Low Voltage Water Cooled Motors

New low voltage water cooled motors range M3LP, frame sizes 400 and 450

The motor range represents a new generation of water cooled motors developed in response to market demands for improved technical features. The new range is available in IEC frame sizes 400 and 450.

Water cooling is a very efficient method of transferring heat away from the motor, and water cooled motors provide high output power per unit of weight. Cooling efficiency is maintained even at lower speeds, which is especially important in constant torque applications.

These advantages make the motors ideal for a range of uses, including marine applications, water and waste water pumping, printing machines, and wind turbine generators. The basic structure of the motors is optimized for variable speed use.

Design

The frames are made of steel with channels for the cooling water around the stator core.
The new design is modular and allows modifications in line with the variant code list of this catalogue.

Range

Frame sizes ..... IEC 400 and 450
Power ..... Up to 1100 kW
Voltage ..... Up to 690 V
Number of poles .....4 to 8
Mounting arrangements ...Foot, flange and foot-flange.

Availability

Please contact ABB for information about availability and delivery times for the M3LP 400 to 450 motors. Availablity and delivery time may vary depending on the mounting arrangement, pole number and variant codes requested.

Low Voltage Water Cooled Motors

Sizes 400 to 450

Contents Page

ABB reserves the right to change the design, technical specification and dimensions without prior notice.

ABB (www.abb.com) is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 105,000 people.

Mechanical design

Stator

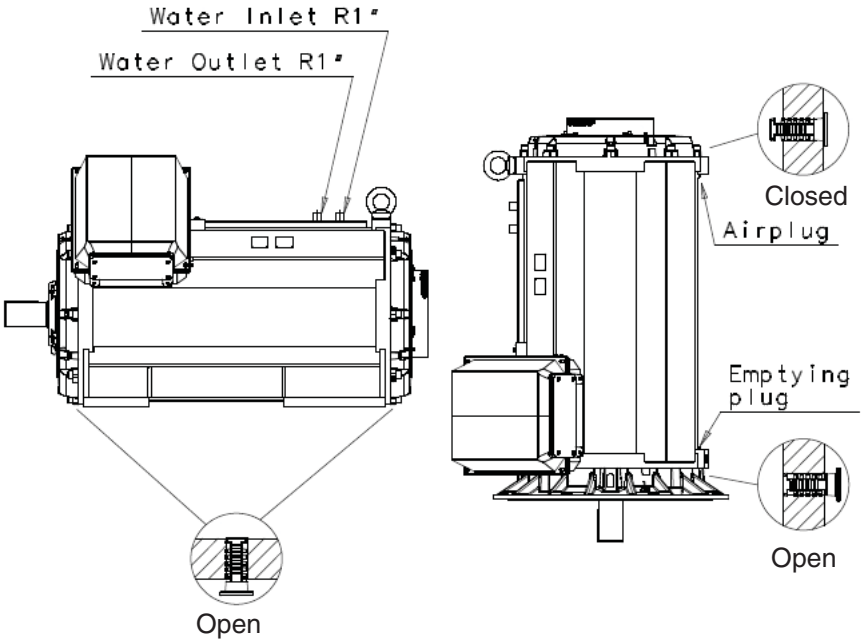
The motor frames including feet are made of steel. Bearing housing and terminal box are made of cast iron. Motors can be supplied for foot mounting, flange mounting and combinations of these.

Degree of protection is IP 55, higher degree of protection, IP 56, is available on request. Motor in frame sizes 400 and 450 are fitted with a bearing fan, which is normally mounted on the non-drive end.

Drain holes

The water mantel is as long as the stator core to minimize the amount of condensed water. M3LP motors are supplied with drain holes and closable plugs as standard to avoid water from gathering in the windings.

With water cooled motors it is of special importance that the drain holes are in the correct position, as shown in the drawing. When mounting the motor, check to make sure that the drain holes face downwards.



Cooling

Cooling water must be tap water quality. Sea water, or water containing more than 120 mg/l of chloride, should not be used. The maximum permitted pressure for the cooling water is 5 bar. The maximum recommended input water temperature is 40°C, the lower the cooling water input temperature, the better the cooling effect will be. If requested by the user, higher input water temperatures may be allowed in some cases provided that they are approved by the manufacturer. The outlet water temperature rise is from 10 to 15 K.

The following table shows the minimum cooling water pressures and flow rates. (If the water flow rate varies, the temperature rise will be inversely proportional to the flow rate.)

Motor type M3LP Frame type	Number of inlets	Cooling water flow rate (l/min)	Water pressure min. (bar)	Water temperature rise (K)
400 L_	1	40	2.0	10-15
450 L_	1	50	2.0	10-15

Cooling designation

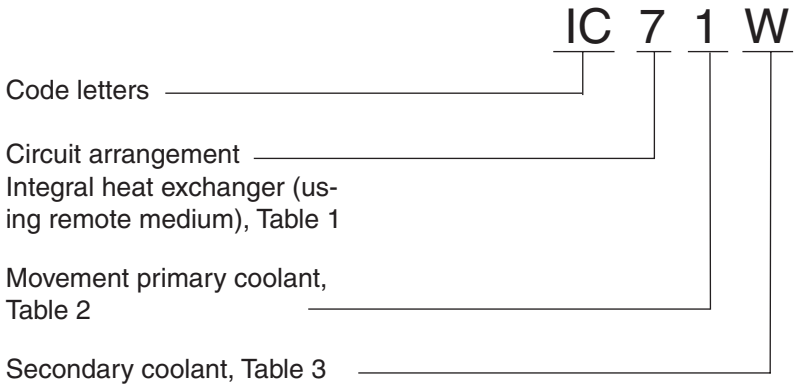


Table 1. Circuit arrangement

Characteristic numeral	Brief description	Definition
7 (see note 2)	Integral heat exchanger (using remote medium)	The primary coolant is circulated in a closed circuit and gives its heat via a heat exchanger, which is built into and forms an integral part of the machine, to the secondary coolant which is the remote medium.

Note 2. The nature of the heat exchanger is not specified (ribbed or plain tubes, etc.).

Table 2. Method of movement (Movement primary coolant)

Characteristic numeral	Brief description	Definition
1	Self-circulation	The coolant is moved dependent on the rotational speed of the main machine, either by action of the rotor alone or by means of a component designed for this purpose and mounted directly on the rotor of the main machine, or by a fan or pump unit mechanically driven by the rotor or the main machine.

Table 3. Coolant (Secondary coolant)

Characteristic letter	Coolant
W	Water

Terminal box

The terminal boxes are mounted in the 45° angle on the motor. Terminal box size 750 can be turned 4x90° and terminal box size 1200 can be turned 2x180°. Degree of protection of standard terminal box is IP 55. The terminal box is normally equipped with cable glands or cable boxes, see following pages.

If no ordering information on the cable is given, it is assumed to be p.v.c. -insulated and termination parts are supplied according to the table below.

To ensure that suitable terminations for the motor can be supplied, please state the cable type, quantity and size when ordering. Non-standard terminal box designs - e.g. non-standard size or degree of protection - are available as options. The terminations are suitable for Cu- and Al-cables. The cables are connected to the terminals using cable lugs (not included with the motor).

Please see the variant code pages for options.

Co-ordination of terminal boxes and cable entries

If no ordering information on the cable is given, it is assumed to be p.v.c. -insulated type and termination parts are supplied according to the following tables. These are supplied when using variant code '230 Standard cable glands' when ordering.

In motor sizes 400 and 450 the terminal box is normally equipped with cable glands or cable boxes according to the tables on the following pages. The table below shows the different alternatives available for cable boxes and cable entries. Other types on request.

Motor size	Voltage/ frequency code	Terminal box	Top-mounted flange or adapter	Cable box or cable gland	Cable diameter	Max. connection cable area mm2
1500 r/min (4 poles)						
400LA, LB, LC	D	1200	see option [1]	see option [1]	see option [1]	6x240
	E	750	3GZF294730-944	3GZF294730-501	2xØ60-80	4x240
450LA, LB	D, E	1200	see option [1]	see option [1]	see option [1]	6x240
1000 r/min (6 poles)						
400LA, LB	D, E	750	3GZF294730-944	3GZF294730-501	2xØ60-80	4x240
400LC, LD	D	1200	see option [1]	see option [1]	see option [1]	6x240
	E	750	3GZF294730-944	3GZF294730-501	2xØ60-80	4x240
450LA	D	1200	see option [1]	see option [1]	see option [1]	6x240
	E	750	3GZF294730-944	3GZF294730-501	2xØ60-80	4x240
750 r/min (8 poles)						
400LA, LB, LC	D, E	750	3GZF294730-944	3GZF294730-501	2xØ60-80	4x240
450LA, LB	D, E	750	3GZF294730-944	3GZF294730-501	2xØ60-80	4x240

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

Terminal bolt sizes M12
Earthing bolt size on stator frame M10

[1] **Options - Variant code 444:**

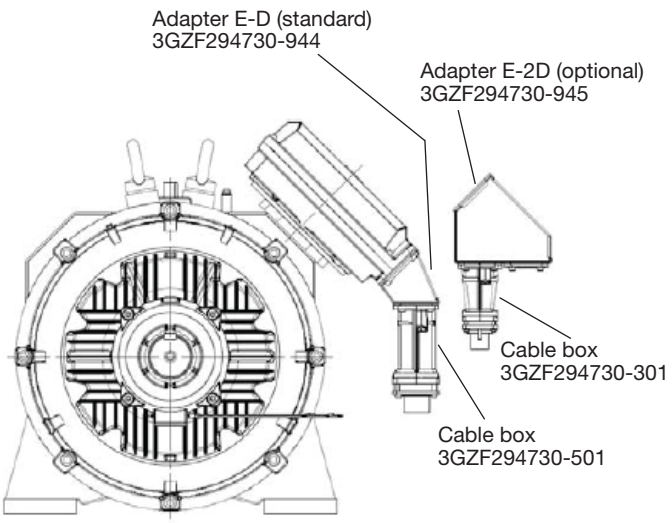
Terminal box	Adapter	Cable box or flange	Max. connection cable area mm²
1200	3GZF294730-944	3GZF294730-301	2xØ48-60
	3GZF294730-944	3GZF294730-501	2xØ60-80
	3GZF294730-945	2x 3GZF294730-301	4xØ48-60
	3GZF294730-945	2x 3GZF294730-501	4xØ60-80
	3GZF293745-1	3x 3GZF294730-301	6xØ48-60
	3GZF293745-1	3x 3GZF294730-501	6xØ60-80
	3GZF293745-2	Flange for gable glands	

Adapter and cable box for terminal box size 1200, to be defined when ordering

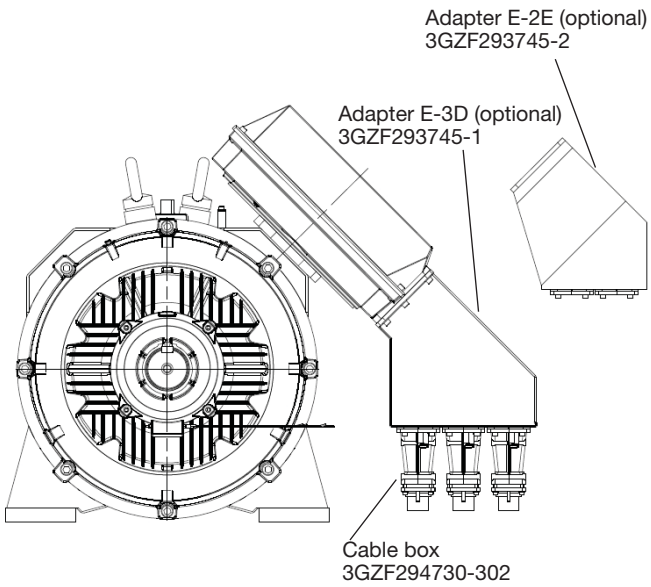
Terminal box	Cable cross-section	Max. rated current		Earthing
		D-connection	Y-connection	
750	2 x 70 mm²	950	550	2x M10
750	2 x 95 mm²	1300	750	2x M10
1200	2 x 120 mm²	1650	950	4xM12
1200	2 x 150 mm²	2100	1200	4xM12

Cable cross-section area between the winding and the terminal board.

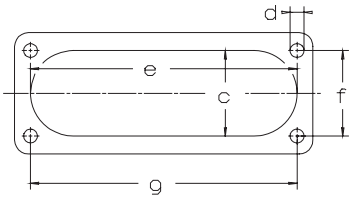
M3LP 400 - 450 with terminal box 750



M3LP 400 - 450 with terminal box 1200



Dimensions for terminal box inlets



Inlet	c	e	f	g	d
D	100	300	80	292	M10
E	115	370	100	360	M12

Bearings

The motors are normally fitted with single-row deep groove ball bearings as listed in the table below. SPM-nipples for bearing vibration monitoring are delivered as standard both at N- and D-end.

If the bearing at the D-end is replaced with a roller bearing (NU- or NJ-), higher radial forces can be handled. Roller bearings are suitable for belt drive applications.

When there are high axial forces e.g. in vertical position, angular contact ball bearings should be used, and direction of forces shall be informed. This option is available on request. When a motor with angular contact ball bearings is ordered, the method of mounting and direction and magnitude of the axial force must be specified. For special bearings, please see the variant codes.

Basic version with deep groove ball bearings

Motor size	Number of poles	Deep groove ball bearings	
		D-end	N-end
400	4-8	6324/C3	6319/C3
450	4-8	6326M/C3	6322/C3

Version with roller bearings, variant code 037

Motor size	Number of poles	Roller bearing, variant code 037
		D-end
400	4-8	NU324/C3
450	4-8	NU326/C3

Axially-locked bearings

The outer bearing ring at the D-end can be axially locked with an inner bearing cover. The inner ring is locked by tight tolerance to the shaft.

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

Transport locking

Motors that have roller bearings or an angular contact ball bearing are fitted with a transport lock before despatch to prevent damage to the bearings during transport. In case of transport locked bearing, motors are provided with a warning sign.

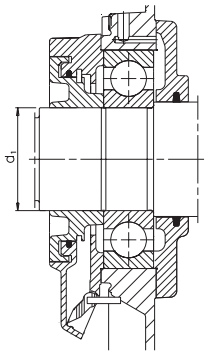
Locking may also be fitted in other cases where transport conditions are suspected of being potentially damaging.

Bearing seals

The size and type of seals for sizes 400 to 450 are in accordance with the table below:

Motor size	Number of poles	Standard design	
		D-end	N-end
400	4-8	Labyrinth seal	Labyrinth seal
450	4-8	Labyrinth seal	Labyrinth seal

Labyrinth seal



Bearing life

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

The calculated bearing life L_{10} for power transmission by means of a coupling (horizontal machine) is $\geq$ 200,000 hours.

Lubrication

On delivery, the motors are ready lubricated with high quality grease. The recommended grease used can be seen from ABB's Low Voltage Motors Manual delivered together with the motor or from the lubrication plate fastened to the motor frame. See example of a lubrication plate on page 20.

Motors with relubrication nipples
The bearing system has been built so that a valve disc can be used to ease the lubrication. Motors are lubricated while running.

Grease outlet opening has closing valves at both ends. This should be opened before greasing and closed 1-2 hours after regreasing. After lubrication close the valves. This ensures that the construction is tight and dust or dirt cannot get inside the bearing.

As an option, a grease collection method can be used.

Lubrication intervals

ABB follows the L1-principle in defining lubrication interval. That means that 99% of the motors are sure to make the interval time. The lubrication intervals can also be calculated according to the L10-principle, which are normally doubled compared to L1-values. Values available from ABB at request.

The table below gives lubrication intervals according to the L1-principle for different speeds. The values are valid for horizontal mounted motors (B3), with about 80°C bearing temperature and using high quality grease with lithium complex soap and mineral or PAO-oil.

For more information, see ABB's Low Voltage Motors Manual.

Frame size	Amount of grease g	1800 r/min	1500 r/min	1000 r/min	500-750 r/min
Ball bearings: lubrication intervals in duty hours					
400	130	2800	4600	8400	12000
450	140	2400	4000	8000	8800

Frame size	Amount of grease g	1800 r/min	1500 r/min	1000 r/min	500-750 r/min
Roller bearings: lubrication intervals in duty hours					
400	130	1400	2300	4200	6000
450	140	1200	2000	4000	4400

Pulley diameter

When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated using F_R, as follows:

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

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

Permissible loadings on shaft

The tables give the permissible radial force in Newtons, assuming zero axial force. The values are based on normal conditions at 50 Hz and calculated bearing lives for motor sizes 400 and 450 of 20,000 and 40,000 hours.

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

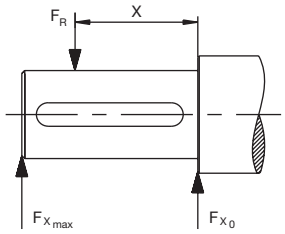
At 60 Hz the values must be reduced by 10%.

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

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

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

E = length of shaft extension in basic version



Permissible radial forces

Motor size	Poles	Length of shaft extension E (mm)	Ball bearings				Roller bearings			
			20,000 hours		40,000 hours		20,000 hours		40,000 hours	
			F_{X0} (N)	F_{Xmax}(N)	F_{X0} (N)	FX_{max}(N)	F_{X0} (N)	F_{Xmax}(N)	F_{X0} (N)	F_{Xmax}(N)
400 L_	4	210	15600	13700	12150	10700	53350	17900	43250	17900
	6	210	17750	15500	13800	12100	60200	15500	48800	15500
	8	210	19650	17000	15350	13500	65650	17000	53250	17000
450 L_	4	210	16900	15100	13000	11600	62350	22700	50550	22700
	6	210	19250	17200	14750	13150	70400	20000	57050	20000
	8	210	21400	19100	16450	14700	76750	19700	62250	19700

Permissible axial forces

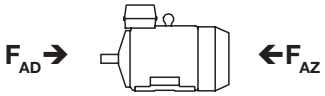
The following tables give the permissible axial forces in Newton, assuming zero radial force. The values are based on normal conditions at 50 Hz with standard bearings and calculated bearing lives of 20,000 and 40,000 hours.

At 60 Hz the values are to be reduced by 10%.

The permissible loads of simultaneous radial and axial forces will be supplied on request.

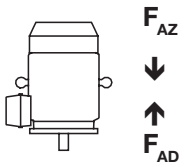
Given axial forces F_{AD}, assumes D-bearing locked by means of locking ring.

Mounting arrangement IM B3



Motor size	20,000 hours						40,000 hours					
	4-pole		6-pole		8-pole		4-pole		6-pole		8-pole	
	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)
400 L_	6950	12950	8600	14600	10250	16250	4200	10200	5350	11350	6600	12600
450 L_	7350	13350	9050	15050	10850	16850	4400	10400	5600	11600	6900	12900

Mounting arrangement IM V1



Motor size	20,000 hours						40,000 hours					
	4-pole		6-pole		8-pole		4-pole		6-pole		8-pole	
	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)	F_{AD} (N)	F_{AZ} (N)
400 L_	16700	6300	20750	6400	22450	8100	13850	3450	17400	3050	18650	4300
450 L_	21100	3850	25850	3700	27800	5400	18050	[1]	22200	[1]	23700	[1]

[1] On request

Ordering information

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

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

Motor type	M3LP 450L
Pole number	6
Mounting arrangement (IM code)	IM B3 (IM 1001)
Rated output	1050 kW
Product code	3GLP 453 530-RDG
Variant codes if needed	

Motor size

A	B	C	D, E, F,	G
M3LP	**450 L**	**3GLP 4 53530 - R D G**		**003 etc.**
		1 2 3 4 5 6 7 8 9 10 11 12 13 14		

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

Explanation of the product code:

Positions 1 to 4
3GLP = Totally enclosed water cooled squirrel cage motor with steel frame

Positions 5 and 6
IEC-frame
40 = 400
45 = 450

Position 7
Speed (Pole pairs)
2 = 4 poles
3 = 6 poles
4 = 8 poles

Position 8 to 10
Serial number

Position 11
- (dash)

Position 12
Mounting arrangement
R = Foot-mounted, terminal box RHS seen from D-end. Please note that the motor with mounting code R means that the terminal box is on right hand seen from D-end. The terminal box is located at 45° angle on the motor, see figures on page 7.
L = Foot-mounted, terminal box LHS seen from D-end
B = Flange-mounted, large flange.
Note! Please always inform either variant code 021 Terminal box LHS or 180 Terminal box RHS, when ordering flange-mounted motor.

S = Foot- and flange-mounted, terminal box RHS seen from D-end
T = Foot- and flange-mounted, terminal box LHS seen from D-end
V = Flange-mounted, special flange
F = Foot- and flange-mounted. Special flange

Position 13
Voltage and frequency code
See table below

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

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

Code letters for supplementing the product code - single speed motors

Code letter for voltage and frequency
Direct start or, with Δ-connection, also Y/Δ-start

Motor	D		H	E	T	U	X
size	50Hz	60 Hz	50 Hz	60 Hz	50 Hz	50 Hz	
400-450	380, 400, 415 VΔ	440VΔ	500 VΔ	-	660 VΔ	690 VΔ	Other rated voltage, connection, 690 maximum.

Water cooled motors

Technical data for totally enclosed squirrel cage three phase motors

IP 55 – IC3W7 – Insulation class F, temperature rise class B

Output kW	Motor type		Product code		Speed r/min	Efficiency		Power factor	Current		Torque		
						Full load 100 %	3/4 load 75 %	cos φ	I_N A	I_s / I_N	T_N Nm	T_s / T_N	T_{max} / T_N
1500 r/min = 4-poles				**400 V 50 Hz**						**Basic design**			
710	**M3LP**	**400 LA**	3GLP	402 510-••G	1488	97.0	97.0	0.86	1225	6.8	4556	2.0	2.3
780	**M3LP**	**400 LB**	3GLP	402 520-••G	1490	97.0	97.0	0.87	1325	7.1	5000	2.0	2.4
850	**M3LP**	**400 LC**	3GLP	402 530-••G	1490	97.1	97.1	0.86	1470	7.4	5448	2.0	2.5
1000	**M3LP**	**450 LA**	3GLP	452 510-••G	1490	97.0	97.0	0.88	1690	6.6	6409	0.8	2.6
1100	**M3LP**	**450 LB**	3GLP	452 520-••G	1490	97.2	97.1	0.88	1850	6.8	7050	0.8	2.7
1000 r/min = 6-poles				**400 V 50 Hz**						**Basic design**			
560	**M3LP**	**400 LA**	3GLP	403 510-••G	992	96.6	96.7	0.84	995	6.5	5391	0.9	2.4
630	**M3LP**	**400 LB**	3GLP	403 520-••G	993	96.8	96.8	0.84	1120	7.2	6058	1.1	2.7
710	**M3LP**	**400 LC**	3GLP	403 530-••G	993	96.8	96.8	0.84	1260	7.7	6828	1.2	2.9
800	**M3LP**	**400 LD**	3GLP	403 540-••G	993	96.9	96.9	0.82	1455	7.7	7693	1.2	2.9
850	**M3LP**	**450 LA**	3GLP	453 510-••G	992	96.9	97.1	0.87	1450	6.6	8182	0.9	2.6
750 r/min = 8-poles				**400 V 50 Hz**						**Basic design**			
400	**M3LP**	**400 LA**	3GLP	404 510-••G	744	96.4	96.5	0.80	748	6.2	5134	0.9	2.3
450	**M3LP**	**400 LB**	3GLP	404 520-••G	744	96.4	96.5	0.81	830	6.3	5776	1.0	2.3
500	**M3LP**	**400 LC**	3GLP	404 530-••G	744	96.5	96.6	0.82	910	6.4	6418	1.0	2.3
560	**M3LP**	**450 LA**	3GLP	454 510-••G	742	96.2	96.4	0.83	1010	5.8	7207	0.9	2.3
630	**M3LP**	**450 LB**	3GLP	454 520-••G	742	96.3	96.5	0.84	1125	6.0	8108	1.0	2.3

[1] Temperature rise acc. to class F by 380 V.

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

Smaller frame sizes on request.

Water cooled motors

Technical data for totally enclosed squirrel cage three phase motors

IP 55 – IC3W7 – Insulation class F, temperature rise class B

Output kW		Motor type		Speed r/min	Effi-ciency %	Power factor cos φ	Current IN A	Speed r/min	Effi-ciency %	Power factor cos φ	Current IN A	Moment of inertia J = 1/4 GD² kgm²	Weight kg
1500 r/min = 4-poles				**380 V 50 Hz**				**415 V 50 Hz**				**Basic design**	
710	1)	**M3LP**	**400 LA**	1487	96.9	0.86	1290	1490	97.1	0.85	1195	15	3200
780	1)	**M3LP**	**400 LB**	1488	96.9	0.88	1390	1490	97.0	0.86	1300	16	3300
850	1)	**M3LP**	**400 LC**	1489	97.0	0.87	1530	1491	97.1	0.84	1450	17	3400
1000	1)	**M3LP**	**450 LA**	1488	96.9	0.89	1760	1490	97.1	0.87	1645	23	3750
1100	1)	**M3LP**	**450 LB**	1489	97.1	0.89	1930	1491	97.2	0.87	1810	25	4050
1000 r/min = 6-poles				**380 V 50 Hz**				**415 V 50 Hz**				**Basic design**	
560	1)	**M3LP**	**400 LA**	991	96.5	0.85	1035	993	96.7	0.82	982	17	2900
630	1)	**M3LP**	**400 LB**	992	96.7	0.85	1165	993	96.8	0.82	1105	20.5	3150
710	1)	**M3LP**	**400 LC**	992	96.7	0.86	1295	994	96.8	0.82	1245	22	3300
800	1)	**M3LP**	**400 LD**	992	96.8	0.84	1490	994	97.0	0.80	1435	24	3400
850	1)	**M3LP**	**450 LA**	991	96.8	0.88	1515	992	97.0	0.86	1410	31	3850
750 r/min = 8-poles				**380 V 50 Hz**				**415 V 50 Hz**				**Basic design**	
400	1)	**M3LP**	**400 LA**	743	96.3	0.82	770	744	96.4	0.78	740	17	2900
450	1)	**M3LP**	**400 LB**	743	96.3	0.83	855	744	96.5	0.80	810	21	3200
500	1)	**M3LP**	**400 LC**	743	96.4	0.83	950	744	96.5	0.80	900	24	3400
560	1)	**M3LP**	**450 LA**	741	96.0	0.85	1040	743	96.3	0.82	990	26	3450
630	1)	**M3LP**	**450 LB**	741	96.1	0.85	1170	743	96.4	0.82	1105	29	3700

Water cooled motors - Variant codes

Code [1]	Variant	Motor type M3LP 400	450
	Balancing		
052	Vibration to Grade A (IEC 60034-14)	S	S
417	Vibration to Grade B (IEC 60034-14)	P	P
	Bearing and lubrication		
036	Transport lock for bearings.	P	P
037	Roller bearing at D-end.	P	P
058	Angular contact bearing at D-end, shaft force away from bearing.	P	P
107	Bearing mounted Pt100 resistance elements.	P	P
420	Bearing mounted PTC thermistors.	P	P
	Brakes		
412	Built-on brake.	R	R
	Branch standard design		
178	Stainless steel / acid proof bolts.	P	P
425	Corrosion protected stator and rotor core.	P	P
	Coupling	P	P
035	Assembly of customer supplied coupling-half (finish bored and balanced).	P	P
	Dimension drawing		
141	Binding dimension drawing.	P	P
	Drain holes		
065	Plugged existing drain holes.	P	P
066	Modified drain hole position (must be ordered for all mounting arrangements exluding IM B3 (1001) and IM B5 (3001).	P	P
	Earthing bolt		
067	External earthing bolt.	S	S
	Heating elements		
450	Heating element, 100-120V.	P	P
451	Heating element, 200-240V.	P	P
	Insulation system		
014	Winding insulation class H.	P	P
405	Special winding insulation for frequency converter supply.	P	P
406	Winding for supply >690<=1000 Volts	P	P
	Mounting arrangements		
009	IM 2001 foot/flange mounted, IEC flange, from IM 1001 (B35 from B3).	P	P
	Painting		
114	Special paint colour, standard grade.	P	P
115	Offshore zink primer painting	P	P
179	Special paint specification.	P	P

[1] Certain variant codes cannot be used simultaneously.

P = New manufacture only
R = On request
S = Included as standard

Note ! Leakage guard + relay acc. to customer specification on request

Code [1]	Variant	Motor type M3LP 400	450
	Protection		
005	Metal protective roof, vertical motor, shaft down.	P	P
072	Radial seal at D-end.	P	P
073	Sealed against oil at D-end.	P	P
403	Degree of protection IP56.	P	P
	Rating & instruction plate		
002	Restamping voltage, frequency and output, continuous duty.	P	P
095	Restamping output (maintained voltage, frequency), intermittent duty.	P	P
135	Mounting of additional identification plate, stainless.	P	P
161	Additional rating plate delivered loose.	P	P
	Shaft and rotor		
069	Two shaft extensions as per basic catalogue.	P	P
070	One or two special shaft extensions, standard shaft material.	P	P
155	Cylindrical shaft extension, D-end, without key-way.	R	R
156	Cylindrical shaft extension, N-end, without key-way.	R	R
410	Stainless steel shaft (standard or non-standard design).	P	P
	Stator winding temperature sensors		
121	Bimetal detectors, break type (NCC), (3 in series), 130ºC, in stator winding.	P	P
122	Bimetal detectors, break type (NCC), (3 in series), 150ºC, in stator winding.	P	P
123	Bimetal detectors, break type (NCC), (3 in series), 170ºC, in stator winding.	P	P
124	Bimetal detectors, break type (NCC), (3 in series), 140ºC, in stator winding.	R	R
125	Bimetal detectors, break type (NCC), (2x3 in series), 150ºC, in stator winding.	P	P
127	Bimetal detectors, break type (NCC), (3 in series, 130ºC & 3 in series, 150ºC), in stator winding.	P	P
445	Pt100 (1 per phase) in stator winding.	P	P
446	Pt100 (2 per phase) in stator winding.	P	P
435	PTC - thermistors (3 in series), 130°C, in stator winding	P	P
436	PTC - thermistors (3 in series), 150°C, in stator winding	S	S
437	PTC - thermistors (3 in series), 170°C, in stator winding	P	P
439	PTC - thermistors (2x3 in series), 150°C, in stator winding	P	P
441	PTC - thermistors (3 in series 130°C & 3 in series 150°C), in stator winding	P	P
442	PTC - thermistors (3 in series 150°C & 3 in series 170°C), in stator winding	P	P
	Terminal box		
021	Terminal box LHS (seen from D-end). In flange-mounted motors code 021 or 180 to be selected.	S	S
157	Terminal box degree of protection IP 65	R	R
180	Terminal box RHS (seen from D-end). In flange-mounted motors code 021 or 180 to be selected	S	S
400	4 x 90 degr turnable terminal box (possible only for terminal box 750)	S	R
418	Separate terminal box for temperature detectors	P	P
444	Adapter and cable box for size 1200 (Please select from the table on page 6)	P	P
466	Terminal box at N-end	P	P

[1] Certain variant codes cannot be used simultaneously.

P = New manufacture only
R = On request
S = Included as standard

Note ! Leakage guard + relay acc. to customer specification on request

Code [1]	Variant	Motor type M3LP 400	450
	Testing		
145	Type test report from a catalogue motor, 400V 50Hz.	P	P
146	Type test with report for motor from specific	P	P
	delivery batch	P	P
147	Type test with report for motor from specific delivery	P	P
	batch, customer witnessed.	P	P
148	Routine test report	P	P
149	Testing according to separate test specification	R	R
	Variable speed drives		
470	Prepared for hollow shaft pulse tacho (L&L equivalent)	P	P
471	512 pulse tacho (L&L 861).	R	R
472	1024 pulse tacho (L&L 861).	P	P
473	2048 pulse tacho (L&L 861).	P	P

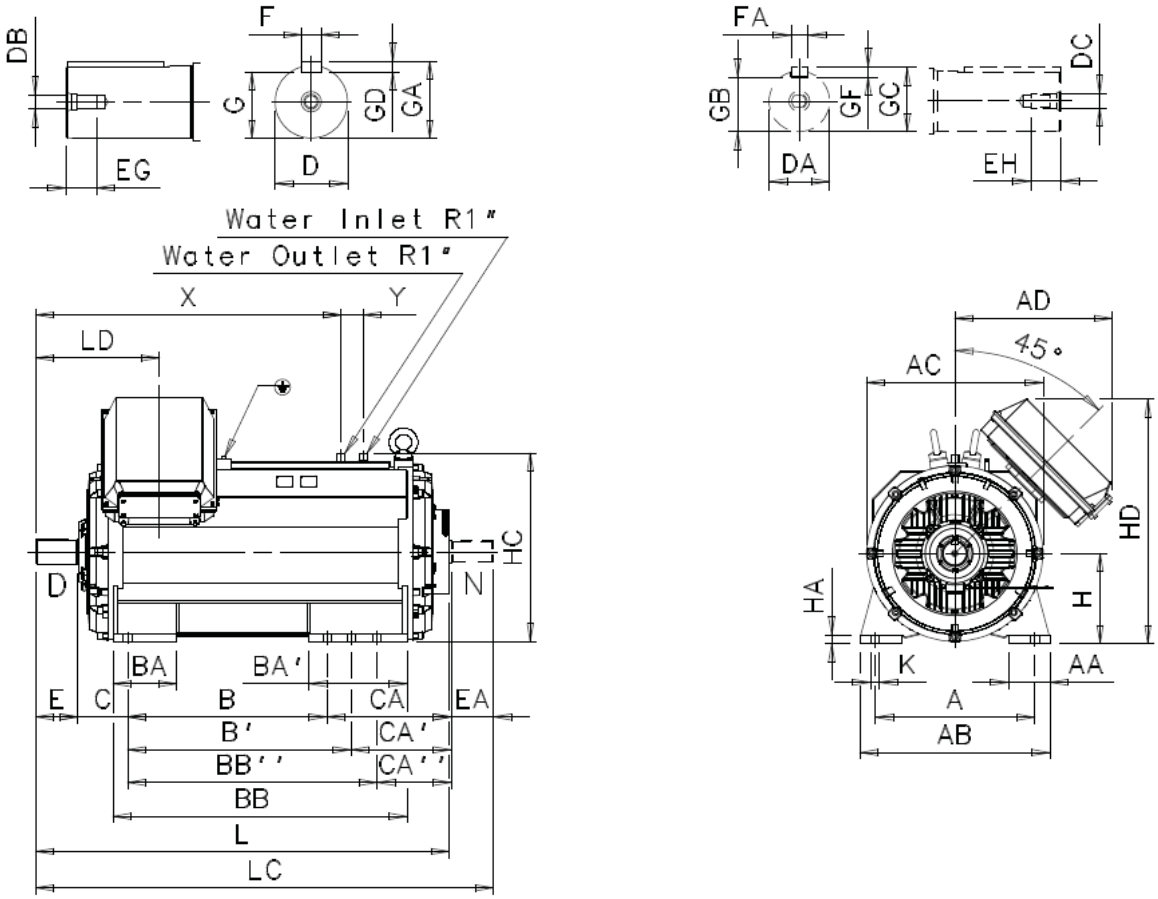
[1] Certain variant codes cannot be used simultaneously.

P = New manufacture only
R = On request
S = Included as standard

Note ! Leakage guard + relay acc. to customer specification on request

Water cooled motors
Dimension drawings

Foot-mounted; IM B3 (IM 1001), IM B6 (IM 1051), IM B7 (IM 1061), IM B8 (IM 1071), IM V5 (IM 1011), IM V6 (IM 1031) – terminal box angle mounted



Motor size	Poles 1)	A	AA	AB	AC	AD 1)	AD 2)	B	B'	B"	BA	BB	C	CA	CA'	CA"	D	DA	DB	DC	E	EA	EG	EH
400 L	4-8	710	183	840	790	679	752	900	1000	-	400	1292	224	536	436	-	110	90	M24	M24	210	210	50	50
450 L	4-8	800	207	950	884	714	788	1000	1120	1250	320	1476	250	622	502	372	120	100	M24	M24	210	210	50	50

Motor size	Poles 1)	F	FA	G	GA	GB	GC	GD	GF	H	HA	HC	HD 1)	HD 2)	K	L	LC	LD	X	Y
400 L	4-8	28	25	100	116	81	95	16	14	400	40	851	1036	1138	35	1860	2080	616	1345	110
450 L	4-8	32	28	109	127	100	116	18	16	450	42	946	1122	1224	42	2072	2292	620	1530	110

Tolerances:

A, B	± 0,8	**H**	0, -1.0
D, DA	ISO m6	**N**	ISO js6
F, FA	ISO h9	**C**	± 0,8

1) Terminal box 750
2) Terminal box 1200

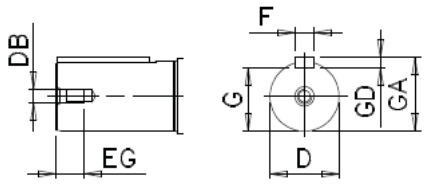
Smaller frame sizes on request.

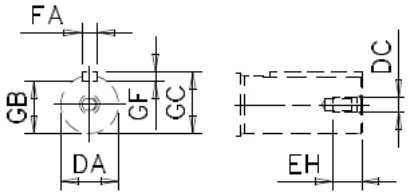
Above table gives the main dimensions in mm.

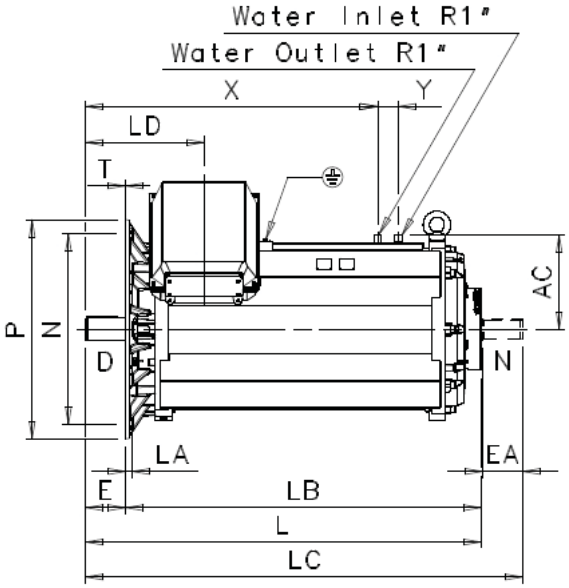
For detailed drawings please see our web site ‘www.abb.com/motors&drives or contact us.

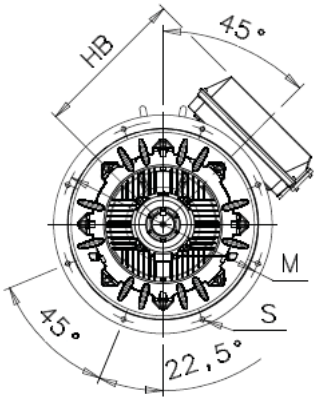
Water cooled motors
Dimension drawings

Flange-mounted; V1 (IM 3011), V3 (IM 3031)
terminal box angle mounted









Motor size	Poles [1]	AC	D	DA	DB	DC	E	EA	EG	EH	F	FA	G	GA	GB	GC	GD	GF
400 L	4-8	451	110	90	M24	M24	210	210	50	50	28	25	100	116	81	95	16	14
450 L	4-8	496	120	100	M24	M24	210	210	50	50	32	28	109	127	100	116	18	16

Motor size	Poles [1]	HB [1]	HB [2]	L	LA	LB	LC	LD	M	N	P	S	T	X	Y
400 L	4-8	686	752	1860	26	1650	2080	616	940	880	1000	28	6	1345	110
450 L	4-8	740	802	2072	33	1862	2292	620	1080	1000	1150	28	6	1530	110

Tolerances:

D, DA	ISO m6	**N**	ISO js6
F, FA	ISO h9		

[1] Terminal box 750
[2] Terminal box 1200

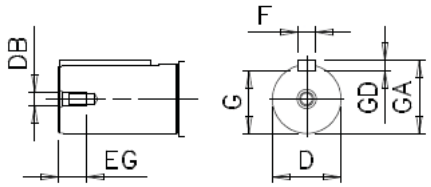
Smaller frame sizes on request.

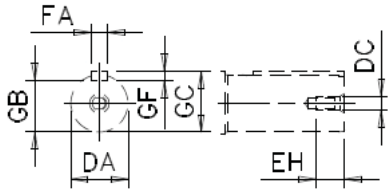
Above table gives the main dimensions in mm.

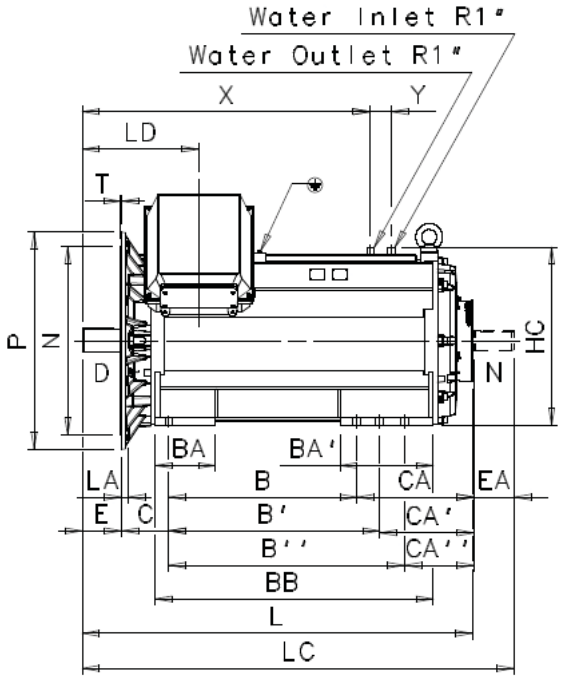
For detailed drawings please see our web site ‘www.abb.com/motors&drives or contact us.

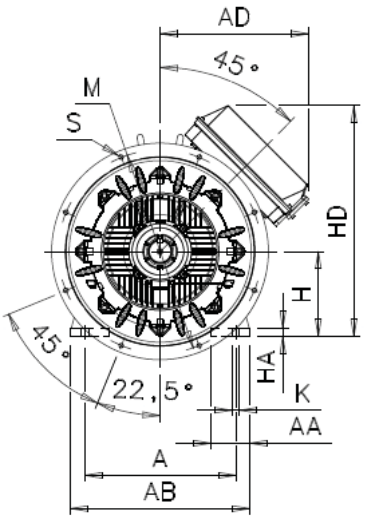
Water cooled motors
Dimension drawings

Foot- and flange-mounted; IM B35 (IM 2001), IM V15 (IM 2011), IM V36 (IM 2031) – terminal box angle mounted









Motor size	Poles [1]	A	AA	AB	AD [1]	AD [2]	B	B'	B"	BA	BB	C	CA	CA'	CA"	D	DA	DB	DC	E	EA	EG	EH
400 L	4-8	710	183	840	679	752	900	1000	-	400	1292	224	536	436	-	110	90	M24	M24	210	210	50	50
450 L	4-8	800	207	950	714	788	1000	1120	1250	320	1476	250	622	502	372	120	100	M24	M24	210	210	50	50

Motor size	Poles [1]	F	FA	G	GA	GB	GC	GD	GF	H	HA	HC	HD[1]	HD[2]	K	L	LC	LD	M	N	P	S	T	X	Y
400 L	4-8	28	25	100	116	81	95	16	14	400	40	851	1036	1138	35	1860	2080	616	940	880	1000	28	6	1345	110
450 L	4-8	32	28	109	127	100	116	18	16	450	42	946	1122	1224	42	2072	2292	620	1080	1000	1150	28	6	1530	110

Tolerances:

A, B	± 0,8	**H**	0, -1.0
D, DA	ISO m6	**N**	ISO js6
F, FA	ISO h9	**C**	± 0,8

[1] Terminal box 750

[2] Terminal box 1200

Smaller frame sizes on request.

Above table gives the main dimensions in mm.

For detailed drawings please see our web site 'www.abb.com/motors&drives or contact us.

Rating plates

The rating plate is in table form giving values current and power factor for six voltages.

Rating plate

ABB Oy, Motors
Vaasa, Finland

3~ Motor M3LP 450 LC 4 B3

S1 — No. 0616-010812345

Ins.cl. F — IP 55

V	Hz	kW	r/min	A	cosφ	Duty
690 Y	50	1200	1491	1170	0,88	
400 D	50	1200	1491	2020	0,88	
660 Y	50	1200	1490	1215	0,89	
380 D	50	1200	1490	2110	0,89	
415 D	50	1200	1492	1970	0,87	
440 D	60	1350	1790	2045	0,89	

Prod. code 3GLP452530-RDG

Nmax 2000 r/min

4400 kg

IEC 60034-1

Lubrication plate

Regreasing intervals in duty hours

Bearings D–end 6326, N–end 6322

Amount of grease D–end 140 g, N–end 120g

Mounting Horizontal/ Vertical	Ambient temp.	1800 r/min	1500 r/min	1000 r/min	500–900
Hor	25°C	2400	4000	8000	
Hor	40°C	1200	2000	4000	4400
Vert	25°C	1200	2000	4000	4400
Vert	40°C	600	1000	2000	2200

Do not exceed the motor max. speed

The following or similar high performance grease can be used:

Esso	Unirex N2, N3 or S2	Mobil	Mobilith SHC 100
Shell	Albida EMS2	Klüber	Klüberplex BEM 41–132
SKF		FAG	Arcanol TEMP110

3GZF193730–42

See the "Low Voltage Motors Manual"

Instruction plate for cooling water

INLET WATER:

TEMPERATURE MAX +40 °C

COOLING WATER FLOW RATE 40 l/min

PRESSURE DROP: 0,2 bar

Water cooled motors in brief, basic design

Motor size		400	450
Stator	Material	Steel plate	
	Paint colour shade	Blue, Munsell 8B 4.5/3.25 / NCS 4822 B05G / RAL 5014	
	Paint thickness	Two-pack epoxy paint, thickness ≥ 80 µm	
Bearing end shields	Material	Cast iron EN-GJL200/GG20/GRS 200, EN-GLJ-250 /GG25/GRS 250, EN-GJS-400/GG40/GRP 400	
	Paint colour shade	Blue, Munsell 8B 4.5/3.25 / NCS 4822 B05G / RAL 5014	
	Paint thickness	Two-pack epoxy paint, thickness ≥ 80 µm	
Bearings	D-end 4-8 pole	6324/C3	6326M/C3
	N-end 4-8 pole	6319/C3	6322/C3
Axially-locked bearings	Inner bearing cover	As standard, locked at D-end	
Bearing seals		Labyrinth seal	
Lubrication		Regreasable bearings, regreasing nipples, M10x1	
Measuring nipples		As standard	
Rating plate	Material	Stainless steel, EN 10088, thickness 0.5 mm	
Terminal box	Frame material	Cast iron EN-GJL-250/GG 25/GRS 250	
	Cover material	Cast iron EN-GJL-250/GG 25/ GRS 250	Steel
	Cover screws material	Steel 8.8, zinc electroplated	
Connections	Cable- entries 4 pole 6-8 pole	*)2xØ80 *)2xØ60/80	*)2xØ60/80
	Terminals	6 terminals for connection with cable lugs (not included)	
	Cable glands	Cable glands included as standard	
Stator winding	Material	Copper	
	Insulation	Insulation class F	
	Winding protection	3 PTC thermistors as standard, 155°C	
Rotor winding	Material	Pressure die-cast aluminum	
Balancing method		Half key balancing as standard	
Key way		Open key way	
Heating elements	On request	2x65 W	2x100 W
Drain holes		Standard, open on delivery	
Enclosure		IP 55, higher protection on request	
Cooling method		IC71W	

*) For detailed information of connections, please see page 6.

ABB Motors' total product offer

ABB offers several comprehensive ranges of AC motors and generators.
We manufacture synchronous motors for even the most demanding applications, and a full range of low and high voltage induction motors.
Our in-depth knowledge of virtually every type of industrial processing ensures we always specify the best solution for your needs.

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General purpose motors for standard applications
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– Cast iron motors
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– Single phase motors

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– Aluminum motors
– Cast iron motors
– Motors for high ambient temperatures

NEMA motors

Motors for hazardous areas
– Flameproof motors
– Increased safety motors
– Non-sparking motors
– Dust ignition proof motors

Marine motors
– Aluminum motors
– Steel motors
– Cast iron motors
– Open drip proof motors

Other applications
– Permanent magnet motors
– High speed motors
– Wind turbine generators
– Smoke venting motors
– Water cooled motors
– Motors for roller table drives

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>>> Water cooled motors

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Low Voltage Motors

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