

# Process performance premium efficiency cast iron motors Totally enclosed squirrel cage three phase low voltage motors Sizes 160 to 355, 11 to 355 kW



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Mechanical design, dimension drawings and other data are the same for low voltage premium efficiency motors as for Process performance motors except for the following parts:

- Bearings
- Permissible loadings on shaft

## Bearings

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

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

When there are high axial forces, angular-contact ball bearings should be used. 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
160	2-12	6309/C3	6209/C3
180	2-12	6310/C3	6209/C3
200	2-12	6312/C3	6210/C3
225	2-12	6313/C3	6212/C3
250	2-12	6315/C3	6213/C3
280	2	6316/C3	6316/C3
	4-12	6316/C3	6316/C3
315	2	6316/C3	6316/C3
	4-12	6319/C3	6316/C3
355	2	6316M/C3	6316M/C3
	4-12	6322/C3	6316/C3

### Version with roller bearings, variant code 037

Motor size	Number of poles	Roller bearings, variant code 037
		D-end
160	2-12	NU 309
180	2-12	NU 310
200	2-12	NU 312
225	2-12	NU 313
250	2-12	NU 315
280	2	<sup>1)</sup>
	4-12	NU 316/C3
315	2	<sup>1)</sup>
	4-12	NU 319/C3
355	2	<sup>1)</sup>
	4-12	NU 322/C3

<sup>1)</sup> On request

## 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, motor sizes 280 to 355 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 160 to 450 are in accordance with the table below:

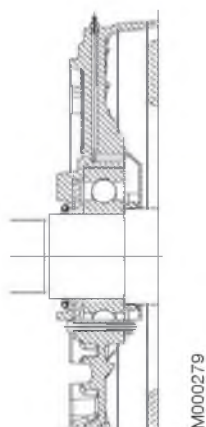
Motor size	Number of poles	Standard design		Alternative design	
		Axial seal		Radial seal (DIN 3760)	
		D-end	N-end	Variant code 072	
160	2-12	RB45	V-45A	45x62x8	
180	2-12	RB50	RB45	50x68x8	
200	2-12	RB60	V-50A	60x80x8	
225	2-12	RB65	V-60A	65x85x10	
250	2-12	RB75	V-65A	75x95x10	

Axial seal:  
RB45...75 = Gamma-ring  
V50...95 = V-ring

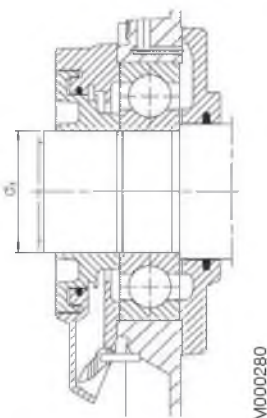
Motor size	Number of poles	Standard design		Alternative design	
		D-end	N-end	D-end	N-end
280	2	Labyrinth seal	Labyrinth seal	-	Labyrinth seal
280	4-12	Labyrinth seal	Labyrinth seal	Labyrinth seal Radial seal 80x110x10	Labyrinth seal Radial seal 80x110x10
315	2	Labyrinth seal	Labyrinth seal	-	Labyrinth seal
315SM, ML	4-12	Labyrinth seal	Labyrinth seal	Labyrinth seal Radial seal 95x125x10	Labyrinth seal Radial seal 80x110x10
315LK	4-12	Labyrinth seal	Labyrinth seal	-	Labyrinth seal Radial seal 80x110x10
355	2	Labyrinth seal	Labyrinth seal	-	Labyrinth seal
355	4-12	Labyrinth seal	Labyrinth seal	-	Labyrinth seal

## Motor sizes 160-250

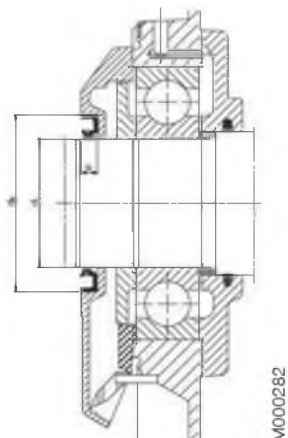


## Motor sizes 280-355

Labyrinth seal



Radial seal



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

The calculated bearing life  $L_{10h}$  for power transmission by means of a coupling (horizontal machine):

Motor sizes 280 to 355  $\geq 200,000$  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 for frame sizes 160-450 from the lubrication plate fastened to the motor frame. See example of a lubrication plate on page 32.

### Motors with permanently greased bearings

Motors with frame sizes 160-250 can be equipped with permanently greased bearings. Bearings are lubricated with high quality, high temperature grease. Bearing types are mentioned in the rating plates.

The following values can be used as a guide for bearing lifetime, depending on application and load conditions:

4-8 pole motors about 40,000 h

2 pole motors about 20,000 h

### Lubrication intervals

ABB follows the  $L_1$ -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  $L_{10}$ -principle, which are normally doubled compared to  $L_1$ -values. Values available from ABB at request.

### Lubrication method in cast iron motors

M4BP 160-355 Regreasable bearings as standard solution

M4BP 160-250 Permanent greased bearings as an option

### Motors with relubrication nipples

For sizes 280 to 355 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.

The table below gives lubrication intervals according to the  $L_1$ -principle for different speeds, ambient temperature of 25°C. 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.

## Lubrication intervals according to L<sub>1</sub> principle

Frame size	Amount of grease g/bearing	kW	3600 r/min	3000 r/min	kW	1800 r/min	1500 r/min	kW	1000 r/min	kW	500-900 r/min
<b>Ball bearings</b>											
<b>Lubrication intervals in duty hours</b>											
160	25	≤ 18,5	9000	12000	≤ 15	18000	21500	≤ 11	24000	all	24000
160	25	> 18,5	7500	10000	> 15	15000	18000	> 11	22500	all	24000
180	30	≤ 22	7000	9000	≤ 22	15500	18500	≤ 15	24000	all	24000
180	30	> 22	6000	8500	> 22	14000	17000	> 15	21000	all	24000
200	40	≤ 37	5500	8000	≤ 30	14500	17500	≤ 22	23000	all	24000
200	40	> 37	3000	5500	> 30	10000	12000	> 22	16000	all	20000
225	50	≤ 45	4000	6500	≤ 45	13000	16500	≤ 30	22000	all	24000
225	50	> 45	1500	2500	> 45	5000	6000	> 30	8000	all	10000
250	60	≤ 55	2500	4000	≤ 55	9000	11500	≤ 37	15000	all	18000
250	60	> 55	1000	1500	> 55	3500	4500	> 37	6000	all	7000
280	60	all	2000	3500	-	-	-	-	-	-	-
280	60	-	-	-	all	8000	10500	all	14000	all	17000
280	35	all	1900	3200	-	-	-	-	-	-	-
280	40	-	-	-	all	7800	9600	all	13900	all	15000
315	35	all	1900	3200	-	-	-	-	-	-	-
315	55	-	-	-	all	5900	7600	all	11800	all	12900
355	35	all	1900	3200	-	-	-	-	-	-	-
355	70	-	-	-	all	4000	5600	all	9600	all	10700

For motors M4BP 160 to 250 the interval may be increased by 30 %, up to a maximum of three calendar years.  
The values in table above are valid also for sizes M4BP 280 to 355.

Frame size	Amount of grease g/bearing	kW	3600 r/min	3000 r/min	kW	1800 r/min	1500 r/min	kW	1000 r/min	kW	500-900 r/min
<b>Roller bearings</b>											
<b>Lubrication intervals in duty hours</b>											
160	25	≤ 18,5	4500	6000	≤ 15	9000	10500	≤ 11	12000	all	12000
160	25	> 18,5	3500	5000	> 15	7500	9000	> 11	11000	all	12000
180	30	≤ 22	3500	4500	≤ 22	7500	9000	≤ 15	12000	all	12000
180	30	> 22	3000	4000	> 22	7000	8500	> 15	10500	all	12000
200	40	≤ 37	2750	4000	≤ 30	7000	8500	≤ 22	11500	all	12000
200	40	> 37	1500	2500	> 30	5000	6000	> 22	8000	all	10000
225	50	≤ 45	2000	3000	≤ 45	6500	8000	≤ 30	11000	all	12000
225	50	> 45	750	1250	> 45	2500	3000	> 30	4000	all	5000
250	60	≤ 55	1000	2000	≤ 55	4500	5500	≤ 37	7500	all	9000
250	60	> 55	500	750	> 55	1500	2000	> 37	3000	all	3500
280	60	all	1000	1750	-	-	-	-	-	-	-
280	70	-	-	-	all	4000	5250	all	7000	all	8500
280	35	all	900	1600	-	-	-	-	-	-	-
280	40	-	-	-	all	4000	5300	all	7000	all	8500
315	35	all	900	1600	-	-	-	-	-	-	-
315	55	-	-	-	all	2900	3800	all	5900	all	6500
355	35	all	900	1600	-	-	-	-	-	-	-
355	70	-	-	-	all	2000	2800	all	4800	all	5400

For motors M4BP 160 to 250 the interval may be increased by 30 %, up to a maximum of three calendar years.  
The values in table above are valid also for sizes M4BP 280 to 355.



When the desired bearing life has been determined, the minimum permissible pulley diameter can be calculated using FR, 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.
- FR = permissible radial force

## Permissible loadings on shaft

The tables give the permissible radial forces in Newtons, assuming zero axial force, ambient temperature 25°C. The values are based on normal conditions at 50 Hz and calculated bearing lives for motor sizes 160 to 355 of 20,000 and 40,000 hours.

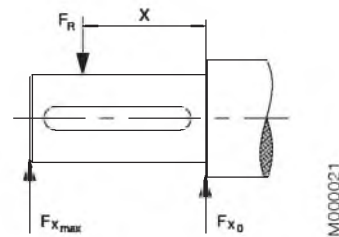
Motors are foot-mounted IM B3 version with force directed sideways. In some cases the strength of the shaft affects the permissible forces. At 60 Hz the values must be reduced by 10%. For two-speed motors, the values must be based on the higher speed.

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 sizes 160 to 355

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)	$F_{Xmax}$ (N)	$F_{X0}$ (N)	$F_{Xmax}$ (N)	$F_{X0}$ (N)	$F_{Xmax}$ (N)
160 MLA	2	110	3540	2740	2955	2285	7100	4300	6140	4300
	4	110	4000	3100	3325	2570	8000	4300	6870	4300
	6	110	4170	3200	3440	2655	8600	4300	7270	4300
	8	110	4600	3585	3855	2985	9300	4300	7955	4300
160 MLB	2	110	3540	2740	2955	2270	7085	4300	6070	4300
	4	110	4085	3300	3370	2725	8300	4300	7055	4300
	6	110	4100	3355	3400	2755	8600	4300	7300	4300
	8	110	4200	3270	3455	2670	9000	4300	7570	4300
160 MLC	2	110	3400	2600	2855	2200	6800	4300	5885	4300
	4	110	3700	3000	3070	2485	7800	4300	6640	4300
	6	110	3600	2900	2870	2325	8000	4300	6700	4300
	8	110	4170	3370	3370	2725	9000	4300	7585	4300
160 MLE	2	110	3400	2755	2755	2240	7600	4300	6370	4300
	4	110	3185	2570	2640	2140	6785	4300	5770	4300
	6	110	4100	3385	3455	2825	8125	5500	7025	5500
	8	110	4270	3485	3525	2885	8600	5500	7300	5500
180 MLA	2	110	4700	3800	3855	3155	9400	5500	7900	5500
	4	110	4785	3900	3870	3170	9800	5500	8255	5500
	6	110	4170	3400	3470	2825	7900	5500	6770	5500
	8	110	4185	3400	3440	2810	8500	5500	7200	5500
180 MLB	2	110	4370	3570	3525	2885	9000	5500	7600	5500
	4	110	3700	3055	3010	2470	7900	5500	6655	5440
	6	110	4370	3570	3525	2885	9000	5500	7600	5500
	8	110	4370	3570	3525	2885	9000	5500	7600	5500



Motor sizes 160 to 355

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 <sub>x0</sub> (N)	FX <sub>max</sub> (N)	F <sub>x0</sub> (N)	FX <sub>max</sub> (N)	F <sub>x0</sub> (N)	FX <sub>max</sub> (N)	F <sub>x0</sub> (N)	FX <sub>max</sub> (N)
<b>200 MLA</b>	2	110	5600	4685	4700	3925	10900	9100	9470	7900
	4	110	6285	5200	5240	4370	12500	9550	10700	8900
	6	110	6800	5700	5700	4770	13600	9550	11670	9550
	8	110	6800	5700	5600	4685	14100	9550	12000	9550
<b>200 MLB</b>	2	110	5670	4700	4700	3925	11000	9200	9500	7900
	4	110	5700	4700	4700	3925	12000	9550	10185	8500
	6	110	6400	5370	5300	4425	13200	9550	11200	9385
<b>200 MLC</b>	2	110	5000	4185	4185	3500	10400	8700	8900	7455
	4	110	5400	4500	4425	3685	11600	9550	9800	8200
	6	110	5800	4885	4740	3955	12500	9550	10600	8800
<b>200 MLD</b>	2	110	4985	4170	4170	3485	10400	8700	8900	7400
<b>225 SMA</b>	2	110	6400	5400	5355	4500	13300	10700	11500	9700
	4	140	7300	5900	6155	4970	15400	10250	13200	10250
	6	140	7600	6200	6370	5140	16400	10250	14000	10250
	8	140	8500	6900	7100	5725	17900	10250	15300	10250
<b>225 SMB</b>	2	110	6100	5185	5155	4340	13000	10700	11200	9455
	4	140	7085	5700	5885	4755	15100	10250	12900	10250
	6	140	7100	5700	5840	4700	16000	10250	13500	10250
<b>225 SMC</b>	2	110	5600	4700	4685	3940	12600	10600	10770	9070
	4	140	6400	5200	5300	4285	14500	10250	12385	10000
	6	110	5500	4640	4600	3880	12420	10460	10640	8960
<b>225 SMD</b>	4	140	5800	4700	4725	3800	13500	10250	11400	9270
	.....									
<b>250 SMA</b>	2	140	7700	6285	6500	5285	17100	10900	14900	10900
	4	140	8700	7000	7300	5900	19800	13800	17000	13785
	6	140	9400	7600	7800	6355	21600	13800	18400	13800
	8	140	9600	7800	7900	6400	22700	13800	19300	13800
<b>250 SMB</b>	2	140	7100	5800	6000	4885	16700	10900	14400	10900
	4	140	7800	6300	6470	5240	18900	13800	16200	13100
	6	140	8900	7200	7355	5955	21200	13800	18000	13800
<b>250 SMC</b>	2	140	6800	5500	5670	4600	16300	10900	14000	10900
	4	140	7400	6000	6055	4900	18100	13800	15400	12485
	6	140	8200	6600	6670	5400	20300	13800	17200	13800
<b>280 SM_</b>	2	140	7350	6150	5800	4900	20350	6350	16550	6350
	4	140	9150	7700	7250	6100	24750	9750	20100	9750
	6	140	10450	8800	8300	6950	27950	9750	22650	9750
<b>315 SM_</b>	2	140	7350	6250	5800	4950	20350	6300	16500	6300
	4	170	11350	9400	9000	7450	32750	10250	26550	10250
	6	170	13000	10250	10300	8500	36950	10250	30000	10250
<b>315 ML_</b>	2	140	7400	6200	5050	5800	20550	6200	16700	6200
	4	170	11350	9600	8950	7600	32700	14650	26550	14650
	6	170	11000	12950	8650	10250	36950	14650	30000	14650
<b>315 LK_</b>	2	140	7450	6050	5850	5150	20800	6050	16850	6050
	4	170	11450	9900	9000	7800	33150	14400	26900	14400
	6	170	11300	13050	8850	10250	37450	14400	30350	14400
<b>355 SM_</b>	2	140	7350	6450	5800	5100	20700	7550	16750	7550
	4	210	15100	12350	11900	9850	45100	14650	36650	14650
	6	210	17250	14300	13600	11300	50950	14700	41350	14700
<b>355 ML_</b>	2	140	7400	6550	5750	5100	20800	7450	16850	7450
	4	210	15200	12800	11950	10050	45500	14550	36900	14550
	6	210	17350	14500	13650	11500	51350	14500	41700	14500
<b>355 LK_</b>	6	210	17450	13950	13650	11850	52100	13950	42250	13950

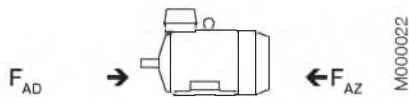


## Permissible axial forces

The following tables give the permissible axial forces in Newton, assuming zero radial force, ambient temperature 25°C. 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%. For

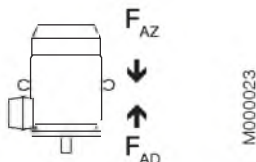
two-speed motors, the values are to be based on the higher speed. The permissible loads of simultaneous radial and axial forces will be supplied on request. Given axial forces  $F_{AD}$ , assumes D-bearing locked by means of locking ring.

### Mounting arrangement IM B3



Motor size	20,000 hours						40,000 hours					
	2-pole		4-pole		6-pole		2-pole		4-pole		6-pole	
	FAD	FAZ	FAD	FAZ	FAD	FAZ	FAD	FAZ	FAD	FAZ	FAD	FAZ
	N	N	N	N	N	N	N	N	N	N	N	N
160 MLA	2850	2850	3450	3450	3690	3690	2325	2325	2775	2775	2970	2970
160 MLB	2850	2850	3435	3435	3600	3600	2325	2325	2760	2760	2880	2880
160 MLC	2775	2775	3150	3150	3135	3135	2280	2280	2535	2535	2490	2490
160 MLD	2865	2865	2900	2900	-	-	2330	2330	2320	2320	-	-
160 MLE	2500	2500	-	-	-	-	2025	2025	-	-	-	-
180 MLA	3300	3300	3600	3600	4140	4140	2700	2700	2920	2920	3320	3320
180 MLB	3340	3340	3580	3580	3800	3800	2725	2725	2900	2900	3040	3040
180 MLC	-	-	3220	3220	-	-	-	-	2560	2560	-	-
200 MLA	4460	4460	5000	5260	5000	5360	3640	3640	4260	4260	4720	4720
200 MLB	4440	4440	4720	4720	5000	5480	3620	3620	3840	3840	4420	4420
200 MLC	3940	3940	4480	4480	4980	4980	3180	3180	3620	3620	3980	3980
200 MLD	3940	3940	-	-	-	-	3200	3200	-	-	-	-
225 SMA	4980	4980	5000	6080	5000	6520	4060	4060	4920	4920	5000	5260
225 SMB	4860	4860	5000	5880	5000	6020	3960	3960	4780	4780	4840	4840
225 SMC	4380	4380	5000	5240	-	-	3540	3540	4260	4260	-	-
225 SMD	4320	4320	4800	4800	-	-	3480	3480	3820	3820	-	-
250 SMA	6000	6080	6000	7140	6000	7880	4920	4920	5820	5820	6000	6380
250 SMB	5620	5620	6000	6320	6000	7480	4540	4540	5100	5100	6000	6040
250 SMC	5260	5260	5960	5960	6000	6860	4220	4220	4760	4760	5520	5520
280 SM_	6200	4200	7900	5900	9100	7100	4850	2850	6100	4100	7000	5000
315 SM_	6100	4100	9250	7250	10700	8700	4750	2750	7100	5100	8150	6150
315 ML_	6000	4000	9150	7150	10550	8550	4700	2700	7050	5050	8050	6050
315 LK_	5900	3900	8950	6950	10250	8250	4600	2600	6850	4850	7750	5750
355 SM_	2950	6750	8450	12250	10250	14050	1650	5450	5750	9550	7050	10850
355 ML_	2900	6700	8350	12150	10100	13900	1550	5350	5600	9400	6850	10650
355 LK	-	-	-	-	9800	13600	-	-	-	-	6600	10400

### Mounting arrangement IM V1



Motor size	20,000 hours						40,000 hours					
	2-pole		4-pole		6-pole		2-pole		4-pole		6-pole	
	FAD	FAZ	FAD	FAZ	FAD	FAZ	FAD	FAZ	FAD	FAZ	FAD	FAZ
	N	N	N	N	N	N	N	N	N	N	N	N
160 MLA	3100	2578	3820	3150	4100	3410	2570	2048	3120	2450	3325	2635
160 MLB	3120	2570	3880	3085	4120	3240	2580	2030	3180	2385	3360	2480
160 MLC	3080	2500	3620	2770	3680	2700	2560	1980	2985	2135	3005	2025
160 MLD	3220	2540	3420	2470	-	-	2665	1985	2820	1870	-	-
160 MLE	2900	2150	-	-	-	-	2420	1670	-	-	-	-
180 MLA	3660	2940	4160	3150	4800	3675	3060	2340	3460	2450	3940	2815
180 MLB)	3760	2960	4220	3095	4500	3285	3125	2320	3500	2375	3700	2485
180 MLC)	-	-	3880	2660	-	-	-	-	3220	2000	-	-
200 MLA	5000	3965	5000	4680	5000	5265	4200	3125	5000	3640	5000	4065
200 MLB	5000	3905	5000	4060	5000	4800	4220	3085	4700	3120	5000	3660
200 MLC	4600	3385	5000	3775	5000	4165	3880	2665	4520	2875	5000	3105
200 MLD	4660	3370	-	-	-	-	3925	2635	-	-	-	-
225 SMA	5000	4375	5000	5445	5000	5735	4780	3455	5000	4225	5000	4395
225 SMB	5000	4245	5000	5175	5000	5155	4780	3345	5000	3995	5000	3915
225 SMC	5000	3670	5000	4445	-	-	4440	2900	5000	3425	-	-
225 SMD	5000	3590	5000	3895	-	-	4400	2790	5000	2935	-	-
250 SMA	6000	5345	6000	6300	6000	6950	5840	4225	6000	4920	6000	5350
250 SMB	6000	4830	6000	5325	6000	6370	5640	3810	6000	4085	6000	4830
250 SMC	6000	4395	6000	4900	6000	5575	5400	3415	6000	3700	6000	4135
280 SM_	7800	3100	9950	4550	11650	5450	6450	1750	8150	2750	9550	3300
315 SM_	8300	2600	12200	5300	14500	6150	6950	1250	10000	3150	11950	3600
315 ML_	8700	2200	12650	4850	15150	5500	7350	850	10500	2650	12600	2950
315 LK_	9350	1550	13650	3850	16550	4100	8000	200	11500	1650	14000	1550
355 SM_	6600	4300	13900	8600	17000	9550	5200	2950	11100	5800	13700	6250
355 ML_	7050	3800	14600	7900	18000	8550	5700	2450	11800	5100	14700	5250
355 LK	-	-	-	-	19500	7050	-	-	-	-	16200	3750



# 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.

<b>Motor type</b>	<b>M4BP 280 SMB</b>
<b>Pole number</b>	<b>2</b>
<b>Mounting arrangement (IM code)</b>	<b>IM B3 (IM 1001)</b>
<b>Rated output</b>	<b>75 kW</b>
<b>Product code</b>	<b>3GBP281220-ADK</b>
<b>Variant codes if needed</b>	

## Motor size

A	B	C	D.E.F.	G														
<b>M4BP 280 SMB 3GBP 281 220 - A D K 003 etc.</b>																		
<table border="1" style="margin: auto;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td> </tr> </table>					1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	3	4	5	6	7	8	9	10	11	12	13	14					
<b>A</b> Motor type		<b>C</b> Product code	<b>E</b> Voltage and frequency code	<b>G</b> Variant codes														
<b>B</b> Motor size		<b>D</b> Mounting arrangement code	<b>F</b> Generation code															

## Explanation of the product code:

### Positions 1 to 4

3GBP = Totally enclosed fan cooled squirrel cage motor with cast iron frame

### Positions 5 and 6

IEC-frame

16 = 160

18 = 180

20 = 200

22 = 225

25 = 250

28 = 280

31 = 315

35 = 355

### Position 7

Speed (Pole pairs)

1 = 2 poles

2 = 4 poles

3 = 6 poles

### Position 8 to 10

Serial number

### Position 11

- (dash)

### Position 12

Mounting arrangement

A = Foot-mounted, top-mounted terminal box

R = Foot-mounted, terminal box RHS seen from D-end

L = Foot-mounted, terminal box LHS seen from D-end

B = Flange-mounted, large flange

C = Flange-mounted, small flange (sizes 71 to 112)

H = Foot- and flange-mounted, terminal box top-mounted

J = Foot- and flange-mounted, small flange with tapped holes

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

Single-speed motors

B 380 VΔ 50 Hz

D 400 VΔ, 415 VΔ, 690 VY 50 Hz

E 500 VΔ 50 Hz

F 500 VY 50 Hz

S 230 VΔ, 400 VY, 415 VY 50 Hz

T 660 VΔ 50 Hz

U 690 VΔ 50 Hz

X Other rated voltage, connection or frequency, 690 V maximum

Two-speed motors

A 220 V 50 Hz

B 380 V 50 Hz

D 400 V 50 Hz

E 500 V 50 Hz

S 230 V 50 Hz

X Other rated voltage, connection or frequency, 690 V maximum

### Remark

For voltage code X the variant code 209 non-standard voltage or frequency (special winding) must be ordered.

### Position 14

Generation code

A, B, C...G...K

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

# Process performance premium efficiency cast iron motors

IE3

## Technical data for totally enclosed squirrel cage three phase motors

IP 55 - IC 411 - Insulation class F - Temperature rise class B

IE3 efficiency class according to IEC 60034-30;2008

Output kW	Motor type	Product code	Speed r/min	Efficiency IEC 60034-2-1; 2007			Power factor cos φ	Current		Torque			Moment of inertia J = 1/4 GD <sup>2</sup> kgm <sup>2</sup>	Weight kg	Sound pressure level L <sub>PA</sub> dB
				Full load 100%	3/4 load 75%	1/2 load 50%		I <sub>N</sub> A	I <sub>s</sub> / I <sub>N</sub>	T <sub>N</sub> Nm	T <sub>l</sub> / T <sub>N</sub>	T <sub>b</sub> / T <sub>N</sub>			
<b>3000 r/min = 2-poles</b>		<b>400 V 50 Hz</b>		<b>CENELEC-design</b>											
11	M4BP 160 MLA	3GBP 161 051-••G	2947	91.4	91.7	90.8	0.92	18.8	7.5	35.6	2.2	3.1	0.054	142	69
15	M4BP 160 MLB	3GBP 161 052-••G	2937	91.9	92.6	92.3	0.92	25.6	7.7	48.7	2.7	3.0	0.064	171	69
18.5	M4BP 160 MLC	3GBP 161 053-••G	2935	92.4	93.1	93.0	0.93	31.0	8.0	60.1	2.9	3.1	0.074	184	69
22	M4BP 180 MLA	3GBP 181 051-••G	2948	92.8	93.4	93.2	0.91	37.6	8.0	71.2	2.9	3.1	0.118	235	69
30	M4BP 200 MLA	3GBP 201 051-••G	2957	93.5	93.7	93.1	0.90	51.4	8.0	96.8	2.7	3.1	0.198	299	72
37	M4BP 200 MLB	3GBP 201 052-••G	2954	93.7	94.1	93.7	0.91	62.6	7.9	119	2.7	3.0	0.219	314	72
45	M4BP 225 SMA	3GBP 221 051-••G	2967	94.3	94.3	93.4	0.91	75.6	8.0	144	2.5	2.6	0.336	410	74
55	M4BP 250 SMA	3GBP 251 051-••G	2969	94.7	94.8	94.2	0.90	93.1	7.5	176	2.4	2.8	0.588	453	75
75	M4BP 280 SMB	3GBP 281 220-••K	2979	95.5	95.4	94.6	0.87	130	7.3	240	2.1	2.9	0.9	665	77
90	M4BP 280 SMC	3GBP 281 230-••K	2981	95.7	95.6	94.8	0.88	154	8.0	288	2.5	3.1	1.15	725	77
110	M4BP 315 SMB	3GBP 311 220-••K	2982	95.9	95.7	95.0	0.87	190	6.7	352	1.9	2.6	1.4	940	77
132	M4BP 315 SMC	3GBP 311 230-••K	2984	95.9	95.9	95.3	0.88	225	7.9	422	2.4	3.0	1.7	1025	77
160	M4BP 315 MLA	3GBP 311 410-••K	2982	96.1	96.1	95.8	0.90	267	7.3	512	2.2	2.7	2.1	1190	77
200	M4BP 315 MLB	3GBP 311 420-••K	2982	96.2	96.2	96.0	0.90	333	6.8	640	1.9	2.6	2.2	1220	77
200 <sup>1)</sup>	M4BP 355 SMA	3GBP 351 210-••K	2984	96.2	96.1	95.5	0.89	337	7.6	640	2.0	3.1	3.0	1600	83
250	M4BP 315 LKB	3GBP 311 820-••K	2981	96.3	96.3	96.2	0.91	411	7.9	800	2.5	2.7	2.9	1540	77
250 <sup>1)</sup>	M4BP 355 SMB	3GBP 351 220-••K	2983	96.3	96.3	95.9	0.90	416	7.6	800	2.2	3.0	3.4	1680	83
315 <sup>1)</sup>	M4BP 355 SMC	3GBP 351 230-••K	2984	96.4	96.4	95.9	0.89	529	7.8	1008	2.3	2.8	3.6	1750	83
355 <sup>1)</sup>	M4BP 355 MLA	3GBP 351 410-••K	2982	96.5	96.5	96.3	0.90	589	7.5	1136	2.3	2.6	4.1	2000	83
<b>1500 r/min = 4-poles</b>		<b>400 V 50 Hz</b>		<b>CENELEC-design</b>											
11	M4BP 160 MLA	3GBP 162 051-••G	1473	92.3	92.6	92.0	0.83	20.7	8.0	71.3	2.9	3.3	0.11	174	62
15	M4BP 160 MLB	3GBP 162 052-••G	1474	92.7	93.0	92.4	0.84	27.8	8.0	97.1	2.8	3.4	0.126	187	62
18.5	M4BP 180 MLA	3GBP 182 051-••G	1480	93.2	93.7	93.5	0.84	34.1	7.7	119	2.5	2.9	0.22	235	62
22	M4BP 180 MLB	3GBP 182 052-••G	1477	93.0	93.6	93.6	0.84	40.6	7.9	142	2.8	2.9	0.22	236	62
30	M4BP 200 MLA	3GBP 202 051-••G	1482	94.0	94.4	94.1	0.85	54.1	7.5	193	2.5	2.9	0.374	319	63
37	M4BP 225 SMA	3GBP 222 051-••G	1482	94.3	94.4	93.7	0.87	65.0	8.0	238	2.5	2.8	0.553	399	66
45	M4BP 225 SMB	3GBP 222 052-••G	1482	94.2	94.4	93.8	0.87	79.2	8.2	289	2.6	2.8	0.553	399	66
55	M4BP 250 SMA	3GBP 252 051-••G	1481	95.1	95.3	94.9	0.86	97.0	8.0	354	3.0	2.8	0.948	476	67
75	M4BP 280 SMB	3GBP 282 220-••K	1486	95.7	95.8	95.3	0.84	133	7.4	481	2.5	2.8	1.5	665	66
90	M4BP 280 SMC	3GBP 282 230-••K	1487	95.9	96.0	95.5	0.85	159	7.9	577	2.9	3.0	1.85	725	66
110	M4BP 315 SMC	3GBP 312 230-••K	1490	96.3	96.3	95.7	0.85	193	7.8	704	2.4	3.1	2.9	1000	68
132	M4BP 315 SMD	3GBP 312 240-••K	1490	96.4	96.4	95.9	0.85	232	7.9	845	2.6	3.2	3.2	1065	68
160	M4BP 315 MLB	3GBP 312 420-••K	1489	96.4	96.4	96.1	0.86	278	7.9	1026	2.7	3.0	3.9	1220	68
200	M4BP 315 LKB	3GBP 312 820-••K	1490	96.5	96.5	96.3	0.87	343	7.6	1281	2.5	2.9	5.0	1520	74
200	M4BP 355 SMA	3GBP 352 210-••K	1490	96.5	96.5	96.3	0.87	343	7.3	1281	2.1	2.7	5.9	1610	74
250	M4BP 315 LKC	3GBP 312 830-••K	1491	96.6	96.6	96.4	0.87	429	7.8	1601	2.3	3.0	5.5	1600	74
250	M4BP 355 SMB	3GBP 352 220-••K	1491	96.6	96.6	96.3	0.87	429	7.8	1601	2.5	2.9	6.9	1780	74
315	M4BP 355 SMC	3GBP 352 230-••K	1491	96.7	96.7	96.3	0.85	553	7.4	2017	2.8	2.9	7.2	1820	74
355	M4BP 355 MLA	3GBP 352 410-••K	1491	96.7	96.7	96.4	0.86	616	7.9	2273	2.7	2.9	8.4	2140	74

<sup>1)</sup> 3dB(A) sound pressure level reduction with unidirectional fan construction. Direction of rotation must be stated when ordering, see variant codes 044 and 045.

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

I<sub>s</sub> / I<sub>N</sub> = Starting current  
 T<sub>l</sub> / T<sub>N</sub> = Locked rotor torque  
 T<sub>b</sub> / T<sub>N</sub> = Breakdown torque

Efficiency values are given according to IEC 60034-2-1; 2007.

Please note that the values are not comparable without knowing the testing method.

ABB has calculated the efficiency values according to indirect method, stray load losses (additional losses) determined from measuring.



# Process performance premium efficiency cast iron motors

IE3

## Technical data for totally enclosed squirrel cage three phase motors

IP 55 - IC 411 - Insulation class F - Temperature rise class B

IE3 efficiency class according to IEC 60034-30;2008

Output kW	Motor type	Product code	Speed r/min	Efficiency IEC 60034-2-1: 2007			Power factor cos φ	Current		Torque			Moment of inertia J = 1/4 GD <sup>2</sup> kgm <sup>2</sup>	Weight kg	Sound pressure level L <sub>PA</sub> dB
				Full load 100%	3/4 load 75%	1/2 load 50%		I <sub>N</sub> A	I <sub>s</sub> I <sub>N</sub>	T <sub>N</sub> Nm	T <sub>l</sub> T <sub>N</sub>	T <sub>b</sub> T <sub>N</sub>			
<b>GENELEC-design</b>															
7.5	M4BP 160 MLA	3GBP 163 051-••G	977	89.9	90.5	89.9	0.78	15.4	7.7	73.3	2.3	3.4	0.116	173	59
11	M4BP 160 MLB	3GBP 163 052-••G	979	90.8	91.1	90.2	0.75	23.3	7.6	107	2.1	3.6	0.134	186	59
15	M4BP 180 MLA	3GBP 183 051-••G	982	91.2	91.7	91.0	0.75	31.6	6.8	145	2.0	2.8	0.218	234	59
18.5	M4BP 200 MLA	3GBP 203 051-••G	990	92.9	93.0	92.0	0.80	35.9	7.8	178	2.5	3.3	0.456	292	63
22	M4BP 200 MLB	3GBP 203 052-••G	990	92.9	93.1	92.3	0.81	42.1	8.0	212	2.5	3.3	0.539	318	63
30	M4BP 225 SMA	3GBP 223 051-••G	989	93.5	93.7	93.1	0.81	57.1	7.9	289	2.7	3.2	0.827	393	63
37	M4BP 250 SMA	3GBP 253 051-••G	991	93.8	94.1	93.5	0.84	67.7	7.5	356	2.7	2.9	1.512	468	63
45	M4BP 280 SMB	3GBP 283 220-••K	991	94.8	94.9	94.2	0.86	79.6	6.9	433	2.4	2.6	2.2	680	65
55	M4BP 280 SMC	3GBP 283 230-••K	990	95.1	95.1	94.7	0.86	97.0	6.8	530	2.4	2.6	2.85	725	65
75	M4BP 315 SMC	3GBP 313 230-••K	993	95.3	95.3	94.8	0.84	135	7.0	721	2.2	2.8	4.9	1000	67
90	M4BP 315 SMD	3GBP 313 240-••K	994	95.5	95.5	94.9	0.83	163	7.2	864	2.4	2.9	4.9	1040	67
110	M4BP 315 MLB	3GBP 313 420-••K	993	95.5	95.5	95.1	0.84	197	6.9	1057	2.3	2.7	6.3	1200	68
132	M4BP 315 LKA	3GBP 313 810-••K	993	95.7	95.7	95.4	0.83	239	6.9	1269	2.4	2.7	7.3	1410	68
160	M4BP 315 LKC	3GBP 313 830-••K	994	95.9	95.9	95.5	0.83	290	7.4	1537	2.7	2.9	9.2	1600	68
160	M4BP 355 SMB	3GBP 353 220-••K	995	95.9	95.9	95.5	0.83	290	7.0	1535	2.1	2.7	9.7	1680	73
200	M4BP 355 SMC	3GBP 353 230-••K	995	96.0	96.0	95.7	0.83	362	7.3	1919	2.3	2.8	11.3	1820	73
250	M4BP 355 MLB	3GBP 353 420-••K	995	96.0	96.0	95.8	0.83	452	7.1	2399	2.3	2.7	13.5	2180	73
315	M4BP 355 LKA	3GBP 353 810-••K	994	96.0	96.0	95.8	0.83	570	6.9	3026	2.3	2.6	15.5	2500	76
355	M4BP 355 LKB	3GBP 353 820-••K	995	96.0	96.0	95.6	0.80	667	7.7	3407	2.7	2.9	16.5	2600	76

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

$I_s / I_N$  = Starting current  
 $T_l / T_N$  = Locked rotor torque  
 $T_b / T_N$  = Breakdown torque

Efficiency values are given according to IEC 60034-2-1; 2007.

Please note that the values are not comparable without knowing the testing method.

ABB has calculated the efficiency values according to indirect method, stray load losses (additional losses) determined from measuring.

Алматы (7273)495-231  
 Ангарск (3955)60-70-56  
 Архангельск (8182)63-90-72  
 Астрахань (8512)99-46-04  
 Барнаул (3852)73-04-60  
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