 / NCS 4822 BO5G / RAL 5014					
		Paint		Epoxy polyester powder paint, ≥ 30 µm.				2-pack polyurethane paint, ≥20µm.	
Bearing end shields		Material		Die-cast aluminum alloy.					
		Paint colour shade		Munsell blue 8B 4.5/3.25 / NCS 4822 BO5G					
		Paint		Epoxy polyester powder paint, ≥ 30 µm.				2-pack polyurethane paint, ≥20µm	
Flanges		Material		Die-cast aluminum alloy.				Cast iron	
		Paint colour shade		Munsell blue 8B 4.5/3.25 / NCS 4822 BO5G / RAL 5014					
		Paint		Epoxy polyester powder paint, ≥ 30 µm.				2-pack polyurethane paint, ≥20µm	
Bearings		6202-2Z/C3		6203-2Z/C3	6204-2Z/C3	6205-2Z/C3	6306-2Z/C3	6206-2Z/C3	6208-2Z/C3
		6202-2Z/C3		6203-2Z/C3	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6206-2Z/C3	6208-2Z/C3
		6202-2Z/C3		6203-2Z/C3	6204-2Z/C3	6205-2Z/C3	6206-2Z/C3	6206-2Z/C3	6208-2Z/C3
Axially locked bearings		Inner bearing circlip, on request.				Inner bearing cover at D-end.			
		System		In sizes 71-80 mounting large flange.					
Bearing seals		D-end		V-ring					
		N-end		V-ring					
Lubrication		Permanently lubricated bearings. Grease for bearing temperatures -40...+160°C.							
Terminal box		Material		Die-cast aluminum alloy.					
		Surface treatment		Similar to stator.					
		Srews		Steel 5 G, chromated.					
Connections		1 x M16 +							
		Knock-out openings		Pg11	2xM20 + Pg16		2 x(M25 + M20)		
		Max Cu area, mm²		2.5	4		6		
		Terminal box		Screw terminal, 6 terminals.				Cable lugs, 6 terminals.	
Fan		Material		Polypropylene. Reinforced with 20% glass fibre.					
Fan cover		Material		Steel.					
Stator winding		Material		Copper.					
		Impregnation		Polyester varnish. Tropicallised.					
		Insulation class		Insulation class F. Temperature rise class B, unless otherwise stated.					
Stator winding temperature sensors		Optional.							
Rotor winding		Material		Die-cast aluminum.					
Balancing method		Half key balancing.							
Key ways		Closed key way.							
Enclosure		Motor, terminal box and brake electrical components: IP 55.							
		Brake mechanical components: IP23 S (IP 55 optional).							
Cooling method		IC 411							

Brake motors in frame sizes 160-180, please select from Low voltage Process performance motors catalog, aluminum motors.

Total product offering

Motors, generators and mechanical power transmission products with a complete portfolio of services

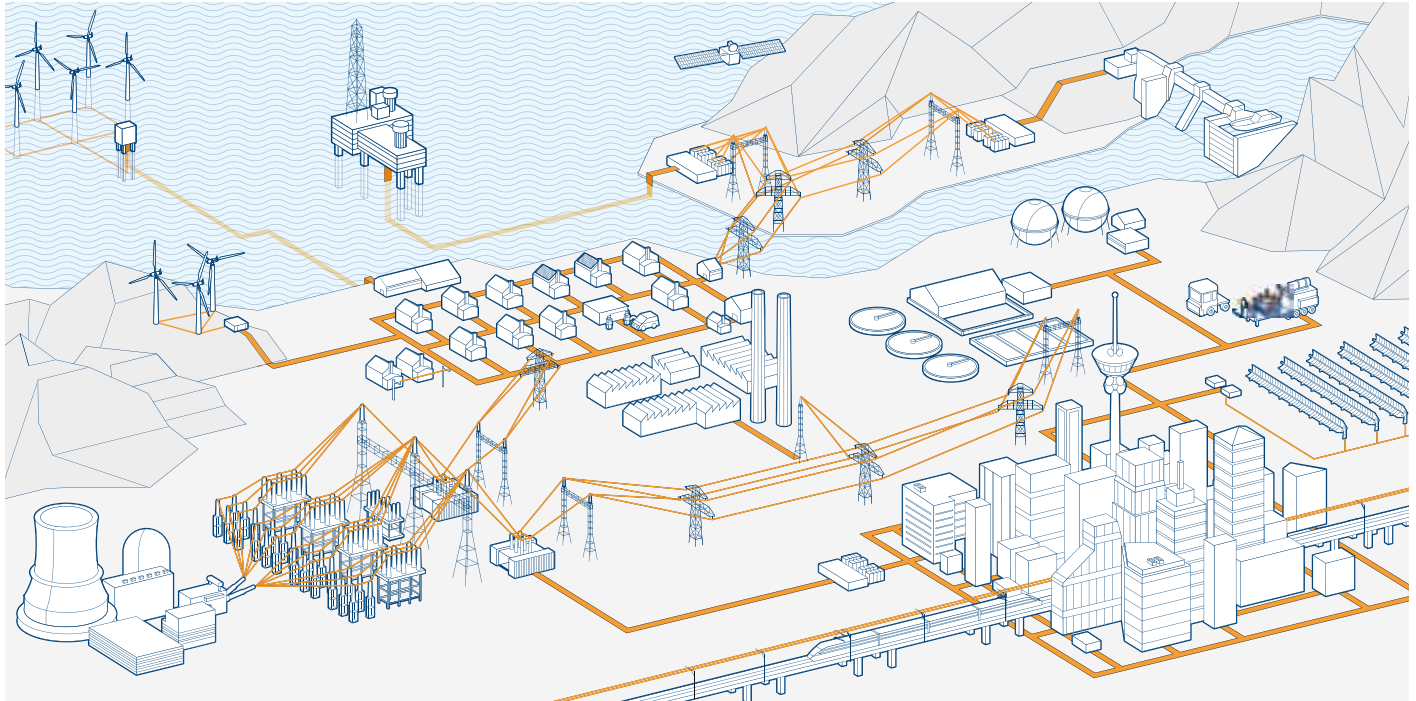


ABB is the leading manufacturer of low, medium and high voltage motors and generators, and mechanical power transmission products. ABB products are backed by a complete portfolio of services. Our in-depth knowledge of virtually every type of industrial process ensures we always specify the best solution for your needs.

> Low and high voltage IEC induction motors

- Process performance motors
- General performance motors
- High voltage cast iron motors
- Induction modular motors
- Slip-ring modular motors
- Synchronous reluctance motors

> Low and medium voltage NEMA motors

- Steel frame open drip proof (ODP) motors
- Weather protected, water cooled, fan ventilated
- Cast iron frame (TEFC)
- Air to air cooled (TEAAC) motors

> Motors and generators for explosive atmospheres

- IEC and NEMA motors and generators, for all protection types

> Synchronous motors

> Synchronous generators

- Synchronous generators for diesel and gas engines
- Synchronous generators for steam and gas turbines

> Wind power generators

> Generators for small hydro

> Other motors and generators

- Brake motors
- DC motors and generators
- Gear motors
- Marine motors and generators
- Single phase motors
- Motors for high ambient temperatures
- Permanent magnet motors and generators
- High speed motors
- Smoke extraction motors

- Wash down motors
- Water cooled motors
- Generator sets
- Roller table motors
- Low inertia motors
- Traction motors and generators

> Life cycle services

- Installation and commissioning
- Spares and consumables
- Preventive maintenance
- Predictive maintenance
- Condition monitoring
- On-site and workshop
- Remote troubleshooting
- Technical support
- Engineering and consulting
- Extensions, upgrades and retrofits
- Replacements
- Training
- Service agreements

> Mechanical power transmission components, bearings, gearings

Life cycle services and support

From pre-purchase to migration and upgrades



ABB offers a complete portfolio of services to ensure trouble-free operation and long product lifetimes. These services cover the entire life cycle. Local support is provided through a global network of ABB service centers and certified partners.

Pre-purchase

- ABB's front-end sales organization can help customers to quickly and efficiently select, configure and optimize the right motor or generator for their application.

Installation and commissioning

- Professional installation and commissioning by ABB's certified engineers represent an investment in availability and reliability over the entire life cycle.

Engineering and consulting

- ABB's experts provide energy efficiency and reliability appraisals, advanced condition and performance assessments and technical studies.

Condition monitoring and diagnosis

- Unique services collect and analyze data to provide early warnings of problems before failures can occur. All critical areas of the equipment are covered.

Maintenance and field services

- ABB offers life cycle management plans and preventive maintenance products. The recommended four-level maintenance program covers the entire product lifetime.

Spare parts

- Spare parts and support are offered throughout the life cycle of ABB products. In addition to individual spares, tailored spare part packages are also available.

Repair and refurbishment

- Support for all ABB motors and generators and other brands is provided by ABB's global service organization. Specialist teams can also deliver emergency support.

Migration and upgrades

- Life cycle audits determine the optimum upgrades and migration paths. Upgrades range from individual components to direct replacement motors and generators.

Training

- Product and service training courses take a practical approach. The training ranges from standard courses to specially tailored programs to suit customer requirements.

Specialized support

- Specialized support is offered through ABB's global service organization. Local units provide major and minor repairs as well as overhauls and reconditioning.

Service contracts

- Service contracts are tailored to the customer's needs. The contracts combine ABB's entire service portfolio and 120 years of experience to deploy the optimal service practices.

www.abb.com/motors&generators

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9AKK105873 EN 03-2014



مرکز تخصصی فروش و خدمات انواع الکتروپمپ، گیربکس الکتروموتور

تلفن: ۰۳۱۳۲۳۵۲۸۶۱-۵

فکس: ۰۳۱۳۲۳۵۲۸۶۶

همراه: ۰۹۳۳۷۲۷۲۴۲۲

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