

Premium efficiency motors designed to match the pump load

Grundfos MG IE3-rated 0.25-22 kW
3-Phase motors provide low energy
consumption, emissions and
operating costs

FAMCO
هایپر صنعت

THE MG MOTOR RANGE

TAILORED PRECISELY TO YOUR APPLICATION

Grundfos is one of the world's leading manufacturers of pumps and pumping equipment. Therefore, high quality electrical motors are a natural priority for us. For decades, we have been manufacturing our own motors that match the very high standard of our pumps for applications in building services, industry and water utility.

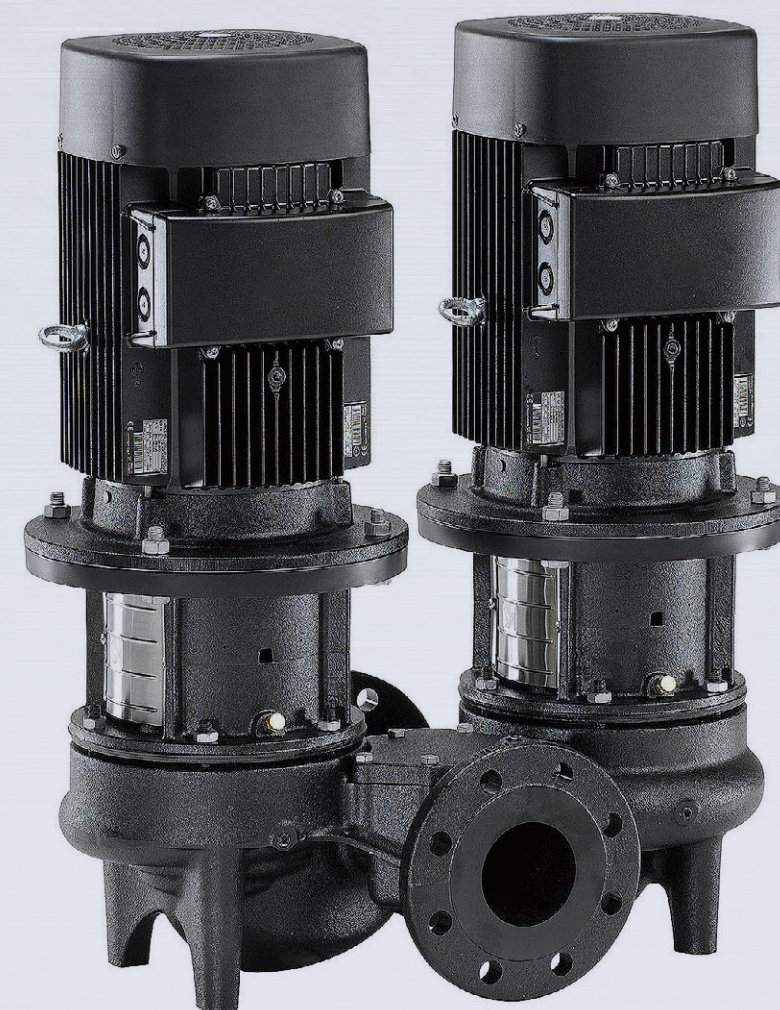
Grundfos MG motors distinguish themselves from standard motors in the market in several ways:

- Optimal lifetime – motor designed to fit pump load
- Wide voltage ranges for both 50 Hz and 60 Hz
- Low noise levels
- Meet or exceed global standards for efficiency (MEPS)
- A range of customised options available on request
- Global availability through Grundfos companies

UNIQUELY ROBUST AND RELIABLE OPERATION

Solid design and a range of construction features contribute to provide trouble-free operation and increase the operating lifetime of the motor.

- High-quality bearings from world's leading manufacturers
- Oversized bearings compared to standard motors
- Inverter-ready as standard (Frame Size 71/80 as an exemption – on request)
- 'Cold motors' – class F insulation system with class B temperature rises
- 60 °C ambient temperature allowed as standard
- Built-in PTC sensor as standard from 3 kW and above
- Drain holes closed on delivery as standard
- Relubrication system as standard from Frame Size 160 and upwards
- Bearing temperature surveillance available on request in both drive and non-drive end bearings for 11 kW and above
- FPV solution available with a second PTC (a warning PTC) from 7.5 kW 2-pole and 5.5 kW 4-pole and above



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تهران، کیلومتر ۲۱ بزرگراه لشگری (جاده مخصوص کرج)

روبروی پالایشگاه نفت پارس، پلاک ۱۲

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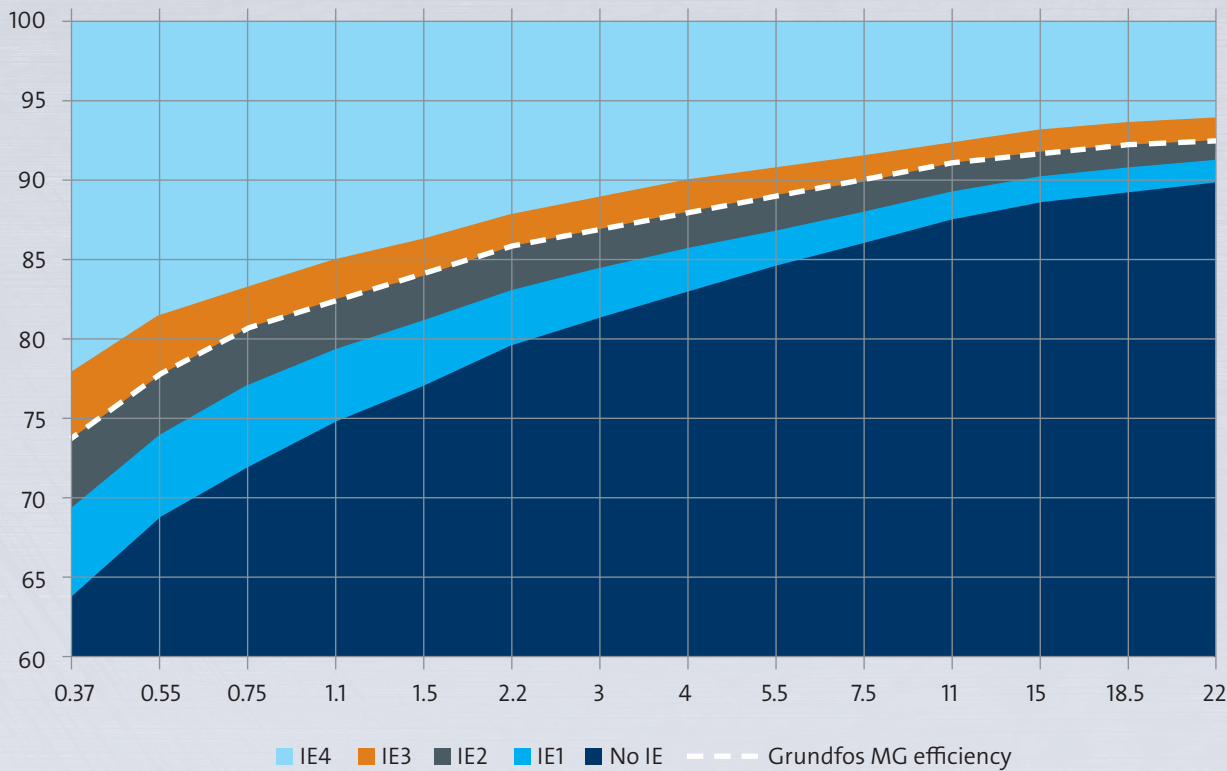
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MEET OR EXCEED GLOBAL STANDARDS FOR EFFICIENCY

Minimum Energy Performance Standards (MEPS) for electric motors are becoming increasingly strict worldwide, and the global standard generally adhered to today is

IE3. Pumps with IE3-rated electric motors use less energy, resulting in lower emissions and operating costs. Our MG motors fulfil all required MEPS, wherever they are applied.

2-POLE, 50 HZ EFFICIENCY CURVES FOR GRUNDFOS MOTORS



If you require even higher efficiencies than IE3, Grundfos can also offer the IE5-rated permanent magnet MGE motor up to 11 kW with built-in variable frequency drive.

MOTORS DESIGNED TO MATCH THE PUMP

Motors manufactured by Grundfos are designed especially for use with Grundfos pumps, and within each motor type we offer a number of different variants.

WIDE VOLTAGE RANGE

The wide voltage range means our motors can be used in many countries around the world. It also makes the motors very robust against over and under voltage as well as voltage unbalance, because the IEC standards requirement for voltage tolerances are fulfilled on the border of the voltages and not just on one nominal voltage.

VOLTAGE RANGE

Frequency	Voltage
50	220-240Δ/380-415Y
60	220-255Δ/380-440Y ¹
	220-277Δ/380-480Y ²
50	380-415Δ
60	380-440Δ ¹
	380-480Δ ²

¹) MG 71/80

²) MG 90-180

GLOBAL APPROVALS AND STANDARDS

The technical data for the motors covers both 50 and 60 Hz versions. Unlike most other motor brands, the Grundfos Standard motors offer the same power output in 50 and 60 Hz versions.

The Grundfos motors are designed, manufactured and tested according to the internationally recognised standards for electrical motors: IEC60034 and IEC60072-1/EN50347

Standard configuration of Grundfos motors mountings

- V18/B14, V1/B5, B3, B34 and B35. IP55 with drain plugs closed

All Global Energy approvals available – also combined

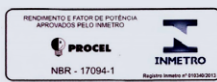
- Canada
- USA
- Brazil
- Mexico
- Peru
- EU
- Japan
- South Korea
- Singapore
- Taiwan
- Australia
- New Zealand
- China
- Eurasian Customs Union/Russia
- Colombia
- India
- Vietnam

Safety approvals available

- cURus, CCC etc.

Certificates available

- Vibration, performance and efficiency levels



STANDARD BEARINGS AVAILABLE WORLDWIDE

The Grundfos MG motors are fitted with locked bearings at the drive end, either a deep-groove ball bearing or an angular-contact bearing depending on the motor use. On standard models, a wave spring washer at the non-drive end holds the motor bearings in place. Grundfos uses only high-quality bearings from the world’s leading manufacturers:

- SKF AB (Sweden)
- NSK Corporation (Japan)
- FAG Schaeffler Technologies AG & Co. KG (Germany)
- INA Schaeffler Technologies AG & Co. KG (Germany)

These manufacturers all comply with international standards, and the bearings are customised to Grundfos requirements, with supreme corrosion resistance and high-temperature grease to deal with tough environmental conditions. The re-greasing gives extended lifetime of the bearings without need forreplacement and applies to motors from 11 kW (FS160 and above). The use of standard bearings makes replacement easy all over the world as well as ensuring that you get optimal lifetime and access to spare bearings.

BEARING SIZE OVERVIEW

Frame size	2-pole	4-pole	Bearing sizes		
	Power	Power	Drive end	Drive end - CR	Non-drive end
71	0.37	0.25	6204.2Z.C3	6204.2Z.C3	6201.2Z.C3
	0.55	0.37			
80	0.75	0.55		6204.2Z.C3 / 6304.2Z.C3	
	1.1	-			
90	1.5	0.75	6305.2Z.C4	6305.2Z.C3	6205.2Z.C3
	2.2	1.1			
	-	1.5			
100	3	2.2	6306.2Z.C3	6306.2Z.C3	6205.2Z.C3
	-	3			
112	4	4	6306.2Z.C3	7306BE.2CS	6206.2Z.C3
132	5.5	5.5	6308.2Z.C3	7308BE.2CS	6206.2Z.C3
	7.5	7.5			
160	11	11	6309.C4	7309BE	6309.C4
	15	15			
	18.5	-			
180	22	-	6310.C4	7310BE	6310.C4

LESS NOISE FROM HIGH EFFICIENCY MOTORS

In electrical motors, the cooling fan is normally the main source of noise. With IE3-rated motors, less cooling air is needed to maintain the motor temperature, because of the higher efficiency. This allows for a smaller cooling fan, which reduces the noise level.

Sound pressure levels

Grundfos complies with the following rules relating to sound pressure:

- Sound power according to EN ISO 3743-2
- Sound power converted to a mean sound pressure (1 m from the test object, EN ISO 11203, method Q2)
- Tolerance on 3 dB[A] according to EN ISO 4871 (not added in the table values)

SOUND PRESSURE OVERVIEW

Sound pressure MG model H				
Motors	Power kW	Type designation	50 Hz Sound pressure level dB(A)	60 Hz Sound pressure level dB(A)
2-pole	0.37	MG71A2-C3	51.0	53.5
	0.55	MG71B2-C3	49.0	55.0
	0.75	MG80A2-H3	48.8	53.7
	1.10	MG80C2-H3	48.6	53.5
	1.50	MG90SD2-H3	54.2	58.6
	2.20	MG90LE2-H3	55.5	59.8
	3.00	MG100LC2-H3	55.3	59.8
	4.00	MG112MC2-H3	58.7	63.6
	5.50	MG132SC2-H3	58.8	63.6
	7.50	MG132SB2-H3	60.3	65.1
	11.0	MG160MB2-H3	60.5	65.1
	15.0	MG160MD2-H3	60.6	65.2
	18.5	MG160LB2-H3	60.7	65.3
	22.0	MG180MB2-H3	64.4	69.1
4-pole	0.25	MG71A4-C1	39.5	39.5
	0.37	MG71B4-C1	37.5	41.0
	0.55	MG80A4-C1	43.5	44.5
	0.75	MG90SC4-H3	43.6	46.6
	1.10	MG90SB4-H3	43.6	46.6
	1.50	MG90LC4-H3	43.2	48.6
	2.20	MG100LB4-H3	42.2	44.3
	3.00	MG100LC4-H3	50.2	50.2
	4.00	MG112MC4-H3	47.4	48.4
	5.50	MG132SB4-H3	49.8	54.5
	7.50	MG132MB4-H3	50.5	56.2
	11.0	MG160MA4-H3	53.0	58.0
	15.0	MG160LB4-H3	53.5	58.0



MG STANDARD MOTORS

50 HZ, 380-415 V - 60 HZ, 400-480 V

Short type designation	Data for 2-pole. 400 V. 50 Hz													
	IE efficiency class marking	Shaft power P ₂	Full load current I _N	Power factor Cos φ at % load			Efficiency η at % load ¹⁾			Speed n	Torque at 400 V M _N	LRC I _s /I _N	LRT M _s /M _N	BT M _{BT} /M _N
		[kW]	[A]	50 %	75 %	100 %	50 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MG71A2-C3	IE3	0.37	1.00	0.51	0.64	0.74	73.2	77.6	78.5	2870	1.26	510	330	370
MG71B2-C3	IE3	0.55	1.45	0.49	0.63	0.74	76.6	79.8	80.0	2840	1.86	500	360	390
MG80A2-C3	IE3	0.75	1.90	0.52	0.66	0.75	81.7	82.7	80.7	2860	2.50	600	360	410
MG80C2-C3	IE3	1.10	2.50	0.58	0.72	0.79	85.4	84.6	82.7	2860	3.64	480	330	380
MG90SD2-H3	IE3	1.50	3.30	0.57	0.70	0.81	84.3	85.5	84.2	2900	5.00	750	330	400
MG90LE2-H3	IE3	2.20	4.60	0.60	0.73	0.83	86.6	87.6	85.9	2900	7.25	830	330	440
MG100LC2-H3	IE3	3.00	6.30	0.63	0.76	0.84	87.7	88.0	87.1	2910	9.90	890	360	440
MG112MC2-H3	IE3	4.00	7.90	0.77	0.85	0.87	85.2	88.6	88.1	2930	13.0	1100	430	520
MG132SC2-H3	IE3	5.50	11.0	0.68	0.80	0.84	89.6	90.0	89.2	2930	17.8	1500	420	510
MG132SB2-H3	IE3	7.50	14.2	0.70	0.79	0.85	90.8	90.8	90.1	2920	24.6	850	240	310
MG160MB2-H3	IE3	11.0	20.2	0.72	0.81	0.86	91.3	91.8	91.2	2940	36.0	730	260	320
MG160MD2-H3	IE3	15.0	26.9	0.76	0.85	0.88	92.4	92.4	91.9	2940	49.0	730	260	310
MG160LB2-H3	IE3	18.5	33.4	0.74	0.83	0.87	93.2	93.2	92.4	2950	60.0	920	230	400
MG180MB2-H3	IE3	22.0	39.5	0.80	0.86	0.90	94.4	93.7	92.7	2950	71.2	830	280	320
	Data for 2-pole. 440 V. 60 Hz													
MG71A2-C3	IE4	0.37	0.85	0.55	0.67	0.76	75.0	79.0	80.0	3470	1.04	650	350	400
MG71B2-C3	IE4	0.55	1.20	0.53	0.67	0.76	79.5	83.0	83.0	3460	1.54	600	390	430
MG80A2-C3	IE4	0.75	1.60	0.56	0.70	0.77	84.5	84.4	82.5	3470	2.10	740	380	440
MG80C2-C3	IE3	1.10	2.30	0.61	0.73	0.80	86.4	86.0	82.5	3470	3.05	500	310	380
MG90SD2-H3	IE3	1.50	3.00	0.61	0.73	0.80	85.4	86.9	85.5	3510	4.10	820	320	450
MG90LE2-H3	IE3	2.20	4.15	0.63	0.75	0.84	87.8	89.0	86.5	3510	6.00	850	360	470
MG100LC2-H3	IE3	3.00	5.70	0.66	0.78	0.87	88.9	88.0	87.5	3510	8.16	1000	380	470
MG112MC2-H3	IE3	4.00	7.20	0.74	0.83	0.86	86.9	88.5	88.5	3530	10.8	1280	450	570
MG132SC2-H3	IE3	5.50	9.80	0.70	0.81	0.84	89.9	90.3	89.5	3530	15.0	1300	450	560
MG132SB2-H3	IE3	7.50	12.9	0.72	0.81	0.85	91.4	90.9	90.2	3510	20.6	900	270	320
MG160MB2-H3	IE3	11.0	18.6	0.72	0.82	0.85	91.2	91.4	91.0	3540	30.0	770	300	330
MG160MD2-H3	IE3	15.0	24.6	0.77	0.85	0.88	92.1	92.3	91.0	3540	40.5	770	280	310
MG160LB2-H3	IE3	18.5	30.6	0.75	0.83	0.86	92.4	93.1	91.7	3540	50.0	930	210	410
MG180MB2-H3	IE3	22.0	35.5	0.84	0.89	0.91	94.4	93.5	91.7	3540	59.5	880	290	330



MG STANDARD MOTORS

50 HZ, 380-415 V - 60 HZ, 400-480 V

	Data for 4-pole, 400 V, 50 Hz													
Short type designation	IE efficiency class marking	Shaft power P ₂	Full load current I _N	Power factor Cos ϕ ₁ at % load			Efficiency η at % load ¹⁾			Speed n	Torque at 400 V M _N	LRC I _y /I _N	LRT M _y /M _N	BT M _{BT} /M _N
		[kW]	[A]	50 %	75 %	100 %	50 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MG71A4-C1	IE2	0.25	0.85	0.41	0.52	0.69	58.3	66.0	69.0	1410	1.70	420	190	260
MG71B4-C1	IE2	0.37	1.10	0.42	0.55	0.71	61.9	68.8	71.0	1410	2.10	440	190	250
MG80A4-C1	IE2	0.55	1.50	0.50	0.64	0.74	75.7	78.2	77.0	1400	3.75	450	220	260
MG90SC4-H3	IE3	0.75	1.90	0.52	0.66	0.73	81.4	83.1	82.5	1450	4.97	690	250	320
MG90SB4-H3	IE3	1.10	2.80	0.45	0.59	0.67	82.9	84.6	84.1	1460	7.17	870	300	400
MG90LC4-H3	IE3	1.50	3.60	0.49	0.62	0.71	84.2	85.8	85.3	1460	9.90	760	280	340
MG100LB4-H3	IE3	2.20	4.90	0.57	0.70	0.76	87.6	87.7	86.7	1450	14.5	630	280	330
MG100LC4-H3	IE3	3.00	6.30	0.55	0.66	0.79	84.5	86.0	87.7	1450	19.8	740	230	310
MG112MC4-H3	IE3	4.00	9.30	0.48	0.63	0.71	88.3	88.9	88.6	1460	26.0	840	320	390
MG132SB4-H3	IE3	5.50	11.0	0.67	0.78	0.83	90.4	90.3	89.6	1460	36.4	760	260	320
MG132MB4-H3	IE3	7.50	14.5	0.69	0.80	0.84	92.4	91.6	90.4	1460	49.5	740	260	320
MG160MA4-H3	IE3	11.0	20.7	0.66	0.77	0.83	91.6	92.1	91.4	1470	71.5	770	200	340
MG160LB4-H3	IE3	15.0	28.4	0.67	0.78	0.84	92.1	92.3	92.1	1470	98.0	820	230	340
	Data for 4-pole, 440 V, 60 Hz													
MG71A4-C1	IE2	0.25	0.70	0.41	0.53	0.69	65.6	71.7	72.0	1720	1.42	470	220	280
MG71B4-C1	IE2	0.37	1.00	0.45	0.58	0.72	67.5	72.4	74.0	1720	2.10	470	220	280
MG80A4-C1	IE2	0.55	1.40	0.51	0.65	0.75	79.1	81.0	80.0	1710	3.10	470	230	260
MG90SC4-H3	IE3	0.75	1.75	0.52	0.65	0.72	82.9	84.1	85.5	1750	4.12	690	270	360
MG90SB4-H3	IE2	1.10	2.60	0.46	0.59	0.66	85.2	86.4	84.0	1760	5.96	830	340	430
MG90LC4-H3	IE3	1.50	3.30	0.51	0.62	0.70	86.0	86.8	86.5	1760	8.25	820	330	400
MG100LB4-H3	IE2	2.20	4.45	0.59	0.70	0.76	88.5	88.3	87.5	1750	11.9	690	310	340
MG100LC4-H3	IE3	3.00	5.75	0.62	0.73	0.78	89.7	89.4	89.5	1750	16.6	780	230	330
MG112MC4-H3	IE3	4.00	8.40	0.51	0.64	0.70	90.9	90.6	89.5	1760	21.6	850	400	340
MG132SB4-H3	IE2	5.50	10.0	0.69	0.78	0.83	91.2	90.9	89.5	1760	30.5	780	300	350
MG132MB4-H3	IE3	7.50	13.4	0.70	0.80	0.83	92.7	92.1	91.7	1760	40.7	770	260	340
MG160MA4-H3	IE2	11.0	19.0	0.68	0.78	0.85	91.3	91.2	91.0	1770	59.5	840	230	360
MG160LB4-H3	IE2	15.0	26.1	0.69	0.78	0.84	91.4	91.2	91.0	1770	81.5	850	240	360

DIMENSIONS

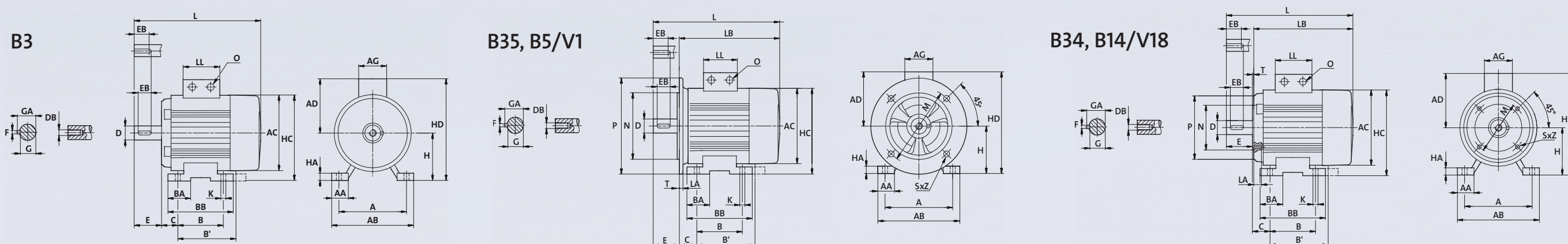
Frame size	Pole	p2 [kW]	Short type designation	Weight [kg] B5/V1 version	Stator housing						Shaft end						Feet												Flange B35. B5/V1						Flange B34. B14/V18						Cable entry				
					AC	AD	AG	L	LB	LL	D	DB	E	EB	F	G	GA	A	AA	AB	B	B'	BA	BB	C	H	HA	HC	HD	K	LA	M³	N	P	SxZ	T	LA	M	N	P	SxZ	T	O		
MG 71	2	0.37	MG71A2-C3	6.5	141	109	82	221	191	82	14 (j6)	M5	30	22	5	11.0	16.0	112	27	139	90	-	20	110	45	71	3	142	180	7 (M6)	10	130	110	160	D10 x 4 (M8)	3.5	12 ¹⁾	85	70	105	M6 x 4	2.5	2 x M20 x 1.5	 MG 71	
		0.55	MG71B2-C3	7.5																																									
	4	0.25	MG71A4-C1	6.8																																									
		0.37	MG71B4-C1	7																																									
MG 80	2	0.75	MG80A2-C3	9.5	141	109	82	271	231	82	19 (j6)	M6	40	32	6	15.5	21.5	125	37	159	100	-	25	125	50	80	3	151	189	10 (M8)	10	165	130	200	D12 x 4 (M10)	3.5	12 ¹⁾	100	80	120	M6 x 4	3.0	2 x M20 x 1.5	 MG 80	
		1.1	MG80C2-C3	11.5				291	251																																				
	4	0.55	MG80A4-C1	8.9				16.8	231																																				
MG 90	2	1.5	MG90SD2-H3	16.8	178	110	162	331	281	103	24(j6)	M8	50	40	8	20.0	27.0	140	-	178	100	125	-	155	56	90	3	179	200	10 (M8)	18	165	130	200	D12 x 4 (M10)	3.5	13 ¹⁾	115	95	135	M8 x 4	3.0	4 x M20 ²⁾	 MG 90	
		2.2	MG90LE2-H3	20.6				371	321		103	24 (j6)	M8	50	40	8	20.0	27.0	140	-	178	100	125	-	150	56	90	3	179	200	10 (M8)	18	165	130	200	D12 x 4 (M10)	3.5	13 ¹⁾	115	95	135	M8 x 4	3.0		4 x M20 ²⁾
	4	0.75	MG90SC4-H3	18	178	110	162	321	281	103	19 (j6)	M6	40	32	6	15.5	21.5	140	-	178	100	125	-	155	56	80	3	179	200	10 (M8)	18	165	130	200	D12 x 4 (M10)	3.5	13 ¹⁾	100	80	115	M6x4	3.0	4 x M20 ²⁾		
		1.1	MG90SB4-H3	20.8				371	321		103	24 (j6)	M8	50	40	8	20.0	27.0	140	-	178	100	125	-	150	56	90	3	179	200	10 (M8)	18	165	130	200	D12 x 4 (M10)	3.5	13 ¹⁾	115	95	135	M8 x 4	3.0		4 x M20 ²⁾
		1.5	MG90LC4-H3	23.3				178	110		162	331	281	103	24 (j6)	M8	50	40	8	20.0	27.0	140	-	178	100	125	-	155	56	90	3	179	200	10(M10)	18	165	130	200	D12 x 4 (M10)	3.5	13 ¹⁾	115	95		135
MG 100	2	3.00	MG100LC2-H3	26	198	120	162	395	335	103	28 (j6)	M10	60	50	8	24.0	31.0	160	-	199	140	-	-	170	63	100	3	199	220	12 (M10)	10	215	180	250	D15 x 4 (M12)	4.0	14 ¹⁾	130	110	160	M8 x 4	3.5	4 x M20 ²⁾	 MG 100	
	2.2	MG100LB4-H3	28.6																																										
	4	3.00	MG100LC4-H3	32.4																																									
MG 112	2	4.00	MG112MC2-H3	37.8	220	134	202	432	372	103	28(j6)	M10	60	50	8	24.0	31.0	190	-	228	140	-	-	172	70	112	4	222	246	12 (M10)	10	215	180	250	D15 x 4 (M12)	4.0	14 ¹⁾	130	110	160	M8 x 4	3.5	4 x M25 ²⁾	 MG 112	
	4	4.00	MG112MC4-H3	44.9																																									
MG 132	2	5.5	MG132SC2-H3	42.7	220	134	202	471	391	103	38 (k6)	M12	80	70	10	33.0	41.0	216	-	255	140	-	-	172	89	132	5	242	266	12 (M10)	12	265	230	300	D15 x 4 (M12)	4.0	28 ¹⁾	165	130	200	M10 x 4	3.5	4 x M25 ²⁾	 MG 160	
		7.5	MG132SB2-H3	52.5																																									260
	4	5.5	MG132SB4-H3	56.5	260	159	203	509	429	135	38 (k6)	M12	80	70	10	33.0	41.0	216	42	244	140	178	-	202	89	132	6	262	257	12 (M10)	12	265	230	300	D15 x 4 (M12)	4.0	-	-	-	-	-	-	4 x M25 ²⁾		
		7.5	MG132MB4-H3	72.8																																									
MG 160	2	11.00	MG160MB2-H3	88	318	204	243	592	482	213	42 (k6)	M16	110	82	12	37.0	45.0	254	49	287	210	-	-	239	108	160	8	317	320	15 (M12)	12	300	250	350	D19 x 4 (M16)	5.0	-	-	-	-	-	-	4 x M40/2 x M20 ²⁾		
		15.00	MG160MD2-H3	100																																									
		18.5	MG160LB2-H3	113																																									
	4	11.00	MG160MA4-H3	109	318	204	243	636	526	213	42 (k6)	M16	110	82	12	37.0	45.0	254	49	287	254	-	-	283	108	160	8	317	320	15 (M12)	12	300	250	350	D19 x 4 (M16)	5.0	-	-	-	-	-	-			
15.00		MG160LB4-H3	131	318	204	243	662	552	213	42 (k6)	M16	110	82	12	37.0	45.0	254	49	287	254	-	-	313	108	160	8	317	320	15 (M12)	12	300	250	350	D19 x 4 (M16)	5.0	-	-	-	-	-	-				
MG 180	2	22.00	MG180MB2-H3	128	318	204	243	662	552	213	48 (K6)	M16	110	100	14	43.0	51.5	279	61	312	241	279	-	308	121	180	8	337	340	15 (M12)	12	300	250	350	D19 x 4 (M16)	5.0	-	-	-	-	-	-	4 x M40/2 x M20 ²⁾		

¹⁾ When fitting a component on the motor flange, check that the through-going screws do not penetrate deeper into the flange than the dimension LA. If the screws are too long, they can be screwed into the stator windings.

2) Knockouts

³⁾ M measurement for a B5 flange is "FF"

M measurement for a B14 is "FT"



About Grundfos

Grundfos is a global leader in advanced pump solutions and a trendsetter in water technology. Founded in 1945, Grundfos has an annual production of 16 million pump units for a wide range of application areas. Grundfos has been manufacturing high-quality electrical motors for more than 30 years, and we know how to match electric motors precisely to the required pump application.

Find out more at www.grundfos.com



MGE

Product compatibility

- **Multi-stage:** CRE, CRIE, CRNE, MTRE, MTSE, SPKE, CME
- **Single-stage:** TPE, TPED, NKE, NBE
- **Systems:** Hydro MPC-E, Hydro Multi-E, Hydro Multi-B, Hydro Solo-E, CMBE home booster.



TM065684 2219

MGE is a dedicated motor-drive system for pumps and other applications. Pumps equipped with MGE motors overcome application challenges and save energy in a variety of pump installations in order to reach the lowest Life Cycle Cost (LCC) possible.

Integrated drives

Integrated drives are beneficial because they are installed on non-controlled pumps at no additional installation cost. Once the mains are connected and the pump is fitted into the pipe system, they are ready to operate at the desired setpoint.

Operating pumps with MGE also reduces CAPEX (capital expense) of additional cabinets, components and facility space by having the entire pump system in line with the pipe system.

MGE is the result of Grundfos' efficient motor technology and it is an efficient IE5 motor, which minimises OPEX (operating expense).

Robustness throughout the system

The Grundfos full line supply of components, from mains connections to pipe fittings, provides the most robust solutions:

- Built-in protection against mains supply disturbances, environment and motor load
- MGE is designed to mitigate bearing currents
- No cooling fans in drive (wear part).

MGE product range

1 x 200-240 V	0.25 - 1.5 kW
3 x 200-240 V	1.1 - 5.5 kW
3 x 380-500 V	0.25 - 11 kW*

* Up to 22 kW available with different specifications.

Features and benefits

Feature	Benefit
Application control	
Control modes	Easy commissioning to match system design criteria.
Multipump function including alternating, back-up, or cascade	Neglects the need for external controllers and continuous operation by redundant pump and sensor if either component fails.
Differential pressure or temperature with 2 sensors	Lower CAPEX by common inexpensive sensor types.
Pump curve adjustments and run at power limit	Stabilises unstable pump curves and extends operating range.
Setpoint influence	Adapts QH to internal or measured values.
Energy saving for lower OPEX	
AUTOADAPT or FLOWLIMIT	Continuously adapts to the most efficient curve and reduces pressure loss in the system.
Low-flow stop function	Improved energy optimisation and comfort.
Permanent-magnet synchronous motor with IE5 (in accordance with IEC 60034-30-2)	IE5 motor loss is more than 30 % lower than IE3. This alone reduces energy consumption by 10 % with a typical pump load profile.
Condition monitoring	
Limit Exceed function	Any value can be supervised to protect the system.
Loss of prime and dry run	Protects the shaft seal.
Cavitation protection	Protects the impellers.
Flow estimate and heat energy monitor	Monitoring of the heating system's performance.
Overload and temperature	Protects the frequency converter and motor.
Stop at minimum speed	Protects the pump and saves energy.
Motor bearings monitors	Ensures uptime by preventive maintenance.
Robustness	
Operating temperature between 20 °C and 60 °C	Allows installation almost anywhere and high margins in control rooms, resulting in longer product service life.
Impulse transient resistance (VDE0160 compliant)	Resistance against lightning, ESD, switching impulses and utility fault clearing.
Interruptions and voltage sags (SEMIF47 compliant)	Keeps process running and derates the pump to the available power.
Line harmonics resistance (EN 61000-4-13, class 3)	Built-in compensation of disturbance to avoid overheating of motor windings and maintaining a steady pump operation.
Built-in RFI filters	Neglects the need for external components.
IP55 / IP66 enclosures	Installed in-line of pipe system at no added cost.

Grundfos iSOLUTIONS

Grundfos iSOLUTIONS delivers the optimal combination of pumps, drives and auxiliary components for the specific application, incorporating special features and functions and building on application knowledge and experience.

Grundfos iSOLUTIONS allows easy integration of pumps, drives, measurements, controls, protections, and communication, saving you valuable engineering, installation and commissioning time.

To learn more, visit: www.grundfos.com/isolutions

Sensors

MGE is sensor-independent and controls the pump to any measured feedback.

Grundfos offers several sensors to be used in pump solutions:

- Pressure sensors
- Temperature sensors
- Differential pressure sensors
- Differential temperature sensors
- Flow meters.

As well as Grundfos sensors with dual-signals.

Grundfos GO Remote

Grundfos GO Remote for iOS and Android ensures easy and quick commissioning, monitoring and servicing of pumps with MGE motors.



TM07 4786 2419

Technical specifications

Motor data			
	Operating range (rpm)	Constant power (rpm)	Constant torque (rpm)
Speed range	180-2000	1450-2000	900-1450
	360-4000	2900-4000	1750-2900
	360-4000	3400-4000*	2000-3400
	500-5900	4000-5900	-
Voltage tolerances	+/- 10 %		
Frequency	50-60 Hz +/- 5 %		
Network	TN/TT (optional: IT) according to IEC 60364		
Environmental limits			
Degree of protection	IP55 or IP66 according to EN 60529. Note: IP44 must be expected with drain plugs open for prevention of condensation.		
Operating temp.	-20 °C to +60 °C, derating above +50 °C		
Storage temp.	-20 °C to +60 °C		
Altitude	0-1000 m without derating / 0-3500 with derating		
Humidity	0-95 %, non-condensing		
Inputs/outputs	FM100	FM200	FM300
Digital inputs	1	1	2
Digital inputs/ outputs	1	1	2
Relay outputs	-	2	2
Analog inputs	1 (only V)		
Pt100/Pt1000 inputs	-	-	2
+5 V supply	Y	Y	Y
+24 V supply	-	Y	Y
Grundfos Digital Sensor input	-	Y	Y
LiqTec sensor input	-	-	Y
Digital inputs (dedicated)	0 - 5 V		
Digital inputs/ outputs	0-24 V, resistive or inductive		
Analog input	0-20 mA / 4-20 mA, 0.5 - 3.5 V / 0.5 V / 0-10 V		
Relay output	250 V AC/30 V DC, max. continuous current 2 A rms		
Connectivity			
Wireless (radio)	Yes, GENlair		
RS-485	Yes, GENlair		
Communication options	• LONWorks (CIM 100)		
	• PROFIBUS DP (CIM 150)		
	• Modbus RTU (CIM 200)		
	• GSM/GPRS (CIM 250)		
	• 3G/4G cellular (CIM 260)		
	• GiC/GRM 3G/4G (CIM 280)		
	• BACnet MS/TP (CIM 300)		
	• PROFINET IO (CIM 500)		
	• Modbus TCP (CIM 500)		
	• BACnet IP (CIM 500)		
• Ethernet IP (CIM 500)			
Compliance			
Conformity to standards	CE, EAC, RCM, CCC, and cURus (UL)		
Harmonics	IEC/EN 61000-3-12		
EMC	Up to 7.5 kW (5.5 kW low speed): Category C1 according to EN 61800-3, corresponding to CISPR 11, class B (residential area)		
	Above 7.5 kW (5.5 kW low speed): Category C3 according to EN 61800-3, corresponding to CISPR 11, class A, group 2 (industrial area)		

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ECM: 1264525



MMG Model D 0.18 - 200 kW

High-efficiency motors from Grundfos

Grundfos is one of the world's leading manufacturers of pumps and pumping equipment. Therefore, high-quality electrical motors are a major priority of ours. In addition to manufacturing our own range of quality motors, we contract some of the world's top manufacturers to produce motors that match the very high standard of our pumps for application in building services, industry and water supply.

Grundfos quality throughout

The Grundfos MMG-D motors are manufactured for Grundfos by AEG in Spain. The motors have been adapted especially for use with Grundfos pumps and they comply with Grundfos standards and the strictest Grundfos quality requirements throughout.

The Grundfos MMG-D range of electrical motors is available in sizes from 0.18 to 200 kW, in 2, 4, and 6-pole versions and different voltages.

Environmentally friendly

EFF1 high-efficiency motors are far more energy friendly than conventional motors. This means reduced energy consumption and, thus, reduction of harmful emissions from the power sources.

At Grundfos, the environmental issue is of great importance and, consequently, we supply only motors, which are in compliance with the CEMEP agreement. Our range comprises EFF1 designated models for every application.

High-efficiency motors mean reduced energy consumption and, consequently, reduced harmful influence on the environment. Obviously, reduced energy consumption also means reduced operating costs, which is a vital consideration for modern industry everywhere.

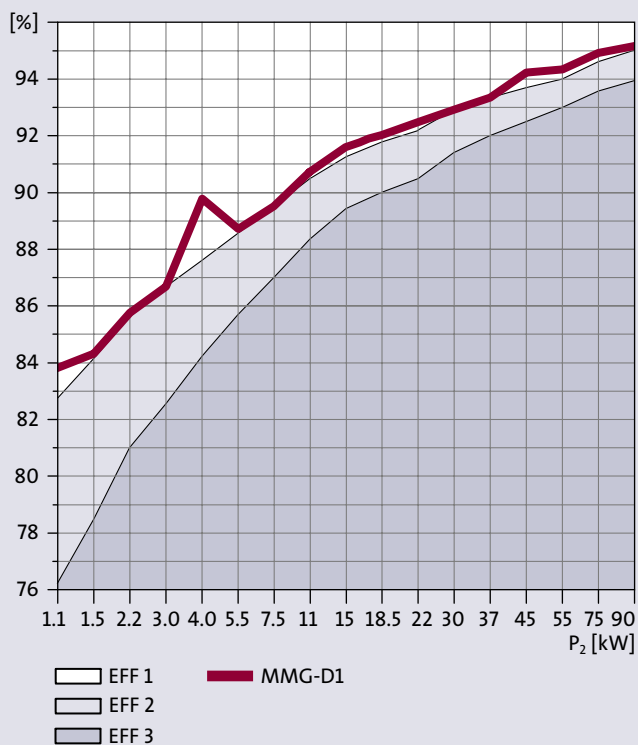


EFF1

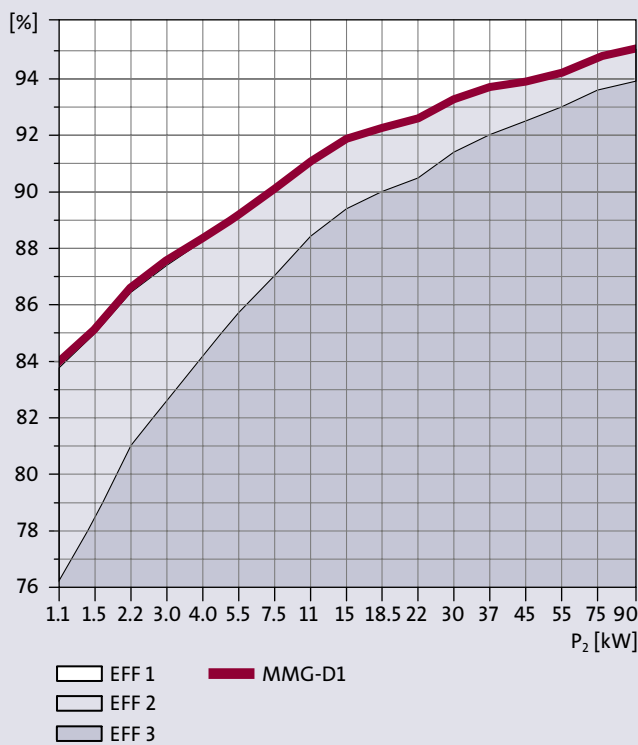
All Grundfos MMG-D motors are EFF1 high-efficiency motors. Furthermore, these motors distinguish themselves from standard AEG motors in several ways. The Grundfos MMG-D motors are equipped with larger, more durable bearings. The drive-end bearings are locked. All models are fitted with drain holes closed at delivery and motors from frame size 160 and up can be relubricated.



Motor efficiency, 2-pole motors



Motor efficiency, 4-pole motors



Efficiency curves

The curves show the efficiency of the Grundfos MMG-D motors. Motors with efficiency on or above the line between the EFF1 and EFF2 bands are classified as EFF1 motors.

EFF1 high efficiency motors

Some motor manufacturers have indiscriminately used the term “high efficiency” for years. In order to counteract this, a definition of what constitutes a high-efficiency motor was laid down in the “Energy Policy Act (EPACT)” instituted by the U.S. Congress effective of October 1997. The EU has agreed upon an almost identical definition. The so-called CEMEP list defines the minimum features of high-efficiency motors in the range from 1.1 to 90 kW, 2 and 4-pole versions.

The rules defined by the CEMEP and EPACT have subsequently been adopted as the world standard for high-efficiency motors.



A wide variety of applications

The Grundfos MMG-D motors are suitable for use with a variety of Grundfos pump models, for instance, the TP Series 100/200/300/400, the NB and NK end-suction centrifugal pumps, and the Grundfos CR range.



Customised versions

The MMG-D motors meet international design standards, and within each motor type we offer a number of different variants. If you do not find the specific motor variant that you require among the ones listed in our product overview, customised motors are available upon request. Please contact your local Grundfos representative for further details.

Standards

The Grundfos MMG-D motors are designed, manufactured and tested according to the internationally recognised standards for electrical motors: IEC60034-1 and IEC60072-1/EN50347. The MMG-D motors are offered in two versions: Standard motors with keyway, key and threaded hole, and standard motors adapted to Grundfos pumps, i.e. with smooth shaft end (no keyway, key or threaded hole).

Standard configuration of Grundfos MMG-D motors

Mountings: V18/B14, V1/B5, B3, B34 and B35.

IP55 with drain plugs closed.

Duty cycle: S1.

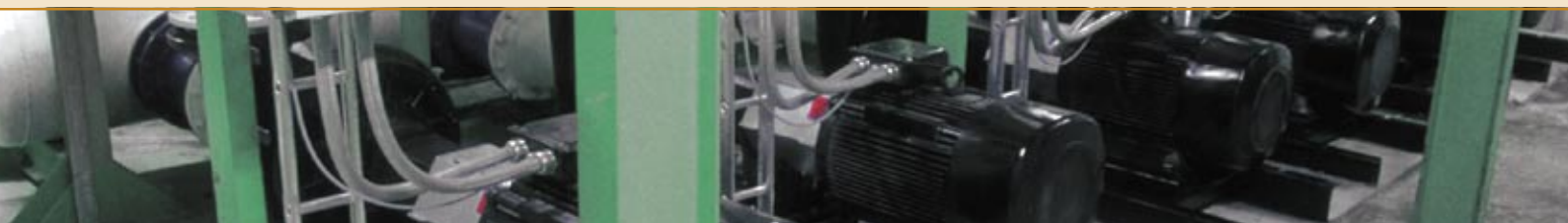
Insulation class F with class B temperature rise according to IEC 62114.

PTC sensors according to DIN 44082 from 3.0 kW and up.

Maximum ambient temperature for

EFF1 motors = 60°C. EFF2 motors = 40°C.

TP111 according to IEC 60034-11.



Range overview

Power [kW]	Number of phases	2-pole		4-pole		6-pole	
		Type designation	Efficiency class 1-2-3	Type designation	Efficiency class 1-2-3	Type designation	Efficiency class 1-2-3
0.18	3	-	-	-	-	MMG71A6-D	-
0.25	3	-	-	-	-	MMG71B6-D	-
0.37	3	-	-	-	-	MMG80A6-D	-
0.55	3	-	-	-	-	MMG80B6-D	-
0.75	3	-	-	-	-	MMG90S6-D	-
1.10	3	MMG80B2-D1	1	MMG90S4-D1	1	MMG90L6-D	-
1.50	3	MMG90S2-D1	1	MMG90L4-D1	1	MMG100L6-D	-
2.20	3	MMG90L2-D1	1	MMG100LA4-D1	1	MMG112M6-D	-
3.00	3	MMG100L2-D1	1	MMG100LB4-D1	1	MMG132SA6-D	-
4.00	3	MMG112M2-D1	1	MMG112M4-D1	1	MMG132MA6-D	-
5.50	3	MMG132SA2-D1	1	MMG132S4-D1	1	MMG132MB6-D	-
7.50	3	MMG132SB2-D1	1	MMG132M4-D1	1	MMG160M6-D	-
11.0	3	MMG160MA2-D1	1	MMG160M4-D1	1	MMG160L6-D	-
15.0	3	MMG160MB2-D1	1	MMG160L4-D1	1	MMG180L6-D	-
18.5	3	MMG160L2-D1	1	MMG180M4-D1	1	MMG200LA6-D	-
22.0	3	MMG180M2-D1	1	MMG180L4-D1	1	MMG200LB6-D	-
30.0	3	MMG200LA2-D1/D1A	1	MMG200L4-D1	1	MMG225M6-D	-
37.0	3	MMG200LB2-D1/D1A	1	MMG225S4-D1	1	MMG250M6-D	-
45.0	3	MMG225M2-D1	1	MMG225M4-D1	1	MMG280S6-D	-
55.0	3	MMG250M2-D1	1	MMG250M4-D1	1	MMG280M6-D	-
75.0	3	MMG280S2-D1	1	MMG280S4-D1	1	MMG315S6-D	-
90.0	3	MMG280M2-D1	1	MMG280M4-D1	1	MMG315MA6-D	-
110	3	MMG315S2-D	-	MMG315S4-D	-	MMG315MB6-D	-
132	3	MMG315M2-D	-	MMG315MA4-D	-	MMG315L6-D	-
160	3	MMG315LA2-D	-	MMG315MB4-D	-	-	-
200	3	MMG315LB2-D	-	MMG315L4-D	-	-	-

MMG-D motor range overview

The Grundfos MMG-D motors are manufactured by AEG in Spain. All are EFF1 motors ranging from 0.18 to 200 kW in frame sizes 71 - 315.

The technical data for the motors cover both 50 and 60 Hz versions. Contrary to most other motor makes, the Grundfos MMG-D motors offer the same power output in 50 and 60 Hz versions.

The standard range covers motors with the following voltages:

Low voltage range	
220-240 Δ/380-415 Y, 50 Hz	220-277 Δ/380-480 Y, 60 Hz

High voltage range	
380-415 Δ/660-690 Y, 50 Hz	380-480 Δ/660-690 Y, 60 Hz

Bearings

The Grundfos MMG-D motors are fitted with locked bearings at the drive end, either a deep-groove ball bearing or an angular-contact bearing depending on the motor model.

In motors from frame size 160 and up, the bearings can be relubricated. Lubrication is done via tapered lubrication nipples DIN 71412 (H1 straight).

Only high-quality bearings from the world's leading manufacturers are used for the Grundfos MMG-D motors:

- SKF AB (Sweden)
- NSK Corporation (Japan)
- NTN Bearing Corporation (Japan)
- FAG Kugelfischer AG & Co KG (Germany)

These manufacturers all comply with international standards, which means that replacement bearings are readily available throughout the world and the bearings are fully interchangeable regardless of make.

Bearing size overview

Power [kW]	Bearing sizes, 2-pole motors			Bearing sizes, 4-pole motors		Bearing sizes, 6-pole motors	
	CR motors	Other models	All models	All models		All models	
	Drive end	Non-drive end	Non-drive end	Drive end	Non-drive end	Drive end	Non-drive end
0.18	-	-	-	-	-	6203-2Z/C3	6203-2Z/C3
0.25	-	-	-	-	-	6203-2Z/C3	6203-2Z/C3
0.37	-	-	-	-	-	6204-2Z/C3	6204-2Z/C3
0.55	-	-	-	-	-	6204-2Z/C3	6204-2Z/C3
0.75	-	-	-	-	-	6205-2Z/C3	6205-2Z/C3
1.10	-	6205-2Z/C3	6204-2Z/C3	6206-2Z/C3	6205-2Z/C3	6206 2Z/C3	6206 2Z/C3
1.50	-	6206-2Z/C3	6205-2Z/C3	6206-2Z/C3	6205-2Z/C3	6206 2Z/C3	6206 2Z/C3
2.20	-	6206-2Z/C3	6205-2Z/C3	6306-2Z/C3	6206-2Z/C3	6306 2Z/C3	6306 2Z/C3
3.00	-	6306-2Z/C3	6206-2Z/C3	6306-2Z/C3	6206-2Z/C3	6308-2Z/C3	6208-2Z/C3
4.00	-	6306-2Z/C3	6306-2Z/C3	6306-2Z/C3	6306-2Z/C3	6308-2Z/C3	6208-2Z/C3
5.50	-	6308-2Z/C3	6208-2Z/C3	6308-2Z/C3	6208-2Z/C3	6308-2Z/C3	6208-2Z/C3
7.50	-	6308-2Z/C3	6208-2Z/C3	6308-2Z/C3	6208-2Z/C3	6309/C3	6209/C3
11.0	7309 B	6309/C3	6209/C3	6309/C3	6209/C3	6309/C3	6209/C3
15.0	7309 B	6309/C3	6209/C3	6309/C3	6209/C3	6310/C3	6210/C3
18.5	7309 B	6309/C3	6209/C3	6310/C3	6210/C3	6312/C3	6212/C3
22.0	7310 B	6310/C3	6210/C3	6310/C3	6210/C3	6312/C3	6212/C3
30.0	7312 B	6312/C3	6212/C3	6312/C3	6212/C3	6313/C3	6213/C3
37.0	7312 B	6312/C3	6212/C3	6313/C3	6213/C3	6314/C3	6214/C3
45.0	7313 B	6313/C3	6213/C3	6313/C3	6213/C3	6316/C3	6216/C3
55.0	-	6314/C3	6214/C3	6314/C3	6214/C3	6316/C3	6216/C3
75.0	-	6316/C3	6216/C3	6316/C3	6216/C3	6319/C3	6319/C3
90.0	-	6316/C3	6216/C3	6316/C3	6216/C3	6319/C3	6319/C3
110	-	6316/C3	6316/C3	6319/C3	6319/C3	6319/C3	6319/C3
132	-	6316/C3	6316/C3	6319/C3	6319/C3	6319/C3	6319/C3
160	-	6316/C3	6316/C3	6319/C3	6319/C3	-	-
200	-	6316/C3	6316/C3	6319/C3	6319/C3	-	-

Noise

In EFF1 high efficiency motors less cooling air is needed to maintain the motor temperature. This allows for a smaller cooling fan, which in turn produces less noise.

Sound pressure levels

The noise level of the MMG-D motors is determined by measuring the sound pressure level in accordance with curve A of the sound level meter to EN 60651. The values are indicated in dB (A).

The permitted noise levels of electrical machines are stipulated in the IEC 60034-9 norm. The noise level of the MMG-D motors is well below these limit values.

Air-borne sound measurement is done in a testing chamber according to EN 21680. The tolerance of the stated value is + 3dB(A).

P ₂ [kW]	2-pole	4-pole	6-pole
	Lp _{fA} [dB(A)]	Lp _{fA} [dB(A)]	Lp _{fA} [dB(A)]
0.18	-	-	40
0.25	-	-	40
0.37	-	-	40
0.55	-	-	40
0.75	-	-	46
1.10	60	53	46
1.50	61	53	51
2.20	61	55	56
3.00	63	55	57
4.00	66	57	57
5.50	67	62	57
7.50	67	62	58
11.0	65	64	58
15.0	65	64	59
18.5	66	65	60
22.0	68	65	60
30.0	69	66	62
37.0	69	69	64
45.0	72	69	68
55.0	74	69	68
75.0	76	73	68
90.0	76	73	68
110	78	74	68
132	78	74	68
160	78	74	-
200	78	74	-



Electrical data

MMG Model D 2-pole · low voltage · 50/60 Hz

Low voltage · 2-pole motors 50 Hz 230 V Δ/400 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{B7}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG80B2-D1	1	1.10	4.30/2.50	0.68	0.77	84.0	83.8	2880	3.50	460	360	360
MMG90S2-D1	1	1.50	5.60/3.20	0.71	0.80	83.4	84.1	2880	5.00	810	360	400
MMG90L2-D1	1	2.20	7.60/4.40	0.80	0.85	85.8	85.6	2860	7.50	850	350	370
MMG100L2-D1	1	3.00	10.2/5.90	0.77	0.84	85.8	86.7	2920	10.0	1050	420	630
MMG112M2-D1	1	4.00	13.0/7.50	0.80	0.86	89.3	89.9	2940	13.0	1060	430	450
MMG132SA2-D1	1	5.50	18.0/10.5	0.85	0.90	88.6	88.6	2900	18.0	760	280	330
MMG132SB2-D1	1	7.50	24.0/14.0	0.85	0.90	89.5	89.5	2900	24.6	790	300	350
MMG160MA2-D1	1	11.0	36.5/21.0	0.81	0.86	90.7	90.7	2930	36.0	730	240	310
MMG160MB2-D1	1	15.0	48.5/28.0	0.82	0.86	91.6	91.6	2930	49.0	760	250	310
MMG160L2-D1	1	18.5	60.0/34.5	0.82	0.86	91.8	92.0	2930	60.5	790	280	340
MMG180M2-D1	1	22.0	71.0/41.0	0.83	0.87	92.5	92.5	2930	71.5	770	250	320
MMG200LA2-D1/D1A	1	30.0	95.5/55.0	0.85	0.89	92.9	92.9	2945	97.5	780	210	280
MMG200LB2-D1/D1A	1	37.0	118/68.0	0.86	0.89	93.3	93.3	2950	120	760	220	280
MMG225M2-D1	1	45.0	142/82.0	0.85	0.88	94.1	94.2	2950	146	790	250	290
MMG250M2-D1	1	55.0	171/99.0	0.86	0.89	94.2	94.3	2955	178	770	240	300
MMG280S2-D1	1	75.0	228/132	0.86	0.90	94.4	94.9	2975	241	750	190	320
MMG280M2-D1	1	90.0	278/161	0.86	0.89	94.8	95.2	2975	289	750	190	320
MMG315S2-D	-	110	346/200	0.81	0.85	94.5	95.0	2980	353	770	220	330
MMG315M2-D	-	132	407/235	0.85	0.88	95.2	95.5	2980	423	680	240	260
MMG315LA2-D	-	160	484/280	0.86	0.90	95.7	95.9	2980	513	720	250	260
MMG315LB2-D	-	200	600/347	0.90	0.90	96.1	96.3	2980	641	780	270	270
Low voltage · 2-pole motors 60 Hz 220 V Δ/380 V Y												
MMG80B2-D1	1	1.10	4.40/2.50	0.75	0.82	82.6	82.3	3430	3.00	390	340	360
MMG90S2-D1	1	1.50	5.60/3.20	0.78	0.85	82.0	82.6	3430	4.00	680	340	400
MMG90L2-D1	1	2.20	7.70/4.40	0.88	0.91	84.3	84.1	3410	6.00	720	340	370
MMG100L2-D1	1	3.00	10.3/6.00	0.84	0.90	84.3	85.1	3480	8.00	880	390	630
MMG112M2-D1	1	4.00	13.1/7.60	0.88	0.92	87.8	88.3	3505	11.0	890	400	450
MMG132SA2-D1	1	5.50	18.0/10.4	0.92	0.93	88.2	87.6	3460	15.2	590	190	240
MMG132SB2-D1	1	7.50	24.0/14.0	0.92	0.93	89.4	88.9	3470	20.6	600	200	250
MMG160MA2-D1	1	11.0	36.5/21.0	0.89	0.90	90.2	89.9	3510	30.0	570	180	230
MMG160MB2-D1	1	15.0	48.5/28.0	0.90	0.91	91.2	90.9	3505	41.0	590	180	230
MMG160L2-D1	1	18.5	59.0/34.0	0.90	0.91	91.8	91.4	3510	50.0	610	210	250
MMG180M2-D1	1	22.0	70.0/40.5	0.90	0.91	92.1	91.8	3505	60.0	600	190	240
MMG200LA2-D1/D1A	1	30.0	95.5/55.0	0.90	0.91	93.0	92.8	3520	81.5	580	160	200
MMG200LB2-D1/D1A	1	37.0	116/67.0	0.90	0.91	93.4	93.2	3530	100	580	170	200
MMG225M2-D1	1	45.0	136/79.0	0.89	0.90	94.1	93.9	3530	122	600	180	210
MMG250M2-D1	1	55.0	173/100	0.90	0.90	93.4	93.7	3535	149	580	180	210
MMG280S2-D1	1	75.0	234/135	0.91	0.91	93.8	94.4	3570	201	580	150	240
MMG280M2-D1	1	90.0	275/159	0.91	0.91	94.4	94.9	3570	241	580	150	240
MMG315S2-D	-	110	332/192	0.91	0.91	94.9	95.4	3575	294	640	190	260
MMG315M2-D	-	132	405/234	0.92	0.91	94.3	94.8	3575	353	530	190	220
MMG315LA2-D	-	160	483/279	0.92	0.91	94.9	95.3	3575	427	580	190	220
MMG315LB2-D	-	200	595/344	0.92	0.92	95.5	95.9	3575	534	620	210	240

50 Hz data shown as 230 V Δ/ 400 V Y and 60 Hz data shown as 220 V Δ/ 380 V Y, 255 V Δ/ 440 V Y and 277 V Δ/ 480 V Y

Electrical data

MMG Model D 2-pole · low voltage · 60 Hz

Low voltage · 2-pole motors 60 Hz 255 V Δ/440 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{BT}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG80B2-D1	1	1.10	3.90/2.30	0.71	0.79	84.5	84.2	3460	3.00	510	410	430
MMG90S2-D1	1	1.50	5.0/02.90	0.74	0.82	83.9	84.5	3460	4.00	890	410	480
MMG90L2-D1	1	2.20	6.90/4.00	0.84	0.87	86.3	86.0	3440	6.00	940	400	440
MMG100L2-D1	1	3.00	9.20/5.30	0.81	0.86	86.3	87.1	3510	8.00	1160	480	750
MMG112M2-D1	1	4.00	11.7/6.80	0.84	0.88	89.8	90.3	3535	10.8	1170	490	530
MMG132SA2-D1	1	5.50	15.5/8.90	0.89	0.91	88.5	88.8	3500	15.0	820	280	340
MMG132SB2-D1	1	7.50	21.0/12.0	0.89	0.91	89.7	89.9	3510	20.4	840	300	350
MMG160MA2-D1	1	11.0	31.0/18.0	0.84	0.88	91.0	91.1	3535	29.5	770	250	320
MMG160MB2-D1	1	15.0	41.5/24.0	0.87	0.90	91.7	91.8	3530	40.5	800	250	320
MMG160L2-D1	1	18.5	51.0/29.5	0.86	0.89	91.9	92.2	3535	50.0	830	290	340
MMG180M2-D1	1	22.0	60.5/35.0	0.86	0.89	92.4	92.6	3530	59.5	810	260	330
MMG200LA2-D1/D1A	1	30.0	82.0/47.5	0.88	0.90	93.3	93.4	3545	81.0	790	220	280
MMG200LB2-D1/D1A	1	37.0	100/58.0	0.87	0.90	93.6	93.8	3550	99.5	790	240	280
MMG225M2-D1	1	45.0	121/70.0	0.89	0.90	93.4	94.0	3550	121	820	250	290
MMG250M2-D1	1	55.0	149/86.0	0.89	0.90	93.5	94.0	3555	148	810	240	300
MMG280S2-D1	1	75.0	200/115	0.89	0.90	93.5	94.4	3580	200	790	200	320
MMG280M2-D1	1	90.0	238/138	0.89	0.91	94.2	94.9	3580	240	790	210	320
MMG315S2-D	-	110	296/171	0.87	0.89	94.5	95.3	3580	293	820	250	340
MMG315M2-D	-	132	348/201	0.90	0.91	94.3	95.0	3580	352	750	240	280
MMG315LA2-D	-	160	417/241	0.90	0.91	94.8	95.5	3580	427	790	250	270
MMG315LB2-D	-	200	516/298	0.91	0.92	95.4	96.0	3580	533	820	270	290
Low voltage · 2-pole motors 60 Hz 277 V Δ/480 V Y												
MMG80B2-D1	1	1.10	3.70/2.20	0.66	0.75	84.1	84.2	3480	3.00	570	480	500
MMG90S2-D1	1	1.50	4.80/2.80	0.68	0.78	83.5	84.5	3480	4.00	1000	480	550
MMG90L2-D1	1	2.20	6.60/3.80	0.77	0.83	85.9	86.0	3460	6.00	1050	470	510
MMG100L2-D1	1	3.00	8.80/5.10	0.74	0.82	85.9	87.1	3530	8.00	1300	560	870
MMG112M2-D1	1	4.00	11.2/6.50	0.77	0.84	89.4	90.3	3555	10.8	1310	570	620
MMG132SA2-D1	1	5.50	14.7/8.50	0.83	0.88	88.2	89.0	3520	15.0	920	340	410
MMG132SB2-D1	1	7.50	20.0/11.5	0.84	0.88	89.4	90.0	3525	20.4	940	350	420
MMG160MA2-D1	1	11.0	30.0/17.5	0.77	0.83	90.3	91.1	3545	29.5	870	300	390
MMG160MB2-D1	1	15.0	40.5/23.5	0.77	0.83	91.0	91.8	3545	40.5	890	300	390
MMG160L2-D1	1	18.5	50.0/29.0	0.77	0.83	91.5	92.2	3545	50.0	920	350	410
MMG180M2-D1	1	22.0	59.0/34.0	0.78	0.84	91.9	92.6	3545	59.5	900	310	400
MMG200LA2-D1/D1A	1	30.0	78.0/45.0	0.80	0.87	92.0	93.4	3555	80.5	880	270	340
MMG200LB2-D1/D1A	1	37.0	97.0/56.0	0.79	0.86	92.0	93.5	3560	99.5	880	290	340
MMG225M2-D1	1	45.0	114/66.0	0.81	0.88	93.1	94.0	3560	121	910	300	350
MMG250M2-D1	1	55.0	138/80.0	0.85	0.88	93.2	94.0	3560	148	920	290	360
MMG280S2-D1	1	75.0	192/111	0.83	0.87	93.2	94.2	3580	200	920	240	360
MMG280M2-D1	1	90.0	227/131	0.84	0.88	93.8	94.8	3580	240	920	250	360
MMG315S2-D	-	110	292/169	0.77	0.83	94.1	95.0	3585	293	940	280	380
MMG315M2-D	-	132	325/188	0.86	0.89	94.1	95.0	3585	352	860	280	310
MMG315LA2-D	-	160	391/226	0.87	0.89	94.7	95.5	3585	426	890	320	340
MMG315LB2-D	-	200	486/281	0.87	0.89	95.2	95.9	3585	533	920	350	370

50 Hz data shown as 230 V Δ/ 400 V Y and 60 Hz data shown as 220 V Δ/ 380 V Y, 255 V Δ/ 440 V Y and 277 V Δ/ 480 V Y



MMG Model D 2-pole · high voltage · 50/60 Hz

High voltage · 2-pole motors 50 Hz 400 V Δ/690 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{BT}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG80B2-D1	1	1.10	2.50/1.40	0.68	0.77	84.0	83.8	2880	3.50	460	360	360
MMG90S2-D1	1	1.50	3.20/1.80	0.71	0.80	83.4	84.1	2880	5.00	810	360	400
MMG90L2-D1	1	2.20	4.40/2.50	0.80	0.85	85.8	85.6	2860	7.50	850	350	370
MMG100L2-D1	1	3.00	5.90/3.40	0.77	0.84	85.8	86.7	2920	10.0	1050	420	630
MMG112M2-D1	1	4.00	7.50/4.30	0.80	0.86	89.3	89.9	2940	13.0	1060	430	450
MMG132SA2-D1	1	5.50	10.5/6.10	0.85	0.90	88.6	88.6	2900	18.0	760	280	330
MMG132SB2-D1	1	7.50	14.0/8.10	0.85	0.90	89.5	89.5	2900	24.6	790	300	350
MMG160MA2-D1	1	11.0	21.0/12.2	0.81	0.86	90.7	90.7	2930	36.0	730	240	310
MMG160MB2-D1	1	15.0	28.0/16.2	0.82	0.86	91.6	91.6	2930	49.0	760	250	310
MMG160L2-D1	1	18.5	34.5/20.0	0.82	0.86	91.8	92.0	2930	60.5	790	280	340
MMG180M2-D1	1	22.0	41.0/23.6	0.83	0.87	92.5	92.5	2930	71.5	770	250	320
MMG200LA2-D1/D1A	1	30.0	55.0/32.0	0.85	0.89	93.1	93.1	2945	97.5	780	210	280
MMG200LB2-D1/D1A	1	37.0	68.0/39.5	0.86	0.89	93.4	93.6	2950	120	760	220	280
MMG225M2-D1	1	45.0	82.0/47.5	0.85	0.88	94.1	94.2	2950	146	790	250	290
MMG250M2-D1	1	55.0	99.0/57.0	0.86	0.89	94.2	94.3	2955	178	770	240	300
MMG280S2-D1	1	75.0	132/76.0	0.86	0.90	94.4	94.9	2975	241	750	190	320
MMG280M2-D1	1	90.0	161/93.0	0.86	0.89	94.8	95.2	2975	289	750	190	320
MMG315S2-D	-	110	200/116	0.81	0.85	94.5	95.0	2980	353	770	220	330
MMG315M2-D	-	132	235/136	0.85	0.88	95.2	95.5	2980	423	680	240	260
MMG315LA2-D	-	160	280/162	0.86	0.90	95.7	95.9	2980	513	720	250	260
MMG315LB2-D	-	200	347/201	0.87	0.91	96.1	96.3	2980	641	780	270	270
High voltage · 2-pole motors 60 Hz 380 V Δ/660 V Y												
MMG80B2-D1	1	1.10	2.50/1.40	0.75	0.82	82.6	82.3	3430	3.00	390	340	360
MMG90S2-D1	1	1.50	3.20/1.80	0.78	0.85	82.0	82.6	3430	4.00	680	340	400
MMG90L2-D1	1	2.20	4.40/2.50	0.88	0.91	84.3	84.1	3410	6.00	720	330	370
MMG100L2-D1	1	3.00	6.00/3.50	0.84	0.90	84.3	85.1	3480	8.00	880	390	630
MMG112M2-D1	1	4.00	7.60/4.40	0.88	0.92	87.8	88.3	3505	11.0	890	400	450
MMG132SA2-D1	1	5.50	10.4/6.0	0.92	0.93	88.2	87.6	3460	15.2	590	190	240
MMG132SB2-D1	1	7.50	14.0/8.10	0.92	0.93	89.4	88.9	3470	20.6	600	200	250
MMG160MA2-D1	1	11.0	21.0/12.1	0.89	0.90	90.2	89.9	3510	30.0	570	180	230
MMG160MB2-D1	1	15.0	28.0/16.2	0.90	0.91	91.2	90.9	3505	41.0	590	180	230
MMG160L2-D1	1	18.5	34.0/19.5	0.90	0.91	91.8	91.4	3510	50.5	610	210	250
MMG180M2-D1	1	22.0	40.5/23.5	0.90	0.91	92.1	91.8	3505	60.0	610	190	240
MMG200LA2-D1/D1A	1	30.0	55.0/32.0	0.90	0.91	93.0	92.8	3520	81.5	580	160	200
MMG200LB2-D1/D1A	1	37.0	67.0/38.5	0.90	0.91	93.4	93.2	3530	100	580	170	200
MMG225M2-D1	1	45.0	79.0/45.5	0.89	0.90	94.1	93.9	3530	122	580	180	210
MMG250M2-D1	1	55.0	100/58.0	0.90	0.90	93.4	93.7	3535	149	580	180	210
MMG280S2-D1	1	75.0	135/78.0	0.91	0.91	93.8	94.4	3570	201	580	150	240
MMG280M2-D1	1	90.0	159/92.0	0.91	0.91	94.4	94.9	3570	241	580	150	240
MMG315S2-D	-	110	192/111	0.91	0.91	94.9	95.4	3575	294	640	190	260
MMG315M2-D	-	132	234/135	0.92	0.91	94.3	94.8	3575	353	530	190	220
MMG315LA2-D	-	160	279/161	0.92	0.91	94.9	95.3	3575	427	580	190	220
MMG315LB2-D	-	200	344/199	0.92	0.92	95.5	95.9	3575	534	620	210	240

50 Hz data shown as 400 V Δ/ 690 V Y and 60 Hz data shown as 380 V Δ, 440 V Δ and 480 V Δ

Electrical data

MMG Model D 2-pole · high voltage · 60 Hz

High voltage · 2-pole motors 60 Hz 440 V Δ												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{BT}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG80B2-D1	1	1.10	2.30	0.71	0.79	84.5	84.2	3460	3.00	510	410	430
MMG90S2-D1	1	1.50	2.90	0.74	0.82	83.9	84.5	3460	4.00	890	410	480
MMG90L2-D1	1	2.20	4.00	0.84	0.87	86.3	86.0	3440	6.00	940	400	440
MMG100L2-D1	1	3.00	5.30	0.81	0.86	86.3	87.1	3510	8.00	1160	480	750
MMG112M2-D1	1	4.00	6.80	0.84	0.88	89.8	90.3	3535	10.8	1170	490	530
MMG132SA2-D1	1	5.50	8.90	0.89	0.91	88.5	88.8	3500	15.0	820	280	340
MMG132SB2-D1	1	7.50	12.0	0.89	0.91	89.7	89.9	3510	20.4	840	300	350
MMG160MA2-D1	1	11.0	18.0	0.84	0.88	91.0	91.1	3535	29.8	770	250	320
MMG160MB2-D1	1	15.0	24.0	0.87	0.90	91.7	91.8	3530	40.6	800	250	320
MMG160L2-D1	1	18.5	29.5	0.86	0.89	91.9	92.2	3535	50.0	830	290	340
MMG180M2-D1	1	22.0	35.0	0.86	0.89	92.4	92.6	3530	59.6	810	260	330
MMG200LA2-D1/D1A	1	30.0	47.5	0.88	0.90	93.3	93.4	3545	81.0	790	220	280
MMG200LB2-D1/D1A	1	37.0	58.0	0.87	0.90	93.6	93.8	3550	99.6	790	240	280
MMG225M2-D1	1	45.0	70.0	0.89	0.90	94.4	94.6	3550	121	820	250	290
MMG250M2-D1	1	55.0	86.0	0.89	0.90	93.5	94.0	3555	148	810	240	300
MMG280S2-D1	1	75.0	115	0.89	0.90	93.5	94.4	3580	200	790	200	320
MMG280M2-D1	1	90.0	138	0.89	0.91	94.2	94.9	3580	240	790	210	320
MMG315S2-D	-	110	171	0.87	0.89	94.5	95.3	3580	293	820	250	340
MMG315M2-D	-	132	201	0.90	0.91	94.3	95.0	3580	352	750	240	280
MMG315LA2-D	-	160	241	0.90	0.91	94.8	95.5	3580	427	790	250	270
MMG315LB2-D	-	200	298	0.91	0.92	95.4	96.0	3580	533	820	270	290
High voltage · 2-pole motors 60 Hz 480 V Δ												
MMG80B2-D1	1	1.10	2.20	0.66	0.75	84.1	84.2	3480	3.00	570	480	500
MMG90S2-D1	1	1.50	2.80	0.68	0.78	83.5	84.5	3480	4.00	1000	480	550
MMG90L2-D1	1	2.20	3.80	0.77	0.83	85.9	86.0	3460	6.00	1050	470	510
MMG100L2-D1	1	3.00	5.10	0.74	0.82	85.9	87.1	3530	8.00	1300	560	870
MMG112M2-D1	1	4.00	6.50	0.77	0.84	89.4	90.3	3555	10.8	1310	570	620
MMG132SA2-D1	1	5.50	8.50	0.83	0.88	88.2	89.0	3520	15.0	920	340	410
MMG132SB2-D1	1	7.50	11.5	0.84	0.88	89.4	90.0	3525	20.5	940	350	420
MMG160MA2-D1	1	11.0	17.5	0.77	0.83	90.3	91.1	3545	29.5	870	300	390
MMG160MB2-D1	1	15.0	23.5	0.77	0.83	91.0	91.8	3545	40.5	890	300	390
MMG160L2-D1	1	18.5	29.0	0.77	0.83	91.5	92.2	3545	50.0	920	350	410
MMG180M2-D1	1	22.0	34.0	0.78	0.84	91.9	92.6	3545	59.0	900	310	400
MMG200LA2-D1/D1A	1	30.0	45.0	0.80	0.87	92.3	93.4	3555	80.5	880	270	340
MMG200LB2-D1/D1A	1	37.0	56.0	0.79	0.86	92.4	93.5	3560	99.0	880	290	340
MMG225M2-D1	1	45.0	66.0	0.81	0.88	93.6	94.5	3560	121	910	300	350
MMG250M2-D1	1	55.0	80.0	0.85	0.88	93.2	94.0	3560	148	920	290	360
MMG280S2-D1	1	75.0	111	0.83	0.87	93.2	94.2	3580	200	920	240	360
MMG280M2-D1	1	90.0	131	0.84	0.88	93.8	94.8	3580	240	920	250	360
MMG315S2-D	-	110	169	0.77	0.83	94.1	95.0	3585	293	940	280	380
MMG315M2-D	-	132	188	0.86	0.89	94.1	95.0	3585	352	860	280	310
MMG315LA2-D	-	160	226	0.87	0.89	94.7	95.5	3585	426	890	320	340
MMG315LB2-D	-	200	281	0.87	0.89	95.2	95.9	3585	533	920	350	370

50 Hz data shown as 400 V Δ/ 690 V Y and 60 Hz data shown as 380 V Δ, 440 V Δ and 480 V Δ



MMG Model D 4-pole · low voltage · 50/60 Hz

Low voltage · 4-pole motors 50 Hz 230 V Δ/400 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{Br}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG90S4-D1	1	1.10	4.30/2.50	0.66	0.76	83.8	83.8	1430	7.00	610	400	410
MMG90L4-D1	1	1.50	5.90/3.40	0.67	0.76	85.3	85.0	1430	10.0	640	390	400
MMG100LA4-D1	1	2.20	9.00/5.20	0.61	0.71	86.1	86.4	1450	14.6	600	320	340
MMG100LB4-D1	1	3.00	11.2/6.50	0.70	0.77	87.8	87.4	1440	20.0	630	340	360
MMG112M4-D1	1	4.00	14.7/8.50	0.68	0.77	88.6	88.3	1450	26.5	610	310	330
MMG132S4-D1	1	5.50	19.5/11.3	0.78	0.84	89.2	89.2	1450	36.0	740	300	330
MMG132M4-D1	1	7.50	26.0/15.0	0.78	0.84	90.1	90.1	1450	49.5	740	300	330
MMG160M4-D1	1	11.0	39.0/22.5	0.77	0.82	91.0	91.0	1460	72.0	690	230	290
MMG160L4-D1	1	15.0	51.0/29.5	0.79	0.84	91.7	91.8	1460	98.0	740	250	310
MMG180M4-D1	1	18.5	62.0/36.0	0.80	0.84	92.0	92.2	1460	121	750	280	310
MMG180L4-D1	1	22.0	74.0/42.5	0.81	0.85	92.5	92.6	1465	143	780	300	320
MMG200L4-D1/D1A	1	30.0	101/58.5	0.80	0.84	93.0	93.2	1465	196	700	240	260
MMG225S4-D1	1	37.0	122/70.5	0.80	0.84	93.4	93.6	1475	240	770	230	290
MMG225M4-D1	1	45.0	146/84.5	0.83	0.86	93.7	93.9	1475	291	770	230	290
MMG250M4-D1	1	55.0	185/107	0.79	0.82	94.0	94.2	1475	356	680	380	260
MMG280S4-D1	1	75.0	142/140	0.83	0.85	94.5	94.7	1485	482	680	220	270
MMG280M4-D1	1	90.0	291/168	0.83	0.85	94.8	95.0	1480	581	680	220	270
MMG315S4-D	-	110	360/208	0.83	0.85	95.0	95.1	1480	710	710	230	280
MMG315MA4-D	-	132	413/239	0.83	0.86	95.2	95.5	1485	849	730	210	280
MMG315MB4-D	-	160	498/288	0.84	0.88	95.5	95.7	1485	1029	730	210	280
MMG315L4-D	-	200	620/359	0.85	0.89	95.8	96.0	1485	1286	760	230	280
Low voltage · 4-pole motors 60 Hz 220 V Δ/380 V Y												
MMG90S4-D1	1	1.10	4.50/2.60	0.81	0.80	81.2	81.0	1705	6.00	620	400	440
MMG90L4-D1	1	1.50	6.10/3.50	0.82	0.80	82.6	82.2	1705	8.50	650	390	430
MMG100LA4-D1	1	2.20	9.40/5.40	0.75	0.75	83.4	83.5	1730	12.2	610	320	360
MMG100LB4-D1	1	3.00	1.70/6.80	0.86	0.81	85.0	84.5	1720	17.0	640	340	390
MMG112M4-D1	1	4.00	15.3/8.80	0.83	0.81	85.8	85.3	1730	22.6	620	310	350
MMG132S4-D1	1	5.50	19.0/11.0	0.84	0.86	89.4	88.2	1730	30.5	600	220	240
MMG132M4-D1	1	7.50	26.0/15.0	0.84	0.86	90.0	88.6	1725	41.5	600	220	240
MMG160M4-D1	1	11.0	37.0/21.5	0.86	0.86	91.6	89.8	1745	60.0	560	170	220
MMG160L4-D1	1	15.0	50.0/29.0	0.86	0.86	92.3	90.9	1745	82.0	570	180	230
MMG180M4-D1	1	18.5	61.5/35.5	0.86	0.86	92.5	91.2	1745	101	570	200	220
MMG180L4-D1	1	22.0	72.5/42.0	0.86	0.87	93.0	92.0	1750	120	610	220	230
MMG200L4-D1/D1A	1	30.0	100/58.0	0.86	0.86	93.4	92.5	1755	163	540	190	200
MMG225S4-D1	1	37.0	119/69.0	0.86	0.87	93.7	93.6	1765	200	590	170	210
MMG225M4-D1	1	45.0	147/85.0	0.87	0.86	94.0	93.7	1765	243	590	170	210
MMG250M4-D1	1	55.0	183/106	0.84	0.84	94.3	94.0	1765	298	540	270	180
MMG280S4-D1	1	75.0	242/140	0.86	0.87	94.5	94.5	1775	404	530	170	200
MMG280M4-D1	1	90.0	291/168	0.86	0.87	94.9	94.7	1775	484	530	170	200
MMG315S4-D	-	110	355/205	0.86	0.87	95.0	94.8	1775	592	550	170	200
MMG315MA4-D	-	132	417/241	0.88	0.88	94.8	95.0	1780	708	560	150	200
MMG315MB4-D	-	160	502/290	0.88	0.88	95.3	95.5	1780	858	560	150	200
MMG315L4-D	-	200	629/364	0.88	0.88	95.6	95.6	1780	1073	570	160	200

50 Hz data shown as 230 V Δ/ 400 V Y and 60 Hz data shown as 220 V Δ/ 380 V Y, 255 V Δ/ 440 V Y and 277 V Δ/ 480 V Y

Electrical data

MMG Model D 4-pole · low voltage · 60 Hz

Low voltage · 4-pole motors 60 Hz 255 V Δ/440 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{B7}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG90S4-D1	1	1.10	4.20/2.40	0.79	0.78	83.4	83.1	1720	6.00	750	470	510
MMG90L4-D1	1	1.50	5.70/3.30	0.80	0.78	84.9	84.3	1720	8.50	790	460	500
MMG100LA4-D1	1	2.20	8.60/5.00	0.73	0.73	85.6	85.7	1755	12.2	740	380	420
MMG100LB4-D1	1	3.00	10.8/6.20	0.84	0.79	87.3	86.7	1730	16.8	770	400	450
MMG112M4-D1	1	4.00	14.1/8.20	0.81	0.79	88.1	87.6	1745	22.2	750	360	410
MMG132S4-D1	1	5.50	16.8/9.70	0.78	0.83	89.7	89.6	1750	30.0	800	310	340
MMG132M4-D1	1	7.50	22.5/13.0	0.79	0.84	90.5	90.2	1750	41.0	800	310	340
MMG160M4-D1	1	11.0	32.0/18.5	0.80	0.84	91.8	91.5	1765	59.5	770	230	300
MMG160L4-D1	1	15.0	43.5/25.0	0.82	0.85	92.9	92.4	1765	81.0	790	250	310
MMG180M4-D1	1	18.5	53.5/31.0	0.82	0.85	93.0	92.6	1760	100	810	290	310
MMG180L4-D1	1	22.0	63.0/36.5	0.83	0.86	93.4	93.1	1765	119	830	310	330
MMG200L4-D1/D1A	1	30.0	87.0/50.0	0.82	0.85	93.7	93.5	1765	162	730	250	260
MMG225S4-D1	1	37.0	105/61.0	0.82	0.85	94.0	94.2	1775	199	810	230	290
MMG225M4-D1	1	45.0	125/72.0	0.85	0.87	94.2	94.4	1775	242	810	230	290
MMG250M4-D1	1	55.0	159/92.0	0.80	0.83	94.3	94.6	1775	296	740	390	270
MMG280S4-D1	1	75.0	211/122	0.83	0.86	94.5	94.9	1780	402	730	230	270
MMG280M4-D1	1	90.0	253/146	0.83	0.86	94.9	95.2	1780	482	720	230	270
MMG315S4-D	-	110	308/178	0.82	0.85	95.0	95.2	1780	590	750	240	280
MMG315MA4-D	-	132	362/209	0.85	0.87	94.8	95.3	1785	706	760	210	280
MMG315MB4-D	-	160	438/253	0.84	0.87	95.2	95.6	1785	856	760	210	280
MMG315L4-D	-	200	540/312	0.86	0.88	95.5	95.8	1785	1070	790	230	280
Low voltage · 4-pole motors 60 Hz 277 V Δ/480 V Y												
MMG90S4-D1	1	1.10	3.80/2.20	0.76	0.75	83.3	83.0	1730	6.00	840	520	560
MMG90L4-D1	1	1.50	5.20/3.30	0.77	0.75	84.8	84.2	1730	8.50	880	510	550
MMG100LA4-D1	1	2.20	7.90/4.60	0.70	0.70	85.5	85.6	1755	12.0	830	420	460
MMG100LB4-D1	1	3.00	9.90/5.70	0.81	0.76	87.2	86.6	1740	16.6	870	440	490
MMG112M4-D1	1	4.00	13.0/7.50	0.78	0.76	88.0	87.5	1755	22.0	840	400	450
MMG132S4-D1	1	5.50	16.1/9.30	0.73	0.79	89.5	89.9	1760	30.0	930	370	420
MMG132M4-D1	1	7.50	12.5/21.5	0.74	0.80	90.3	90.5	1760	40.5	930	380	420
MMG160M4-D1	1	11.0	32.0/18.5	0.71	0.78	91.8	91.7	1770	59.5	850	280	370
MMG160L4-D1	1	15.0	41.5/24.0	0.74	0.80	92.6	92.6	1770	81.0	900	310	390
MMG180M4-D1	1	18.5	51.0/29.5	0.75	0.81	92.9	92.8	1770	100	920	350	380
MMG180L4-D1	1	22.0	60.5/35.0	0.76	0.82	93.2	93.3	1770	119	960	370	400
MMG200L4-D1/D1A	1	30.0	82.0/47.5	0.76	0.81	93.5	93.7	1775	162	830	290	320
MMG225S4-D1	1	37.0	100/58.0	0.76	0.81	93.9	94.2	1780	199	920	280	360
MMG225M4-D1	1	45.0	118/68.0	0.81	0.85	94.0	94.5	1780	241	910	280	360
MMG250M4-D1	1	55.0	151/87.0	0.76	0.81	94.2	94.7	1780	295	870	460	330
MMG280S4-D1	1	75.0	201/117	0.77	0.82	94.3	94.9	1785	401	840	280	330
MMG280M4-D1	1	90.0	239/138	0.77	0.82	94.8	95.2	1785	481	840	280	330
MMG315S4-D	-	110	294/170	0.77	0.82	94.8	95.2	1785	588	880	290	340
MMG315MA4-D	-	132	346/200	0.79	0.84	94.7	95.3	1790	705	890	260	340
MMG315MB4-D	-	160	426/246	0.77	0.82	94.9	95.5	1790	854	890	260	340
MMG315L4-D	-	200	510/295	0.81	0.85	95.3	95.8	1790	1067	920	290	340

50 Hz data shown as 230 V Δ/ 400 V Y and 60 Hz data shown as 220 V Δ/ 380 V Y, 255 V Δ/ 440 V Y and 277 V Δ/ 480 V Y



MMG Model D 4-pole · high voltage · 50/60 Hz

High voltage · 4-pole motors 60 Hz 400 V Δ/690 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{BT}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG90S4-D1	1	1.10	2.50/1.40	0.66	0.76	83.8	83.8	1430	7.50	610	400	410
MMG90L4-D1	1	1.50	3.40/2.00	0.67	0.76	85.3	85.0	1430	10.0	640	390	400
MMG100LA4-D1	1	2.20	5.20/3.00	0.61	0.71	86.1	86.4	1450	14.6	600	320	340
MMG100LB4-D1	1	3.00	6.50/3.80	0.70	0.77	87.8	87.4	1440	20.0	630	340	360
MMG112M4-D1	1	4.00	8.50/4.90	0.68	0.77	88.6	88.3	1450	26.5	610	310	330
MMG132S4-D1	1	5.50	11.3/6.50	0.78	0.84	89.2	89.2	1450	36.0	740	300	330
MMG132M4-D1	1	7.50	15.0/8.70	0.78	0.84	90.1	90.1	1450	49.5	740	300	330
MMG160M4-D1	1	11.0	22.5/13.0	0.77	0.82	91.0	91.0	1460	72.0	690	230	290
MMG160L4-D1	1	15.0	29.5/17.0	0.79	0.84	91.7	91.8	1460	98.0	740	250	310
MMG180M4-D1	1	18.5	36.0/21.0	0.80	0.84	92.0	92.2	1460	121	750	280	310
MMG180L4-D1	1	22.0	42.5/24.5	0.81	0.85	92.5	92.6	1465	143	780	300	320
MMG200L4-D1/D1A	1	30.0	58.5/34.0	0.80	0.84	93.0	93.2	1465	196	700	240	260
MMG225S4-D1	1	37.0	70.5/41.0	0.80	0.84	93.4	93.6	1475	240	770	230	290
MMG225M4-D1	1	45.0	84.5/49.0	0.83	0.86	93.7	93.9	1475	291	770	230	290
MMG250M4-D1	1	55.0	107/62.0	0.79	0.82	94.0	94.2	1475	356	680	380	260
MMG280S4-D1	1	75.0	140/81.0	0.83	0.85	94.5	94.7	1485	482	680	220	270
MMG280M4-D1	1	90.0	168/97.0	0.83	0.85	94.8	95.0	1480	581	680	220	270
MMG315S4-D	-	110	208/120	0.83	0.85	95.0	95.1	1480	710	710	230	280
MMG315MA4-D	-	132	239/138	0.83	0.86	95.2	95.5	1485	849	730	210	280
MMG315MB4-D	-	160	288/166	0.84	0.88	95.5	95.7	1485	1029	730	210	280
MMG315L4-D	-	200	359/208	0.85	0.89	95.8	96.0	1485	1286	760	230	280
High voltage · 4-pole motors 60 Hz 380 V Δ/660 V Y												
MMG90S4-D1	1	1.10	2.60/1.50	0.81	0.80	81.2	81.0	1705	6.00	620	400	440
MMG90L4-D1	1	1.50	3.50/2.00	0.82	0.80	82.6	82.2	1705	8.50	650	390	430
MMG100LA4-D1	1	2.20	5.40/3.10	0.75	0.75	83.4	83.5	1730	12.2	610	320	360
MMG100LB4-D1	1	3.00	6.80/3.90	0.86	0.81	85.0	84.5	1720	17.0	640	340	390
MMG112M4-D1	1	4.00	8.80/5.10	0.83	0.81	85.8	85.3	1730	22.6	620	310	350
MMG132S4-D1	1	5.50	11./06.40	0.84	0.86	89.4	88.2	1730	30.5	600	220	240
MMG132M4-D1	1	7.50	15.0/8.70	0.84	0.86	90.0	88.6	1725	41.5	600	220	240
MMG160M4-D1	1	11.0	21.5/12.5	0.86	0.86	91.6	89.8	1745	60.0	560	170	220
MMG160L4-D1	1	15.0	29.0/16.8	0.86	0.86	92.3	90.9	1745	82.0	570	180	230
MMG180M4-D1	1	18.5	35.5/20.5	0.86	0.86	92.5	91.2	1745	101	570	200	220
MMG180L4-D1	1	22.0	42.0/24.5	0.86	0.87	93.0	92.0	1750	120	610	220	230
MMG200L4-D1/D1A	1	30.0	58.0/33.5	0.86	0.86	93.4	92.5	1755	163	540	190	200
MMG225S4-D1	1	37.0	69.0/40.0	0.86	0.87	94.1	93.6	1765	200	590	170	210
MMG225M4-D1	1	45.0	85.0/49.0	0.87	0.86	94.3	93.7	1765	243	590	170	210
MMG250M4-D1	1	55.0	106/61.0	0.84	0.84	94.7	94.0	1765	298	540	270	180
MMG280S4-D1	1	75.0	140/81.0	0.86	0.87	94.5	94.5	1775	404	530	170	200
MMG280M4-D1	1	90.0	168/97.0	0.86	0.87	94.9	94.7	1775	484	530	170	200
MMG315S4-D	-	110	205/118	0.86	0.87	95.0	94.8	1775	592	550	170	200
MMG315MA4-D	-	132	241/139	0.88	0.88	94.8	95.0	1780	708	560	150	200
MMG315MB4-D	-	160	290/168	0.88	0.88	95.3	95.5	1780	858	560	150	200
MMG315L4-D	-	200	364/210	0.88	0.88	95.6	95.6	1780	1073	570	160	200

50 Hz data shown as 400 V Δ/ 690 V Y and 60 Hz data shown as 380 V Δ, 440 V Δ and 480 V Δ

Electrical data

MMG Model D 4-pole · high voltage · 60 Hz

High voltage · 4-pole motors 60 Hz 440 V Δ												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{B7}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG90S4-D1	1	1.10	2.40	0.79	0.78	83.4	83.1	1720	6.00	750	470	510
MMG90L4-D1	1	1.50	3.30	0.80	0.78	84.9	84.3	1720	8.50	790	460	500
MMG100LA4-D1	1	2.20	5.00	0.73	0.73	85.6	85.7	1755	12.2	740	380	420
MMG100LB4-D1	1	3.00	6.20	0.84	0.79	87.3	86.7	1730	16.8	770	400	450
MMG112M4-D1	1	4.00	8.20	0.81	0.79	88.1	87.6	1745	22.2	750	360	410
MMG132S4-D1	1	5.50	9.70	0.78	0.83	89.7	89.6	1750	30.0	800	310	340
MMG132M4-D1	1	7.50	13.0	0.79	0.84	90.5	90.2	1750	41.0	800	310	340
MMG160M4-D1	1	11.0	18.5	0.80	0.84	91.8	91.5	1765	59.5	770	230	300
MMG160L4-D1	1	15.0	25.0	0.82	0.85	92.9	92.4	1765	81.0	790	250	310
MMG180M4-D1	1	18.5	31.0	0.82	0.85	93.0	92.6	1760	100	810	290	310
MMG180L4-D1	1	22.0	36.5	0.83	0.86	93.4	93.1	1765	119	830	310	330
MMG200L4-D1/D1A	1	30.0	50.0	0.82	0.85	93.7	93.5	1765	162	730	250	260
MMG225S4-D1	1	37.0	61.0	0.82	0.85	94.2	94.2	1775	199	810	230	290
MMG225M4-D1	1	45.0	72.0	0.85	0.87	94.5	94.4	1775	242	810	230	290
MMG250M4-D1	1	55.0	92.0	0.80	0.83	94.9	94.8	1775	296	740	390	270
MMG280S4-D1	1	75.0	122	0.83	0.86	94.5	94.9	1780	402	730	230	270
MMG280M4-D1	1	90.0	146	0.83	0.86	94.9	95.2	1780	482	720	230	270
MMG315S4-D	-	110	178	0.82	0.85	95.0	95.2	1780	590	750	240	280
MMG315MA4-D	-	132	209	0.85	0.87	94.8	95.3	1785	706	760	210	280
MMG315MB4-D	-	160	253	0.84	0.87	95.2	95.6	1785	856	760	210	280
MMG315L4-D	-	200	312	0.86	0.88	95.5	95.8	1785	1070	790	230	280
High voltage · 4-pole motors 60 Hz 690 V Δ												
MMG90S4-D1	1	1.10	2.20	0.76	0.75	83.3	83.0	1730	6.00	840	520	560
MMG90L4-D1	1	1.50	3.00	0.77	0.75	84.8	84.2	1730	8.50	880	510	550
MMG100LA4-D1	1	2.20	4.60	0.70	0.70	85.5	85.6	1755	12.0	830	420	460
MMG100LB4-D1	1	3.00	5.70	0.81	0.76	87.2	86.6	1740	16.6	870	440	490
MMG112M4-D1	1	4.00	7.50	0.78	0.76	88.0	87.5	1755	22.0	840	400	450
MMG132S4-D1	1	5.50	9.30	0.73	0.79	89.5	89.9	1760	30.0	930	370	420
MMG132M4-D1	1	7.50	21.5	0.74	0.80	90.3	90.5	1760	40.5	930	380	420
MMG160M4-D1	1	11.0	18.5	0.71	0.78	91.8	91.7	1770	59.5	850	280	370
MMG160L4-D1	1	15.0	24.0	0.74	0.80	92.6	92.6	1770	81.0	900	310	390
MMG180M4-D1	1	18.5	29.5	0.75	0.81	92.9	92.8	1770	100	920	350	380
MMG180L4-D1	1	22.0	35.0	0.76	0.82	93.2	93.3	1770	119	960	370	400
MMG200L4-D1/D1A	1	30.0	47.5	0.76	0.81	93.5	93.7	1775	162	830	290	320
MMG225S4-D1	1	37.0	58.0	0.76	0.81	93.9	94.2	1780	199	920	280	360
MMG225M4-D1	1	45.0	68.0	0.81	0.85	94.4	94.6	1780	241	910	280	360
MMG250M4-D1	1	55.0	87.0	0.76	0.81	94.8	95.0	1780	295	870	460	330
MMG280S4-D1	1	75.0	117	0.77	0.82	94.3	94.9	1785	401	840	280	330
MMG280M4-D1	1	90.0	138	0.77	0.82	94.8	95.2	1785	481	840	280	330
MMG315S4-D	-	110	170	0.77	0.82	94.8	95.2	1785	588	880	290	340
MMG315MA4-D	-	132	200	0.79	0.84	94.7	95.3	1790	705	890	260	340
MMG315MB4-D	-	160	246	0.77	0.82	94.9	95.5	1790	854	890	260	340
MMG315L4-D	-	200	295	0.81	0.85	95.3	95.8	1790	1067	920	290	340

50 Hz data shown as 400 V Δ/ 690 V Y and 60 Hz data shown as 380 V Δ, 440 V Δ and 480 V Δ



MMG Model D 6-pole · low voltage · 50/60 Hz

Low voltage · 6-pole motors 50 Hz 230 V Δ/400 V Y												
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{B7}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG71A6-D	-	0.18	1.30/0.75	0.48	0.60	47.0	51.0	880	2.00	220	160	160
MMG71B6-D	-	0.25	1.90/1.10	0.56	0.65	50.0	54.0	870	3.00	250	170	170
MMG80A6-D	-	0.37	2.20/1.30	0.65	0.72	58.0	60.0	910	4.00	270	160	210
MMG80B6-D	-	0.55	3.10/1.80	0.58	0.67	64.0	68.0	910	6.00	290	220	210
MMG90S6-D	-	0.75	4.30/2.50	0.55	0.63	69.0	69.0	910	8.00	290	170	170
MMG90L6-D	-	1.10	6.20/3.60	0.56	0.63	73.0	72.0	908	11.6	300	170	170
MMG100L6-D	-	1.50	7.60/4.40	0.65	0.71	75.0	75.0	930	15.4	370	180	230
MMG112M6-D	-	2.20	9.40/5.40	0.64	0.72	83.0	82.0	940	22.4	440	240	260
MMG132SA6-D	-	3.00	12.3/7.10	0.67	0.75	81.6	83.7	955	30.0	580	210	270
MMG132MA6-D	-	4.00	15.9/9.20	0.68	0.76	83.2	84.9	955	40.0	620	230	280
MMG132MB6-D	-	5.50	21.5/12.5	0.69	0.77	83.8	85.2	955	55.0	620	230	280
MMG160M6-D	-	7.50	27.5/15.9	0.76	0.82	86.8	87.7	965	74.0	590	190	250
Low voltage · 6-pole motors 60 Hz 220 V Δ/380 V Y												
MMG71A6-D	-	0.18	1.50/0.85	0.48	0.60	47.0	51.0	1050	1.60	180	150	140
MMG71B6-D	-	0.25	1.90/1.10	0.56	0.65	50.0	54.0	1020	2.40	200	150	150
MMG80A6-D	-	0.37	2.20/1.30	0.65	0.72	58.0	60.0	1090	3.00	220	130	130
MMG80B6-D	-	0.55	3.10/1.80	0.58	0.67	64.0	68.0	1090	5.00	230	150	140
MMG90S6-D	-	0.75	4.20/2.40	0.55	0.63	72.0	69.0	1090	6.50	230	120	130
MMG90L6-D	-	1.10	5.70/3.30	0.56	0.63	75.0	73.0	1090	9.50	240	150	170
MMG100L6-D	-	1.50	7.20/4.20	0.65	0.71	76.0	75.0	1110	13.0	300	130	160
MMG112M6-D	-	2.20	9.40/5.40	0.64	0.72	83.0	82.0	1120	18.8	350	130	160
MMG132SA6-D	-	3.00	11.8/6.80	0.76	0.81	85.3	83.5	1135	25.0	470	150	190
MMG132MA6-D	-	4.00	15.4/8.90	0.77	0.81	86.1	84.4	1135	33.5	500	170	200
MMG132MB6-D	-	5.50	21.0/12.1	0.78	0.82	86.4	84.4	1135	46.5	500	170	200
MMG160M6-D	-	7.50	27.0/15.7	0.83	0.85	88.2	86.0	1150	62.5	480	140	180
Low voltage · 6-pole motors 60 Hz 255 V Δ/440 V Y												
MMG71A6-D	-	0.18	1.30/0.73	0.47	0.60	50.8	54.0	1060	1.60	210	170	160
MMG71B6-D	-	0.25	1.70/1.00	0.55	0.65	50.0	53.0	1030	2.20	230	170	170
MMG80A6-D	-	0.37	1.90/1.10	0.64	0.72	58.3	62.0	1100	3.00	250	140	150
MMG80B6-D	-	0.55	2.80/1.60	0.57	0.67	62.1	66.0	1100	5.00	270	170	160
MMG90S6-D	-	0.75	3.60/2.10	0.54	0.62	72.0	73.0	1100	6.50	270	140	140
MMG90L6-D	-	1.10	4.90/2.80	0.55	0.65	76.0	76.0	1100	9.50	280	170	190
MMG100L6-D	-	1.50	6.20/3.60	0.64	0.70	78.0	78.0	1120	12.8	340	140	170
MMG112M6-D	-	2.20	8.30/4.80	0.63	0.72	79.0	84.0	1130	18.6	400	140	170
MMG132SA6-D	-	3.00	10.5/6.20	0.69	0.75	85.2	85.4	1155	24.8	630	210	270
MMG132MA6-D	-	4.00	14.0/8.10	0.71	0.76	86.0	86.3	1155	33.0	670	230	280
MMG132MB6-D	-	5.50	18.8/10.9	0.72	0.77	86.5	86.5	1155	45.5	670	230	280
MMG160M6-D	-	7.50	23.5/13.5	0.79	0.83	88.1	88.4	1165	61.5	640	190	250
Low voltage · 6-pole motors 60 Hz 277 V Δ/480 V Y												
MMG71A6-D	-	0.18	1.20/0.72	0.46	0.56	48.0	50.0	1065	1.60	220	190	170
MMG71B6-D	-	0.25	1.60/0.94	0.54	0.61	51.0	53.5	1035	2.40	250	180	180
MMG80A6-D	-	0.37	1.90/1.10	0.63	0.68	58.0	58.2	1105	3.00	270	150	160
MMG80B6-D	-	0.55	2.60/1.50	0.55	0.63	66.5	67.1	1105	4.80	290	180	170
MMG90S6-D	-	0.75	3.60/2.10	0.53	0.59	70.0	72.0	1105	6.50	290	150	150
MMG90L6-D	-	1.10	4.70/2.70	0.53	0.59	75.0	74.0	1105	9.50	300	180	210
MMG100L6-D	-	1.50	6.00/3.50	0.58	0.67	76.0	77.5	1125	12.8	370	150	190
MMG112M6-D	-	2.20	8.00/4.60	0.56	0.68	80.5	81.0	1135	18.6	440	140	180
MMG132SA6-D	-	3.00	10.7/6.20	0.59	0.69	84.5	85.3	1165	24.6	700	260	330
MMG132MA6-D	-	4.00	13.8/8.00	0.61	0.70	85.7	86.4	1165	33.0	750	290	350
MMG132MB6-D	-	5.50	18.9/10.9	0.62	0.71	86.2	86.6	1165	45.0	750	290	350
MMG160M6-D	-	7.50	22.5/13.0	0.71	0.79	88.7	88.8	1175	61.0	710	240	310

50 Hz data shown as 230 V Δ/ 400 V Y and 60 Hz data shown as 220 V Δ/ 380 V Y, 255 V Δ/ 440 V Y and 277 V Δ/ 480 V Y

Electrical data

MMG Model D 6-pole · high voltage · 50/60 Hz

MMG-D	High voltage · 6-pole motors 50 Hz 400 V Δ/690 V Y											
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{B7}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG100L6-D	-	1.50	4.40/2.55	0.65	0.71	75.0	75.0	930	15.0	370	180	230
MMG112M6-D	-	2.20	5.40/3.10	0.64	0.72	83.0	82.0	940	22.0	440	240	260
MMG132SA6-D	-	3.00	7.10/4.10	0.67	0.75	81.6	83.7	955	30.0	580	210	270
MMG132MA6-D	-	4.00	9.20/5.30	0.68	0.76	83.2	84.9	955	40.0	620	230	280
MMG132MB6-D	-	5.50	12.5/7.20	0.69	0.77	83.8	85.2	955	55.0	620	230	280
MMG160M6-D	-	7.50	15.9/9.20	0.76	0.82	86.8	87.7	965	74.0	590	190	250
MMG160L6-D	-	11.0	22.5/13.0	0.76	0.82	88.6	89.0	965	109	610	200	260
MMG180L6-D	-	15.0	30.0/17.5	0.80	0.83	90.5	90.8	970	148	670	220	280
MMG200LA6-D	-	18.5	37.0/21.5	0.79	0.82	89.3	90.4	970	182	530	220	230
MMG200LB6-D	-	22.0	44.0/25.5	0.79	0.82	89.9	91.0	975	215	570	220	230
MMG225M6-D	-	30.0	58.0/33.5	0.80	0.83	90.7	91.7	975	294	570	230	230
MMG250M6-D	-	37.0	71.0/41.0	0.81	0.84	90.8	91.9	975	362	710	320	260
MMG280S6-D	-	45.0	87.0/50.0	0.83	0.86	91.4	92.5	985	436	560	180	240
MMG280M6-D	-	55.0	106/61.0	0.83	0.86	91.5	92.7	985	533	560	180	240
MMG315S6-D	-	75.0	139/80.0	0.84	0.87	93.2	94.0	985	727	680	190	260
MMG315MA6-D	-	90.0	167/97.0	0.84	0.87	94.2	94.8	988	870	760	250	260
MMG315MB6-D	-	110	202/117	0.84	0.87	94.5	95.0	987	1064	740	250	260
MMG315L6-D	-	132	241/139	0.85	0.88	95.0	95.3	987	1277	770	270	250
High voltage · 6-pole motors 60 Hz 380 V Δ/660 V Y												
MMG100L6-D	-	1.50	4.20/2.40	0.65	0.71	76.0	75.0	1110	13.0	300	130	160
MMG112M6-D	-	2.20	5.40/3.10	0.64	0.72	83.0	82.0	1120	18.8	350	130	160
MMG132SA6-D	-	3.00	6.80/3.90	0.76	0.81	85.3	83.5	1135	25.0	470	150	190
MMG132MA6-D	-	4.00	8.90/5.10	0.77	0.81	86.1	84.4	1135	34.0	500	170	200
MMG132MB6-D	-	5.50	12.1/7.00	0.78	0.82	86.4	84.4	1135	46.0	500	170	200
MMG160M6-D	-	7.50	15.7/9.10	0.83	0.85	88.2	86.0	1150	62.0	480	140	180
MMG160L6-D	-	11.0	22.5/13.0	0.84	0.85	89.1	87.2	1150	91.0	490	140	190
MMG180L6-D	-	15.0	30.0/17.5	0.85	0.86	90.9	89.2	1160	124	540	160	200
MMG200LA6-D	-	18.5	37.5/21.5	0.84	0.84	90.6	89.6	1160	152	430	160	170
MMG200LB6-D	-	22.0	43.5/25.0	0.85	0.85	91.0	90.3	1165	180	460	160	170
MMG225M6-D	-	30.0	59.0/34.0	0.85	0.85	91.8	91.0	1165	246	460	170	170
MMG250M6-D	-	37.0	72.0/41.5	0.86	0.86	92.2	91.5	1165	303	580	230	190
MMG280S6-D	-	45.0	85.0/49.0	0.88	0.88	92.8	92.5	1175	366	450	130	170
MMG280M6-D	-	55.0	103/60.0	0.88	0.88	93.4	93.1	1175	447	450	130	170
MMG315S6-D	-	75.0	140/81.0	0.87	0.85	93.6	93.3	1180	607	550	140	190
MMG315MA6-D	-	90.0	175/101	0.87	0.84	94.3	93.7	1180	729	620	180	190
MMG315MB6-D	-	110	210/121	0.87	0.84	94.8	94.4	1180	890	600	180	190
MMG315L6-D	-	132	255/147	0.88	0.83	95.0	94.5	1180	1068	620	190	180

50 Hz data shown as 400 V Δ/ 690 V Y and 60 Hz data shown as 380 V Δ, 440 V Δ and 480 V Δ



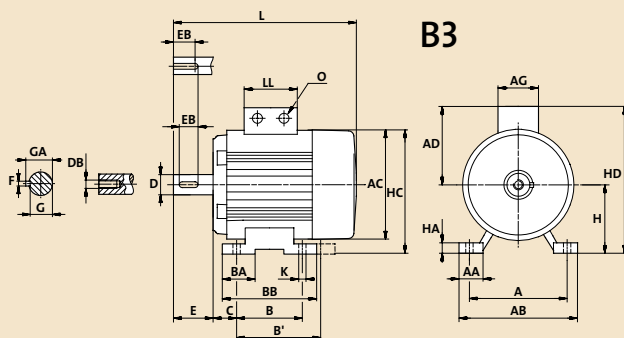
MMG Model D 6-pole · high voltage · 50/60 Hz

MMG-D	High voltage · 6-pole motors 60 Hz 440 V Δ											
Short type designation	Efficiency class	Shaft power P_2	Full load current I_N	Power factor $\cos \varphi$ at % load		Efficiency η at % load		Speed n	Torque at 400 V M_N	LRC I_s/I_N	LRT M_s/M_N	BT M_{B7}/M_N
		[kW]	[A]	75 %	100 %	75 %	100 %	[min ⁻¹]	[Nm]	[%]	[%]	[%]
MMG100L6-D	-	1.50	3.60	0.64	0.70	78.0	78.0	1120	12.8	340	140	170
MMG112M6-D	-	2.20	4.80	0.63	0.72	79.0	84.0	1130	18.6	400	140	170
MMG132SA6-D	-	3.00	6.20	0.69	0.75	85.2	85.4	1155	24.8	630	210	270
MMG132MA6-D	-	4.00	8.10	0.71	0.76	86.0	86.3	1155	33.0	670	230	280
MMG132MB6-D	-	5.50	10.9	0.72	0.77	86.5	86.5	1155	45.5	670	230	280
MMG160M6-D	-	7.50	13.5	0.79	0.83	88.1	88.4	1165	61.5	640	190	250
MMG160L6-D	-	11.0	19.5	0.80	0.84	89.3	89.3	1170	90.0	660	200	260
MMG180L6-D	-	15.0	26.0	0.81	0.85	90.7	91.0	1170	122	720	220	280
MMG200LA6-D	-	18.5	32.0	0.81	0.84	90.9	91.0	1170	151	570	220	230
MMG200LB6-D	-	22.0	37.5	0.81	0.84	91.0	91.3	1175	179	620	220	230
MMG225M6-D	-	30.0	51.0	0.82	0.85	91.8	92.1	1175	244	620	230	230
MMG250M6-D	-	37.0	62.0	0.83	0.86	92.1	92.4	1180	300	770	320	260
MMG280S6-D	-	45.0	73.0	0.85	0.87	92.8	93.1	1185	363	600	180	240
MMG280M6-D	-	55.0	89.0	0.85	0.87	93.5	93.7	1185	443	600	180	240
MMG315S6-D	-	75.0	120	0.86	0.87	94.0	94.2	1185	605	730	190	260
MMG315MA6-D	-	90.0	145	0.87	0.87	94.5	94.6	1180	729	820	250	260
MMG315MB6-D	-	110	175	0.87	0.87	94.9	95.1	1185	887	800	250	260
MMG315L6-D	-	132	210	0.87	0.88	95.1	95.2	1185	1064	830	270	250
High voltage · 6-pole motors 60 Hz 480 V Δ												
MMG100L6-D	-	1.50	3.50/2.40	0.58	0.67	76.0	77.5	1125	12.8	370	150	190
MMG112M6-D	-	2.20	4.60/3.10	0.56	0.68	80.5	81.0	1135	18.6	440	140	180
MMG132SA6-D	-	3.00	6.20/3.90	0.59	0.69	84.5	85.3	1165	24.6	700	260	330
MMG132MA6-D	-	4.00	8.00/5.10	0.61	0.70	85.7	86.4	1165	33.0	750	290	350
MMG132MB6-D	-	5.50	10.9/7.00	0.62	0.71	86.2	86.6	1165	45.0	750	290	350
MMG160M6-D	-	7.50	13.0/9.10	0.71	0.79	88.7	88.8	1175	61.0	710	240	310
MMG160L6-D	-	11.0	18.5/13.0	0.74	0.80	89.8	89.8	1175	89.5	740	250	320
MMG180L6-D	-	15.0	24.5/17.5	0.75	0.81	91.4	91.4	1175	122	810	270	350
MMG200LA6-D	-	18.5	31.0/21.5	0.74	0.80	90.6	91.1	1175	150	640	270	290
MMG200LB6-D	-	22.0	36.5/25.0	0.74	0.80	90.7	91.3	1180	178	690	270	290
MMG225M6-D	-	30.0	49.0/34.0	0.75	0.81	91.6	92.1	1180	243	690	290	290
MMG250M6-D	-	37.0	60.0/41.5	0.76	0.81	91.8	92.3	1180	300	860	400	320
MMG280S6-D	-	45.0	72.0/49.0	0.76	0.82	92.4	93.1	1185	363	680	220	300
MMG280M6-D	-	55.0	85.0/60.0	0.78	0.83	93.1	93.7	1185	443	680	220	300
MMG315S6-D	-	75.0	112/81.0	0.82	0.85	94.0	94.4	1190	602	820	240	320
MMG315MA6-D	-	90.0	132/101	0.83	0.86	94.4	94.8	1190	723	920	310	320
MMG315MB6-D	-	110	160/121	0.84	0.87	94.8	95.1	1190	883	900	310	320
MMG315L6-D	-	132	195/147	0.84	0.87	95.1	95.3	1190	1060	930	330	310

50 Hz data shown as 400 V Δ / 690 V Y and 60 Hz data shown as 380 V Δ, 440 V Δ and 480 V Δ

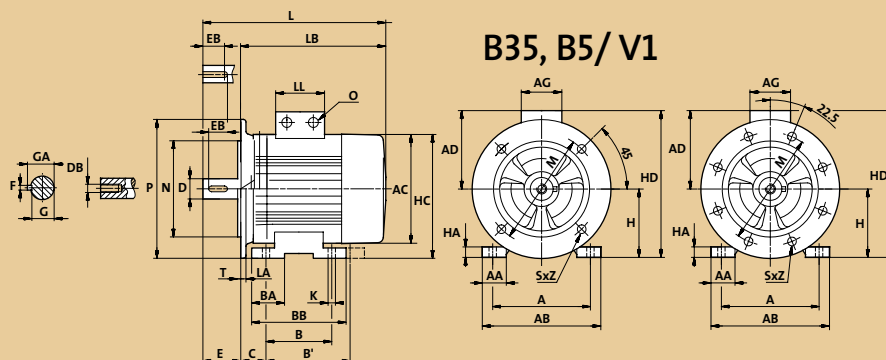
Dimensions

Frame size	Poles	Stator housing						Shaft end					
		IEC:	AC	AD	H	L	LB	D	DB	E	EB	F	G
71 A, B	2, 4, 6		137.6	114.5	71	245.0	215.0	14	M5	30	20	5	5
80 A, B	2, 4, 6		157.0	138.0	80	272.0	232.0	19	M6	40	30	6	6
90 S, SA, SB	2, 4, 6		177.0	148.0	90	317.0	267.0	24	M8	50	40	8	7
90L	2, 4, 6		177.0	148.0	90	317.0	267.0	24	M8	50	40	8	7
100 L, LA	2, 4, 6		196.0	155.0	100	366.0	305.0	28	M10	60	50	8	7
100 LB	2, 4, 6		194.0	155.0	100	400.0	340.0	28	M10	60	50	8	7
112 M	2, 4, 6		220.0	171.0	112	388.0	328.0	28	M10	60	50	8	7
132 SA	2, 4, 6		260.0	197.0	132	449.5	369.5	38	M12	80	70	10	8
132 S, SB	2, 4, 6		260.0	197.0	132	499.5	419.5	38	M12	80	70	10	8
132 M	2, 4, 6		260.0	197.0	132	537.5	457.5	38	M12	80	70	10	8
132 MA, MB	2, 4, 6		260.0	197.0	132	487.5	407.5	38	M12	80	70	10	8
160 M, MA, MB	2, 4, 6		325.0	244.5	160	612.0	502.0	42	M16	110	100	12	8
160 L	2, 4, 6		325.0	244.5	160	657.0	547.0	42	M16	110	100	12	8
180 M	2, 4, 6		355.0	266.0	180	712.0	602.0	48	M16	110	100	14	8
180 L	2, 4, 6		355.0	266.0	180	712.0	602.0	48	M16	110	100	14	8
200 LA, LB	2, 4, 6		379.0	341.0	200	779.0	669.0	55	M20	110	100	16	10
200 LA, LB version A	2, 4, 6		379.0	327.0	200	779.0	669.0	55	M20	110	100	16	10
225 M	2		443.0	366.0	225	857.5	747.5	55	M20	110	100	16	10
225 S	4, 6		443.0	366.0	225	887.5	747.5	60	M20	140	110	18	11
225 M	4, 6		443.0	366.0	225	887.5	747.5	60	M20	140	110	18	11
250 M	2		494.0	385.0	250	971.5	831.5	60	M20	140	110	18	11
250 M	4, 6		494.0	385.0	250	971.5	831.5	65	M20	140	110	18	11
280 S	2		496.0	419.0	280	1035.5	895.5	65	M20	140	100	18	11
280 S	4, 6		496.0	419.0	280	1035.5	895.5	75	M20	140	100	20	12
280 M	2		496.0	419.0	280	1086.5	946.5	65	M20	140	100	18	11
280 M	4, 6		496.0	419.0	280	1086.5	946.5	75	M20	140	100	20	12
315 S	2		620.0	512.0	315	1094.0	954.0	65	M20	140	125	18	11
315 S	4, 6		620.0	512.0	315	1124.0	954.0	80	M20	170	140	22	14
315 M, MA, MB	2		620.0	512.0	315	1094.0	954.0	65	M20	140	125	18	11
315 M, MA, MB	4, 6		620.0	512.0	315	1124.0	954.0	80	M20	170	140	22	14
315 L, LA, LB	2		620.0	512.0	315	1214.0	1074.0	65	M20	140	125	18	11
315 L, LA, LB	4, 6		620.0	512.0	315	1244.0	1074.0	80	M20	170	140	22	14





Feet					Flange B35, B5/V1						Cable entry
GA	A	B	C	K	LA	M	N	P	T	SxZ	O
16.0	112	90	45	7.0	-	130	110	160	3.5	M8 x 8	1 x M16 x 1.5 + 1 x M20 x 1.5
21.5	125	100	50	9.5	10	165	130	200	3.5	M10 x 8	1 x M20 x 1.5 + 1 x M25 x 1.5
27.0	140	100	56	10.0	12	165	130	200	3.5	M10 x 8	1 x M20 x 1.5 + 1 x M25 x 1.5
27.0	140	125	56	10.0	12	165	130	200	3.5	M10 x 8	1 x M20 x 1.5 + 1 x M25 x 1.5
31.0	160	140	63	11.0	14	215	180	250	4.0	M12 x 8	1 x M20 x 1.5 + 1 x M25 x 1.5
31.0	160	140	63	11.0	14	215	180	250	4.0	M12 x 8	1 x M20 x 1.5 + 1 x M25 x 1.5
31.0	190	140	70	12.5	14	215	180	250	4.0	M12 x 8	1 x M20 x 1.5 + 1 x M25 x 1.5
41.0	216	140	89	12.0	12	265	230	300	4.0	M12 x 8	1 x M16 x 1.5 + 2 x M32 x 1.5
41.0	216	140	89	12.0	12	265	230	300	4.0	M12 x 8	1 x M16 x 1.5 + 2 x M32 x 1.5
41.0	216	178	89	12.0	12	265	230	300	4.0	M12 x 8	1 x M16 x 1.5 + 2 x M32 x 1.5
41.0	216	178	89	12.0	12	265	230	300	4.0	M12 x 8	1 x M16 x 1.5 + 2 x M32 x 1.5
45.0	254	210	108	14.0	13	300	250	350	5.0	M16 x 8	1 x M20 x 1.5 + 2 x M40 x 1.5
45.0	254	254	108	14.0	13	300	250	350	5.0	M16 x 8	1 x M20 x 1.5 + 2 x M40 x 1.5
51.5	279	241	121	14.0	13	300	250	350	5.0	M16 x 8	1 x M20 x 1.5 + 2 x M40 x 1.5
51.5	279	279	121	14.0	13	300	250	350	5.0	M16 x 8	1 x M20 x 1.5 + 2 x M40 x 1.5
59.0	318	305	133	18.0	15	350	300	400	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M50 x 1.5
59.0	318	305	133	18.0	15	350	300	400	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M50 x 1.5
59.0	356	311	149	18.5	16	400	350	450	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M50 x 1.5
64.0	356	286	149	18.5	16	400	350	450	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M50 x 1.5
64.0	356	311	149	18.5	16	400	350	450	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M50 x 1.5
64.0	406	349	168	22.0	18	500	450	550	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M63 x 1.5
69.0	406	349	168	22.0	18	500	450	550	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M63 x 1.5
69.0	457	368	190	22.0	18	500	450	550	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M63 x 1.5
79.5	457	368	190	22.0	18	500	450	550	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M63 x 1.5
69.0	457	419	190	22.0	18	500	450	550	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M63 x 1.5
79.5	457	419	190	22.0	18	500	450	550	5.0	M16 x 8	1 x M25 x 1.5 + 2 x M63 x 1.5
69.0	508	406	216	28.0	22	600	550	660	6.0	M20 x 8	2 x M25 x 1.5 + 2 x M63 x 1.5
85.0	508	406	216	28.0	22	600	550	660	6.0	M20 x 8	2 x M25 x 1.5 + 2 x M63 x 1.5
69.0	508	457	216	28.0	22	600	550	660	6.0	M20 x 8	2 x M25 x 1.5 + 2 x M63 x 1.5
85.0	508	457	216	28.0	22	600	550	660	6.0	M20 x 8	2 x M25 x 1.5 + 2 x M63 x 1.5
69.0	508	508	216	28.0	22	600	550	660	6.0	M20 x 8	2 x M25 x 1.5 + 2 x M63 x 1.5
85.0	508	508	216	28.0	22	600	550	660	6.0	M20 x 8	2 x M25 x 1.5 + 2 x M63 x 1.5



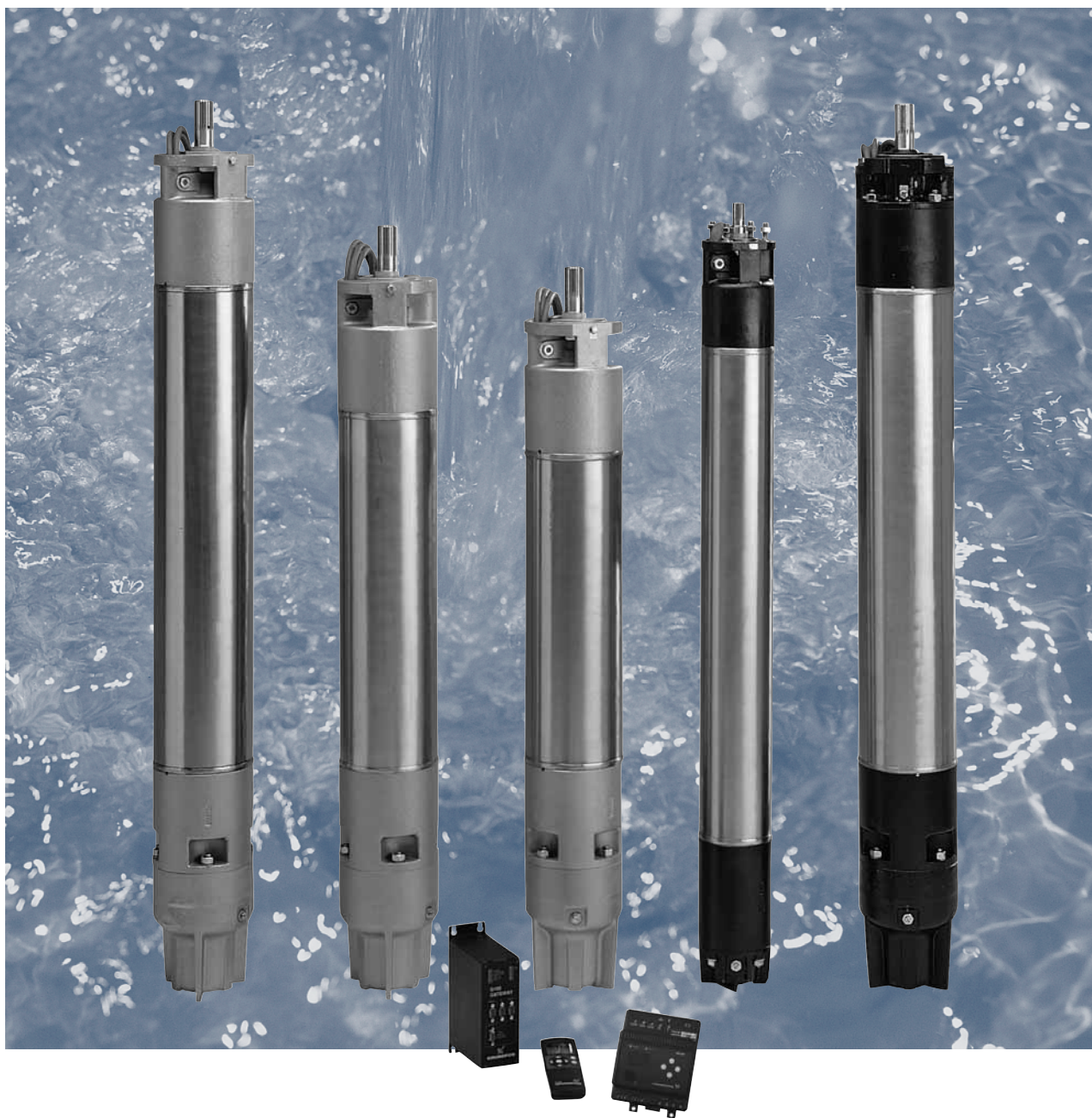


Doing business with Grundfos

Grundfos has been manufacturing high-quality electrical motors for more than 30 years, and as one of the world's leading pump manufacturers, we know better than anyone what is required of a reliable electrical motor.

Cost of Ownership is an important consideration when choosing a motor for a specific task. At Grundfos we define Cost of Ownership as the total sum of both the costs and benefits of having a business relationship with us. An important element of this is how Grundfos can assist in reducing operation costs through technical advice, customer training, service, and reliable logistics.

Rewindable submersible motors and accessories
50/60 Hz



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MMS rewindable motors

The Grundfos MMS product range is a complete range of submersible, rewindable motors, available in sizes from 3.7 kW 6" up to 250 kW 12" motors.

Three material versions are available. A cast iron version EN-JL1040. For more aggressive liquids with a moderate content of salt, an N-version made of stainless steel DIN/EN 1.4401 (AISI 316) is available. For aggressive liquids with more salt content than sea water and temperatures above 15 deg celsius, it is recommended to use the R version AISI 904L.

Grundfos MMS submersible motors are designed according to market standards. All Grundfos MMS motors are designed to fit pump ends manufactured according to NEMA standards. The motors are ideally suited for water supply pumps for irrigation, groundwater regulation, pressure boosting, industrial water transfer and similar applications. The 10" and 12" motors are designed according to the drawings shown on page 8. MMS motors comply with the same standards as Grundfos MS motors and can therefore be fitted on all Grundfos SP pumps without the need for adapters.

The motor production is in the hands of experts with many years of experience within the manufacture of motors. In order to make the time of delivery as short as possible, components are manufactured for stock, enabling rapid assembly of a few basic components into the finished motor.

The rewindable motor construction means low costs of repair of the motor in case of damage. Moreover, as rewinding can be effected locally, unnecessary time for transportation of the motor can be avoided and possible periods of downtime reduced to a minimum. The construction of the motor, based on few basic components, also facilitates service and repair of the motor.

Fitted with a sturdy MICHELL thrust bearing, which also functions as an upthrust bearing, all motors offer reliable operation.

In order to achieve maximum protection of the motor against burnout, all motors can be fitted with a Pt100 sensor. Combined with a relay and an optional Grundfos MP 402, the Pt100 provides optimum protection of the motor.



Fig. 1 MMS motors

TM01 7873 4999

Product range, 50 Hz

	MMS 6000 (N/R)	MMS 8000 (N/R)	MMS 10000 (N)	MMS 12000 (N)
Motor size	6"	8"	10"	12"
Power range, direct-on-line and star-delta				
- 3 x 220-230 V	3.7-37* kW	22-63 kW	75-110 kW	
- 3 x 380-415 V		22-110 kW	75-190 kW	147-250 kW
- 3 x 500 V	7.5-37* kW			
Allowed installation				
- Vertical	3.7- 37* kW	22-110 kW	75-190 kW	147-250 kW
- Horizontal	3.7- 30 kW	22-92 kW	75-170 kW	147-190 kW

Note: * = 37 kW, R-version only

Product range, 60 Hz

	MMS 6000 (N/R)	MMS 8000 (N/R)	MMS 10000 (N)
Motor size	6"	8"	10"
Power range, direct-on-line and star-delta			
- 3 x 220 V	3.7-37* kW	22-75 kW	75-132 kW
- 3 x 380 V	3.7-37* kW	22-110 kW	75-190 kW
- 3 x 460 V	3.7-37* kW	22-110 kW	75-190 kW
Power range, direct-on-line			
- 3 x 575 V		22-110 kW	75-190 kW
Allowed installation			
- Vertical	3.7- 37* kW	22-110 kW	75-190 kW
- Horizontal	3.7- 30 kW	22-92 kW	75-170 kW

Note: * = 37 kW, R-version only

Rewindable motors

The two pole MMS motors are easily rewinded. The windings of the stator are made of a special water-proof wire of pure electrolytic copper sheathed with special non-hydroscopic thermoplastic material. The high dielectric strength properties of this material allow direct contact between the windings and the liquid for efficient cooling of the windings.

Type key

Example	MMS	6	000	N
Type range				
Min. borehole diameter in inches				
Generation				
Material:				
= Cast iron EN-JL1040				
N = DIN/EN 1.4401 (AISI 316)				
R = DIN W.-Nr. 1.4539				

High motor efficiency

The complete motor range offered by Grundfos is characterized by high efficiency, which contributes to improved economy of the total pump system.

Overtemperature protection

For protection against overtemperature, Grundfos offers the Pt100 temperature sensor as an optional extra.

The Pt100 is fitted in the motor and connected via a relay, which can be connected to the MP204 motor protection.

When the temperature becomes too high, the motor will be cut out and damage to the pump be avoided.

Protection against upthrust

In case of a very low counter pressure in connection with start-up, there is a risk that the entire pump body may rise, for instance in connection with fountain applications. This is called upthrust, and it may cause damage to both pump and motor. Therefore, the MMS motors are fitted with upthrust spacers, which prevent upthrust in the critical start-up phase.

The maximum load in connection with thrust and upthrust can be seen in the table below.

Motor type	Motor power [kW] (hp)		Thrust		Upthrust
	Min.	Max.	(*) [N]	(**) [N]	
6"	3.7 (5)	15 (20)	15000		6000
	18.5 (25)	37 (50)	27500		6000
8"	22 (30)	110 (150)	60000		12500
10"	75 (100)	190 (260)	60000		12500
12"	132 (180)	250 (340)		70000	15000

(*) Double direction of rotation (clockwise and counterclockwise)

(**) Direction of rotation to be specified (counterclockwise)

Motor protection range and communication tools

Description	Power	
	3.7-190 kW	220- 250 kW
Pt100 including relay	●	●
MP 204	●	
R100	●	
G100	●	

Operation

Frequency of starts and stops

Motor type	Number of starts	
	PE/PA	PVC
MMS 6000	Minimum 1 per year is recommended	
	Maximum 10 per hour	Maximum 3 per hour
	Maximum 70 per day	Maximum 40 per day
MMS 8000	Minimum 1 per year is recommended	
	Maximum 8 per hour	Maximum 3 per hour
	Maximum 60 per day	Maximum 30 per day
MMS 10000	Minimum 1 per year is recommended	
	Maximum 6 per hour	Maximum 2 per hour
	Maximum 50 per day	Maximum 20 per day
MMS 12000	Minimum 1 per year is recommended	
	Maximum 5 per hour	Maximum 1 per hour
	Maximum 40 per day	Maximum 10 per day

Name plate

1	GRUNDFOS	2	
	MMS 8000	3	PROD. No. 96430674 0404
4	75 KW SF. 1,0 50 HZ		
	3 ~ VOLT	380	400 415
	MAX. AMPS	156	152 152
	COS Ø /PF	0,890	0,860 0,840
	RPM	2900	2910 2920
5	75 KW SF. 1,15 60 HZ		
	3 ~ VOLT	440	460 480
	MAX. AMPS	154	150 148
	COS Ø /PF	0,890	0,880 0,850
6	RPM	3490	3500 3510
7	S1/30 °C 0,5 m/s - 1.6 ft/s IEC 34		
8	WEIGHT 237 Kg / 522 LB		
	MODEL B		
	CE		
	Made in EU,I		
		9	
		10	

TM01 7408 1204

Fig. 2 Name plate

Pos.	Description	Code
1	Type designation	MMS 8000
2	Product number	PROD. No 96430674
3	Production data (MMYY)	0404
4	Motor data, 50 Hz	See name plate
5	Motor data, 60 Hz	See name plate
6	Duty conditions	S1/30 °C 0.5 m/s-1.6 ft/s
7	Weight	237 kg/522 LB
8	Model type	Model B
9	International Electrotechnical Commission standard	IEC 34
10	Enclosure Class	IP 58

Voltage quality

The required voltage quality for Grundfos MMS submersible motors, measured at the motor terminals, is –10%/+6% of the nominal voltage during continuous operation (including variations in the supply voltage and losses in cables).



TM01 8447 0200

Fig. 3 MMS motor

Operating conditions

Cooling

The cooling of the motor depends on the temperature and the flow velocity of the pumped liquid past the motor.

To ensure sufficient cooling, the values for maximum temperature of the pumped liquid and its flow velocity must be kept.

It is recommended always to ensure a minimum cooling flow of 0.15 m/s.

Free convection

Free convection is achieved when the diameter of the borehole is at least 2" (~ 50 mm) bigger than the outer diameter of the motor.

The motor must always be installed above the borehole screen. If a flow sleeve is used, the motor can be placed in the screen.

Calculation of the flow velocity:

$$v = \frac{Q_{min}}{2826 \times (D_i^2 - d_A^2)} \text{ m/s}$$

Required data:

Q_{min} : Flow in m³/h

D_i : Borehole diameter in m

d_A : Motor diameter in m.

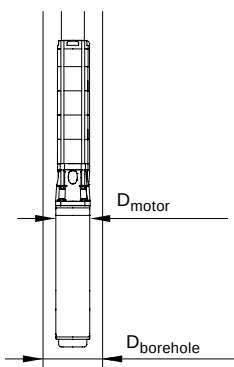


Fig. 4 Diameter of motor and borehole

Maximum liquid temperature:

Motor	Flow velocity past motor	Installation			
		PVC windings		PE/PA windings	
		Vertical	Horizontal	Vertical	Horizontal
Grundfos 6" to 12" rewindable	0.15 m/s	40 °C	30 °C	20 °C	15 °C
	0.50 m/s	45 °C	35 °C	25 °C	20 °C

Note: For MMS 6000, 37 kW, MMS 8000, 110 kW, and MMS 10000, 170 kW, the maximum liquid temperature is 5 °C lower than the values stated in the table above. For MMS 10000, 190 kW the temperature is 10 °C lower.

Operating pressure

For all motor sizes: Maximum 60 bar.

Temperature of pumped liquid

Motors with PVC windings can operate at liquid temperatures up to 30 °C.

When operating in liquids at temperatures from 20 °C to 43 °C, the motor can be derated according to the curve below.

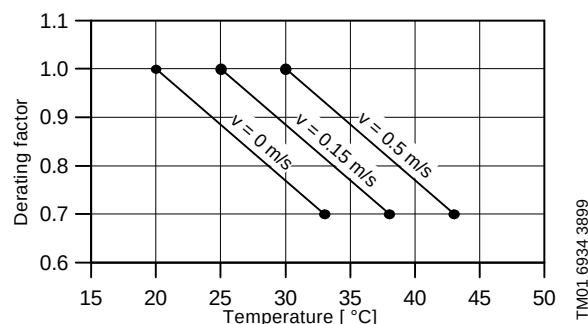


Fig. 5 PVC windings

Motors with PE/PA windings can operate at temperatures up to 50 °C.

For liquid temperatures from 35 °C to 50 °C, the motors with PE/PA windings can be derated according to the curve below.

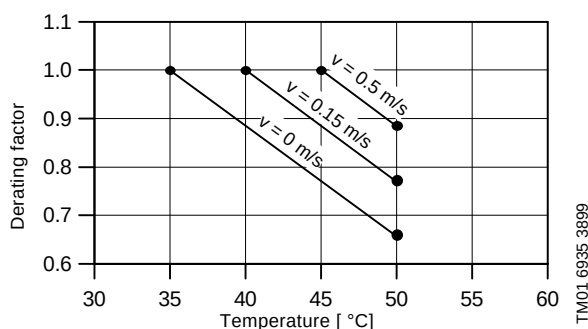


Fig. 6 PE/PA windings

Windings temperature

PVC windings: 70 °C

PE/PA windings 90 °C

Enclosure class

Enclosure class: IP 58

IP 68 (on request).

Material specification for MMS 6000 to MMS 12000

Cast iron version

Pos.	Component	Material	DIN/EN
202	Shaft	Steel	1.4462
202a	Shaft ends	Stainless steel	
203/ 206	Thrust bearing Stationary/ rotating part	6" 3.7-15 kW	Hardened steel/ EPDM
		12"	
		6" 18.5-37 kW	Ceramic/carbon
		8"-10"	
204	Bearing ring	6"-10"	Carbon
		12"	Stainless steel/ NBR
205	Bearing housing, upper	Cast iron	EN- JL1040
212	Diaphragm	CR	
213	Motor end shield	Cast iron	EN- JL1040
218	Motor sleeve	Stainless steel	1.4401
220	Motor cable	EPDM	
226	Shaft seal	Ceramic/carbon	
235	Intermediate housing	Cast iron	EN- JL1040
236	Bearing housing, lower	Cast iron	EN- JL1040

N- and R-versions

Pos.	Component	Material	Version	
			N	R*
			DIN/EN	DIN/EN
202	Shaft	Steel	1.0533	1.0533
202a	Shaft ends	Stainless steel	1.4460	1.4462
203/ 206	Thrust bearing Stationary/ rotating part	6" 3.7-15 kW	Hardened steel/EPDM	
		12"		
		6" 18.5-37 kW	Ceramic/ carbon	
		8"-10"		
204	Bearing ring	6"-10"	Carbon	
		12"	Stainless steel/NBR	
205	Bearing housing, upper	Stainless steel	1.4401	1.4539
212	Diaphragm	CR		
213	Motor end shield	Stainless steel	1.4401	1.4539
218	Motor sleeve	Stainless steel	1.4401	1.4539
220	Motor cable	EPDM		
226	Shaft seal	Ceramic/ carbon		
235	Intermediate housing	Stainless steel	1.4401	1.4539
236	Bearing housing, lower	Stainless steel	1.4401	1.4539

* Only MMS 8000 are available in R-versions

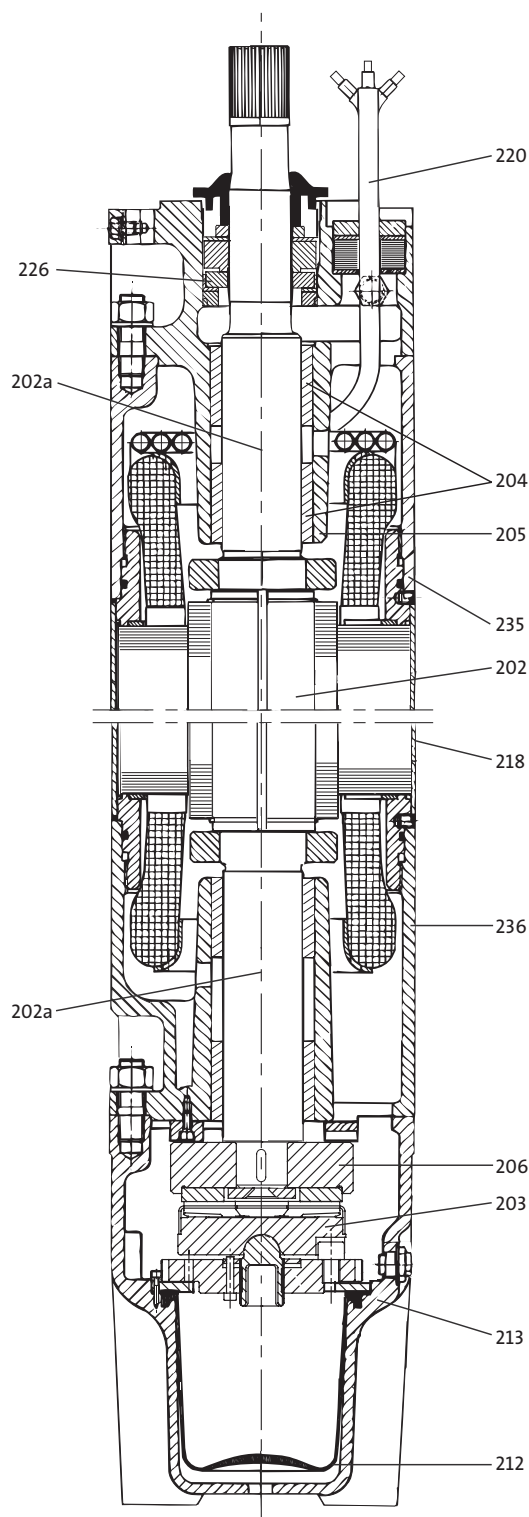


Fig. 7 MMS 10000

TM01 4985 0404

Pump connection

MMS 6000 and MMS 8000 have connections according to NEMA standard MG 1-18.413.

MMS 10000 and MMS 12000 connections are according to the drawings to the right.

The cable outlet of motors for star-delta starting are displaced by 90°.

Shaft and radial bearing

The stainless steel splined shaft end of the 6" and 8" motors fulfills ANSI B92.1, 1970, class 5.

6" motors have 15-teeth module. Pressure angle 30°.
8" motors have 23-teeth module. Pressure angle 30°.
10" and 12" motor shafts have keys.

The bearing system for the 6", 8" and 10" motors is stainless steel shaft against carbon bearing rings. The radial bearing rings of the 12" motors are made of stainless steel and NBR.

Shaft seal

The mechanical shaft seal is available in two variants: Ceramic/carbon and SiC/SiC. SiC/SiC is according to DIN 24960 and available for motors wound for

- 3 x 380-415 V, 50 Hz,
- 3 x 380 V, 60 Hz and
- 3 x 460 V, 60 Hz

only.

The material features high wear resistance and long durability, which ensures tightness and thereby limited replacement of the motor liquid. This is important when the pumped liquid contains sand.

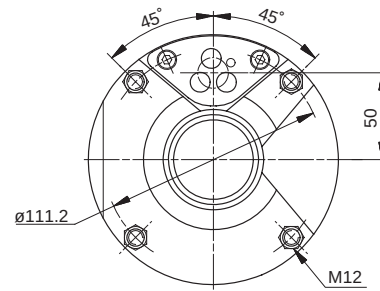
Together with the shaft seal housing, the sand shield forms a labyrinth seal, which during normal operating conditions prevents penetration of sand particles into the shaft seal.

Motor

MMS motors 18.5 kW and up have a squirrel cage rotor with copper bars brazed to the short circuit rings by a silver alloy.

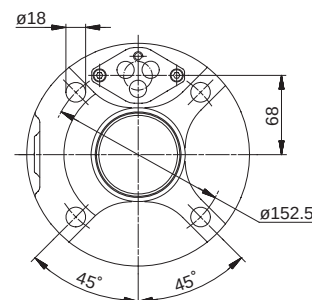
Note: MMS 6000 motors up to 15 kW have a cast aluminium squirrel cage rotor.

The rotor is dynamically balanced for smooth and vibration-free operation.



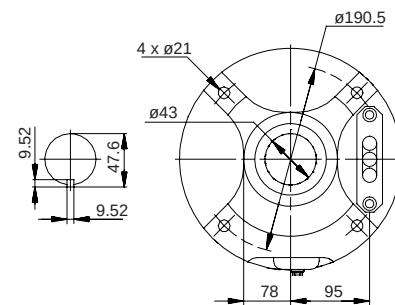
TM01 8178 1104

Fig. 8 MMS 6000 connection



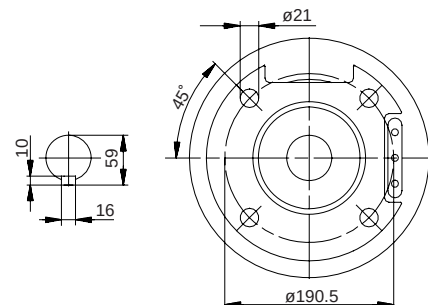
TM01 8177 1104

Fig. 9 MMS 8000 connection



TM01 7328 4902

Fig. 10 MMS 10000 connection



TM01 7330 4902

Fig. 11 MMS 12000 connection

Stator

The stator is a wet-wound construction in stainless steel to protect the motor, even in corrosive water. The stator design allows complete access to the winding for easy maintenance and rewinding. The construction of the laminations minimizes operating losses and improves motor performance.

In 6", 8", and 10" motors, the motor end shield is screwed onto the stator. A suitable centring assures alignment of rotor and stator.

Thrust bearing

The MICHELL/Kingsbury type of water-lubricated thrust bearing is very simple and most efficient.

The thrust capacity of the bearings is in accordance with NEMA standards for submersible motors, where these are applicable. See drawing to the below.

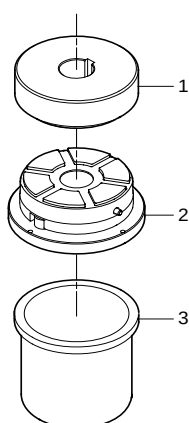
Upthrust bearing

The EPDM upthrust spacers placed above the rotating bearing part prevent motor damage during transportation or in case of upthrust in connection with start-up.

The upthrust bearing is an integrated part of the thrust bearing.

Diaphragm

The diaphragm (pos. no. 3) is fitted between the stator and the motor end shield. The diaphragm is dimensioned to equalize pressure variations caused by temperature rises in connection with intermittent operation.



TM01 7331 0604

Fig. 12 MMS 8000

1. Rotating bearing part
2. Stationary bearing part
3. Diaphragm.

Motor liquid

The motor is filled with glycerol-containing motor liquid, which is frost-proof down to -20°C .

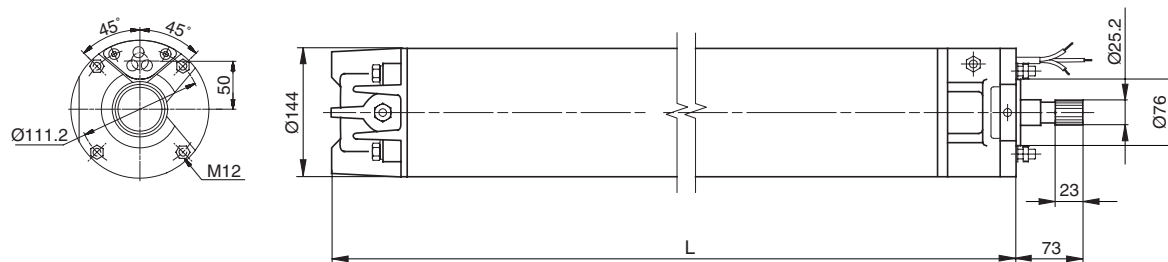
The motor liquid has an anti-corrosive and lubricating function. To obtain the best protection, a concentration of 40% to 60% in water is recommended.

Should the glycerol-containing motor liquid mixed with water not be allowed for special applications, MMS motors may be filled even with fresh water.

Motors not filled with motor liquid are available on request. The following table indicates the freezing points obtainable with various percentages of glycerol-containing motor liquid.

Glycerol-containing motor liquid % volume	Freezing point [°C]
40	-3,9
50	-11,5
60	-15,2
70	-20
80	-26,7
90	-36,5
100	-46,5

MMS 6000 (N)



TM01 7325 3505

Motor power		L [mm]	Weight [kg]	Shipping volume [m ³]
P ₂ [kW]	P ₂ [hp]			
3.7	5.0	630	45	0.077
5.5	7.5	660	48	0.077
7.5	10	690	50	0.077
9.2	12.5	720	55	0.077
11	15	780	60	0.077
13	17.5	850	72	0.108
15	20	910	78	0.108
18.5	25	1085	90	0.108
22	30	1195	100	0.108
26	35	1315	115	0.123
30	40	1425	125	0.123
37	50	1425	125	0.123

Cables

The 6" motors are connected by means of three single-core cables, approved for use with drinking water. All cables are round.

The cable outlet of motors for star-delta starting are displaced by 90 °.

Being an integrated part of the motor, the motor cable cannot be fitted/removed once the motor is assembled.

Cable length: 5 m.

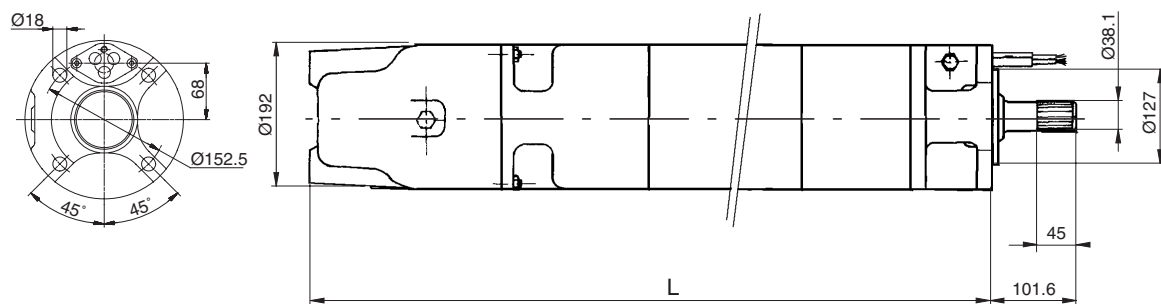
Note: Sizing of the motor cable requires that it is submerged in water. For longer cables and cable connection for extension, please see section for accessories.

Motor power		Cross-section [mm ²]									
		3 x 220 V, 60 Hz		3 x 220-230 V, 50 Hz		3 x 380-415 V, 50 Hz 3 x 460 V, 60 Hz		3 x 500 V, 50 Hz		3 x 380 V, 60 Hz	
		DOL	SD	DOL	SD	DOL	SD	DOL	SD	DOL	SD
P ₂ [kW]	P ₂ [hp]	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1
3.7	5.0	6		6	6	6	6			6	
5.5	7.5	6		6	6	6	6			6	
7.5	10	6		6	6	6	6	6	6	6	
9.2	12.5	6		6	6	6	6	6	6	6	
11	15	6		6	6	6	6	6	6	6	
13	17.5	6		6	6	6	6	6	6	6	
15	20	6		6	6	6	6	6	6	6	
18.5	25	10		10	6	6	6	6	6	6	
22	30	10		10	6	6	6	6	6	6	
26	35	10		10	6	10	6	10	6	10	
30	40	10		10	6	10	6	10	6	10	
37	50		10		10	10	6	10	6	10	6

Outer dimensions

Cross-section [mm ²]	Type of cable	Outer dimensions, max. [mm]
6	Round	8.1
10	Round	8.8

MMS 8000 (N)



TM01 7326 1104

Motor power		L [mm]	Weight [kg]	Shipping volume [m ³]
P ₂ [kW]	P ₂ [hp]			
22	30	1010	126	0.156
26	35	1050	134	0.156
30	40	1110	146	0.156
37	50	1160	156	0.156
45	60	1270	177	0.156
55	75	1350	192	0.187
63	85	1490	218	0.187
75	100	1590	237	0.187
92	125	1830	283	0.239
110	150	2060	333	0.239

Cables

The 8" motors are connected by means of three single-core cables, approved for use with drinking water. All cables are round.

The cable outlet of star-delta motors are displaced by 90°.

Being an integrated part of the motor, the motor cable cannot be fitted/removed once the motor is assembled.

Cable length: 8 m.

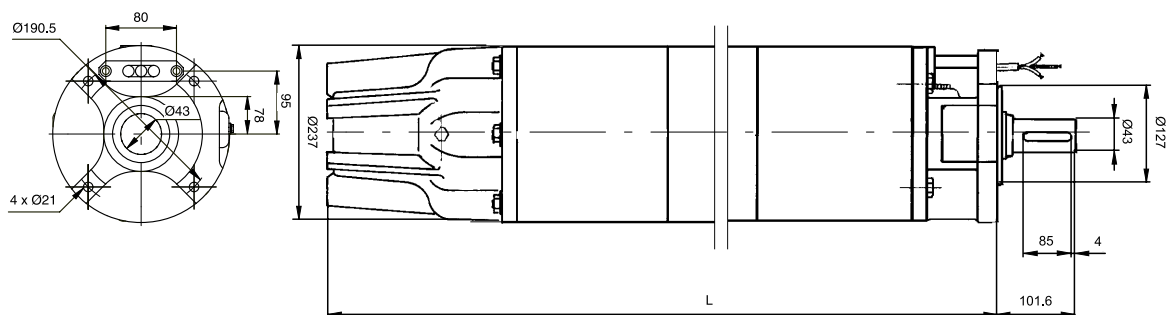
Note: Sizing of the motor cable requires that it is submerged in water. For longer cables and cable connection for extension, please see section for accessories.

Motor power		Cross-section [mm ²]									
		3 x 220 V, 60 Hz		3 x 220-230 V, 50 Hz		3 x 380-415 V, 50 Hz 3 x 460 V, 60 Hz		3 x 500 V, 50 Hz 3 x 575 V, 60 Hz		3 x 380 V, 60 Hz	
		DOL	SD	DOL	SD	DOL	SD	DOL	SD	DOL	SD
P ₂ [kW]	P ₂ [hp]	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1
22	30	16	10	16	10	16	10	16	10	16	10
26	35	16	10	16	10	16	10	16	10	16	10
30	40	16	10	16	10	16	10	16	10	16	10
37	50	16	16	16	16	16	10	16	10	16	10
45	60	25	16	25	16	16	10	16	10	16	16
55	75	25	16	25	16	16	16	16	16	16	16
63	85	25	16	25	16	16	16	16	16	16	16
75	100	25	16			16	16	16	16	16	16
92	125					25	16	25	16	25	16
110	150					25	16	25	16	25	16

Outer dimensions

Cross-section [mm ²]	Type of cable	Outer dimensions, max. [mm]
10	Round	8.8
16	Round	10.7
25	Round	12.1

MMS 10000 (N)



Motor power		L [mm]	Weight [kg]	Shipping volume [m ³]
P ₂ [kW]	P ₂ [hp]			
75	100	1400	280	0.415
92	125	1500	330	0.415
110	150	1690	385	0.415
132	180	1870	435	0.494
147	200	2070	500	0.494
170	230	2220	540	0.564
190	260	2400	580	0.564

Cables

The 10" motors are connected by means of three single-core cables, approved for use with drinking water. All cables are round.

The cable outlet of star-delta motors are displaced by 90 °.

Being an integrated part of the motor, the motor cable cannot be fitted/removed once the motor is assembled.

Cable length: 8 m.

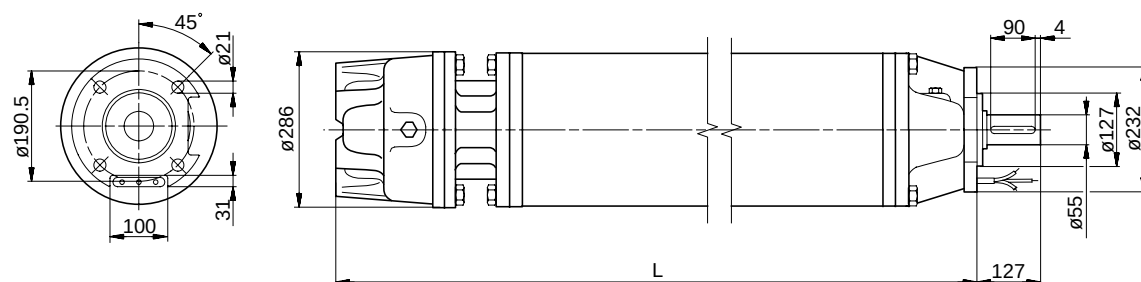
Note: Sizing of the motor cable requires that it is submerged in water. For longer cables and cable connection for extension, please see section for accessories.

Motor power		Cross-section [mm ²]									
		3 x 220 V, 60 Hz		3 x 220-230 V, 50 Hz		3 x 380-415 V, 50 Hz 3 x 460 V, 60 Hz		3 x 500 V, 50 Hz 3 x 575, 60 Hz		3 x 380 V, 60 Hz	
		DOL	SD	DOL	SD	DOL	SD	DOL	SD	DOL	SD
P ₂ [kW]	P ₂ [hp]	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1	3 x 1	6 x 1
75	100	50		50	35	50	35	50	35	50	35
92	125	50		50	35	50	35	50	35	50	35
110	150	50		50	35	50	35	50	35	50	35
132	180	50				50	35	50	35	50	35
147	200					50	35	50	35	50	35
170	230					50	35	50	35	50	35
190	260					50	35	50	35	50	35

Outer dimensions

Cross-section [mm ²]	Type of cable	Outer dimensions, max. [mm]
35	Round	14.2
50	Round	16.1

MMS 12000 (N)



TM01 7329 3505

Motor power		L [mm]	Weight [kg]	Shipping volume [m ³]
P ₂ [kW]	P ₂ [hp]			
147	200	1790	565	0.564
170	230	1880	605	0.564
190	260	1980	650	0.564
220	300	2110	700	0.564
250	340	2280	775	0.564

Cables

The 12" motors are connected by means of three single-core cables, approved for use with drinking water.

All cables are round.

The cable outlet of star-delta motors are displaced by 90 °.

Being an integrated part of the motor, the motor cable cannot be fitted/removed once the motor is assembled.

Cable length: 8 m.

Note: Sizing of the motor cable requires that it is submerged in water.

Motor power		Cross-section [mm ²]			
		3 x 380-415 V, 50 Hz		3 x 500 V, 50 Hz	
		DOL	SD	DOL	SD
P ₂ [kW]	P ₂ [hp]	3 x 1	6 x 1	3 x 1	6 x 1
147	200	70	50	70	50
170	230	70	50	70	50
190	260	70	50	70	50
220	300	70	50	70	50
250	340	70	50	70	50

Outer dimensions

Cross-section [mm ²]	Type of cable	Outer dimensions, max. [mm]
50	Round	16.1
70	Round	18.5

Electrical data

3 x 220 V, 50 Hz

Motor				Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start} I _{1/ 1}
Type	Size	Power [kW]	Power [hp]		η50 %	η75 %	η100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%	
MMS 6000 (N)	6"	3.70	5.0	17.4	69	71	70	0.70	0.80	0.84	3 x 220 V, 50 Hz
		5.50	7.5	24.8	76	76	74	0.70	0.80	0.85	
		7.50	10	32.5	79	79	77	0.68	0.79	0.83	
		9.20	12.5	39.5	78	79	76	0.71	0.81	0.85	
		11.0	15	46.0	79	79	77	0.73	0.82	0.85	
		13.0	17.5	53.0	82	82	79	0.72	0.82	0.85	
		15.0	20	60.5	83	83	81	0.73	0.82	0.85	
		18.5	25	69.5	85	85	83	0.81	0.87	0.89	
		22.0	30	82.5	85	85	83	0.80	0.87	0.88	
		26.0	35	100	85	85	84	0.72	0.82	0.86	
		30.0	40	114	86	86	84	0.74	0.83	0.87	
		37.0 ¹⁾	50	144	86	86	84	0.67	0.79	0.84	
MMS 8000 (-N, -R)	8"	22.0	30	84.5	81	84	84	0.76	0.83	0.86	
		26.0	35	99.5	81	83	83	0.80	0.85	0.86	
		30.0	40	114	83	85	85	0.76	0.83	0.86	
		37.0	50	138	84	86	86	0.78	0.84	0.86	
		45.0	60	166	85	88	88	0.69	0.79	0.85	
		55.0	75	212	85	87	88	0.64	0.76	0.82	
		63.0	85	218	87	89	88	0.84	0.89	0.90	
MMS 10000 (N)	10"	75.0	100	280	84	86	86	0.78	0.85	0.87	
		92.0	125	350	84	86	86	0.72	0.81	0.85	
		110	150	405	85	86	85	0.84	0.88	0.88	

1) Also available in R-version

3 x 230 V, 50 Hz

Motor				Rated current $I_{1/1}$ [A]	Motor efficiency [%]			Power factor			I_{start} $I_{1/1}$
Type	Size	Power [kW]	Power [hp]		η 50 %	η 75 %	η 100 %	Cos ϕ 50 %	Cos ϕ 75 %	Cos ϕ 100 %	
MMS 6000 (N)	6"	3.70	5.0	17.2	0.64	0.75	0.82	67	71	70	4.0
		5.50	7.5	24.2	0.63	0.75	0.81	75	76	74	3.7
		7.50	10	32.0	0.61	0.74	0.80	78	79	77	3.7
		9.20	12.5	38.5	0.64	0.76	0.82	77	78	77	3.6
		11.0	15	45.5	0.66	0.81	0.83	78	79	78	3.7
		13.0	17.5	52.5	0.65	0.77	0.82	81	82	80	3.8
		15.0	20	58.5	0.66	0.78	0.83	82	83	81	3.8
		18.5	25	67.0	0.76	0.85	0.88	85	85	83	5.3
		22.0	30	79.5	0.75	0.84	0.87	85	85	84	5.2
		26.0	35	100	0.63	0.76	0.83	84	85	84	4.7
		30.0	40	112	0.66	0.78	0.84	85	85	84	4.8
MMS 8000 (-N, -R)	8"	37.0 ¹⁾	50	146	0.59	0.73	0.80	85	86	84	4.8
		22.0	30	82.5	0.71	0.80	0.84	80	84	84	5.3
		26.0	35	95.5	0.76	0.83	0.86	81	84	84	5.1
		30.0	40	110	0.71	0.80	0.84	83	85	86	5.7
		37.0	50	134	0.73	0.82	0.85	83	86	86	5.7
		45.0	60	168	0.62	0.74	0.81	84	87	88	6
		55.0	75	214	0.57	0.70	0.77	84	87	88	5.9
MMS 10000 (N)	10"	63.0	85	210	0.81	0.87	0.90	87	89	89	5.7
		75.0	100	270	0.72	0.81	0.85	84	86	86	5.4
		92.0	125	345	0.65	0.77	0.82	83	85	86	5.6
		110	150	385	0.80	0.86	0.88	85	86	86	5.7

1) Also available in R-version

Electrical data

3 x 380 V, 50 Hz

Motor				Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start} I _{1/1}	
Type	Size	Power [kW]	Power [hp]		η50 %	η75 %	η100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%		
MMS 6000 (N)	6"	3.70	5.0	10.0	69	71	69	0.70	0.80	0.82	3 x 220 V, 50 Hz	
		5.50	7.5	14.4	76	76	74	0.70	0.80	0.83		3.5
		7.50	10	18.6	79	79	77	0.69	0.79	0.84		3.5
		9.20	12.5	22.8	78	79	76	0.72	0.81	0.85		3.3
		11.0	15	27.0	79	79	77	0.73	0.82	0.85		3.5
		13.0	17.5	30.5	82	82	79	0.72	0.82	0.85		3.6
		15.0	20	35.0	83	82	80	0.74	0.83	0.86		3.7
		18.5	25	40.5	85	85	84	0.73	0.83	0.87		5.1
		22.0	30	48.5	85	85	84	0.74	0.83	0.87		4.9
		26.0	35	57.0	86	85	83	0.76	0.85	0.88		4.5
		30.0	40	65.5	86	85	83	0.76	0.84	0.87		4.5
		37.0 ¹⁾	50	83.0	85	85	82	0.71	0.81	0.85		4.2
MMS 8000 (-N, -R)	8"	22.0	30	50.0	80	82	82	0.78	0.84	0.86	4.8	
		26.0	35	59.0	80	82	81	0.80	0.86	0.87	4.5	
		30.0	40	66.5	82	84	83	0.79	0.85	0.87	5.2	
		37.0	50	81.5	83	84	84	0.79	0.85	0.87	5.3	
		45.0	60	95.5	85	86	86	0.76	0.84	0.88	5.6	
		55.0	75	116	85	86	86	0.79	0.86	0.88	5.4	
		63.0	85	132	86	87	86	0.78	0.86	0.89	5.4	
		75.0	100	156	86	87	86	0.78	0.85	0.89	5.2	
		92.0	125	194	87	88	86	0.80	0.86	0.88	5.2	
		110	150	230	86	87	86	0.80	0.87	0.89	5.2	
MMS 10000 (N)	10"	75.0	100	160	85	87	87	0.77	0.84	0.86	5.3	
		92.0	125	198	85	87	87	0.75	0.83	0.85	5.2	
		110	150	323	85	87	87	0.77	0.84	0.86	5.4	
		132	180	275	86	88	88	0.79	0.85	0.87	5.3	
		147	200	315	85	87	88	0.73	0.82	0.85	5.8	
		170	230	365	85	87	87	0.73	0.82	0.85	5.7	
		190	260	420	85	87	87	0.69	0.79	0.84	5.8	
MMS 12000 (N)	12"	147	200	310	84	87	88	0.75	0.83	0.87	5.9	
		170	230	350	85	87	88	0.77	0.85	0.88	5.8	
		190	260	390	85	88	88	0.77	0.85	0.88	5.8	
		220	300	450	86	88	88	0.78	0.85	0.89	5.8	
		250	340	515	86	88	88	0.78	0.86	0.89	5.4	

1) Also available in R-version

Electrical data

3 x 400 V, 50 Hz

Motor				Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start}
Type	Size	Power [kW]	Power [hp]		η50 %	η75 %	η100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%	I _{1/ 1}
3 x 220 V, 50 Hz											
MMS 6000 (N)	6"	3.70	5.0	9.85	67	70	70	0.63	0.75	0.81	4.0
		5.50	7.5	14.0	75	76	74	0.62	0.75	0.81	3.7
		7.50	10	18.4	77	79	77	0.60	0.73	0.80	3.7
		9.20	12.5	22.4	77	78	77	0.64	0.76	0.81	3.6
		11.0	15	26.0	78	79	78	0.65	0.77	0.82	3.7
		13.0	17.5	30.0	81	81	80	0.64	0.76	0.82	3.8
		15.0	20	34.0	82	82	81	0.66	0.79	0.83	3.8
		18.5	25	40.5	83	85	84	0.64	0.77	0.83	5.3
		22.0	30	47.5	84	85	84	0.65	0.77	0.83	5.2
		26.0	35	56.0	85	85	84	0.68	0.79	0.85	4.7
		30.0	40	64.0	85	85	84	0.67	0.79	0.84	4.8
		37.0 ¹⁾	50	80.0	84	85	83	0.66	0.77	0.83	4.3
MMS 8000 (-N, -R)	8"	22.0	30	48.0	80	82	82	0.72	0.81	0.84	5.3
		26.0	35	56.5	80	82	82	0.76	0.83	0.85	5.1
		30.0	40	64.0	82	84	84	0.74	0.82	0.85	5.7
		37.0	50	78.5	82	84	84	0.74	0.82	0.85	5.7
		45.0	60	96.5	84	86	86	0.65	0.76	0.82	6.0
		55.0	75	114	84	86	86	0.72	0.81	0.85	5.9
		63.0	85	132	85	87	87	0.66	0.78	0.83	5.7
		75.0	100	152	86	87	87	0.71	0.82	0.86	5.8
		92.0	125	186	87	88	87	0.72	0.82	0.86	5.9
		110	150	224	86	87	87	0.73	0.83	0.87	5.8
MMS 10000 (N)	10"	75.0	100	156	84	86	87	0.70	0.80	0.84	5.4
		92.0	125	194	84	87	87	0.67	0.78	0.82	5.6
		110	150	228	85	87	88	0.70	0.79	0.84	5.7
		132	180	270	85	88	88	0.72	0.81	0.84	5.7
		147	200	315	84	87	87	0.64	0.75	0.81	6.2
		170	230	365	84	86	87	0.64	0.75	0.81	6.0
		190	260	425	83	86	87	0.60	0.72	0.79	5.9
MMS 12000 (N)	12"	147	200	305	84	87	88	0.66	0.77	0.83	6.2
		170	230	345	85	87	88	0.69	0.79	0.85	6.1
		190	260	390	85	87	88	0.68	0.80	0.84	6.2
		220	300	445	85	87	88	0.69	0.80	0.85	6.1
		250	340	505	85	87	88	0.69	0.80	0.85	5.9

1) Also available in R-version

3 x 415 V, 50 Hz

Motor				Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start} I _{1/ 1}
Type	Size	Power [kW]	Power [hp]		η50 %	η75 %	η100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%	
MMS 6000 (N)	6"	3.70	5.0	10.0	66	70	70	0.57	0.70	0.78	4.0
		5.50	7.5	14.0	73	75	74	0.57	0.70	0.77	3.9
		7.50	10	19.0	76	78	77	0.54	0.67	0.75	3.8
		9.20	12.5	22.6	75	78	77	0.57	0.70	0.77	3.7
		11.0	15	26.5	77	79	78	0.59	0.72	0.79	3.7
		13.0	17.5	30.5	79	81	80	0.57	0.71	0.78	3.9
		15.0	20	34.0	80	82	81	0.60	0.73	0.80	3.9
		18.5	25	41.0	82	84	84	0.57	0.71	0.79	5.4
		22.0	30	48.5	83	84	84	0.58	0.72	0.79	5.4
		26.0	35	56.0	84	85	84	0.60	0.74	0.81	4.9
		30.0	40	65.0	84	85	84	0.60	0.73	0.81	4.9
		37.0 ¹⁾	50	79.0	84	85	83	0.61	0.74	0.81	4.3
MMS 8000 (-N, -R)	8"	22.0	30	47.5	79	82	82	0.67	0.77	0.82	5.6
		26.0	35	55.0	79	82	82	0.72	0.80	0.84	5.5
		30.0	40	63.0	81	84	84	0.69	0.79	0.83	6.0
		37.0	50	77.0	82	84	84	0.69	0.79	0.83	5.9
		45.0	60	96.0	82	85	86	0.61	0.73	0.80	6.8
		55.0	75	112	83	86	86	0.66	0.77	0.83	6.3
		63.0	85	130	83	86	86	0.63	0.76	0.82	5.9
		75.0	100	152	85	87	87	0.66	0.78	0.84	5.8
		92.0	125	186	86	87	87	0.66	0.81	0.83	6.2
		110	150	222	85	87	87	0.67	0.78	0.84	6.0
MMS 10000 (N)	10"	75.0	100	156	83	86	87	0.65	0.76	0.81	5.6
		92.0	125	196	84	86	87	0.61	0.73	0.79	5.7
		110	150	228	84	87	88	0.64	0.75	0.81	6.0
		132	180	270	85	87	88	0.65	0.76	0.81	5.9
		147	200	320	83	86	87	0.57	0.70	0.77	6.3
		170	230	375	83	86	87	0.57	0.69	0.77	6.0
		190	260	440	82	85	86	0.53	0.66	0.74	5.9
MMS 12000 (N)	12"	147	200	315	83	86	87	0.58	0.71	0.79	6.3
		170	230	350	84	87	88	0.61	0.74	0.81	6.3
		190	260	395	84	87	88	0.60	0.73	0.80	6.2
		220	300	450	84	87	88	0.62	0.74	0.81	6.2
		250	340	510	84	87	88	0.62	0.74	0.81	6.1

1) Also available in R-version

Electrical data

3 x 500 V, 50 Hz

Motor			Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start} I _{1/1}
Type	Size	Power [kW]		η 50 %	η 75 %	η 100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%	
MMS 6000 (N)	6"	7.50	14.4	78	78	74	0.73	0.82	0.85	3.2
		9.20	17.4	77	78	76	0.69	0.80	0.84	3.4
		11.0	20.4	79	79	77	0.71	0.81	0.85	4.7
		13.0	23.4	82	82	80	0.69	0.80	0.84	3.7
		15.0	26.5	83	83	80	0.76	0.84	0.86	4.2
		18.5	31.5	84	85	84	0.70	0.81	0.85	5.2
		22.0	36.5	85	86	84	0.77	0.85	0.87	4.9
		26.0	44.5	85	85	84	0.68	0.79	0.85	4.8
		30.0	50.5	86	86	84	0.72	0.82	0.86	4.7
		37.0 ¹⁾	63.0	86	86	85	0.68	0.79	0.84	4.9
MMS 8000 (-N, -R)	8"	22.0	37.5	81	83	83	0.79	0.85	0.87	4.7
		26.0	44.0	81	84	83	0.80	0.85	0.86	4.8
		30.0	49.5	83	85	85	0.78	0.85	0.86	5.6
		37.0	60.5	84	85	85	0.82	0.87	0.87	5.6
		45.0	72.0	85	87	87	0.73	0.82	0.86	6.2
		55.0	88.5	86	88	88	0.71	0.81	0.86	6.1
		63.0	96.5	87	89	88	0.82	0.88	0.90	6.1
		75.0	114	88	89	88	0.85	0.89	0.90	5.6
		92.0	142	88	87	88	0.81	0.87	0.89	5.3
		110	182	86	88	88	0.67	0.78	0.84	5.3
MMS 10000 (N)	10"	75.0	122	85	87	87	0.77	0.84	0.86	5.3
		92.0	150	85	87	87	0.74	0.82	0.85	5.3
		110	178	85	87	88	0.76	0.84	0.86	5.4
		132	210	86	88	87	0.82	0.87	0.88	5.0
		147	236	85	88	88	0.74	0.83	0.86	5.8
		170	270	86	88	88	0.78	0.85	0.87	5.4
		190	305	86	88	87	0.80	0.86	0.87	5.3
MMS 12000 (N)	12"	147	218	86	89	90	0.80	0.88	0.91	6.9
		170	265	87	89	90	0.74	0.82	0.86	6.0
		190	275	88	90	91	0.85	0.91	0.93	7.8
		220	335	88	90	90	0.79	0.86	0.88	5.8
		250	375	87	90	91	0.75	0.85	0.89	6.3

1) Also available in R-version

Electrical data

3 x 220 V, 60 Hz and 3 x 380 V 60 Hz

Motor				Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start} I _{1/1}
Type	Size	Power [kW]	Power [hp]		η50 %	η75 %	η100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%	
3 x 220 V, 60 Hz											
MMS 6000 (N)	6"	3.7	5.0	19.6	66	72	74	0.68	0.76	0.80	4.3
		5.5	7.5	27.5	74	77	75	0.72	0.80	0.83	3.8
		7.5	10	37.0	77	79	77	0.73	0.81	0.84	3.5
		9.2	12.5	45.0	74	77	76	0.74	0.82	0.85	3.5
		11	15	51.5	79	81	79	0.77	0.84	0.86	3.5
		13	17.5	60.5	80	82	80	0.78	0.82	0.85	3.6
		15	20	69.0	79	82	81	0.82	0.86	0.86	3.5
		18.5	25	81.0	82	84	83	0.85	0.88	0.88	4.6
		22	30	96.0	82	84	84	0.84	0.88	0.88	4.9
		26	35	114	83	85	83	0.77	0.84	0.87	4.4
		30	40	130	84	85	84	0.77	0.84	0.87	4.4
		37.0 ¹⁾	50	166	83	85	84	0.68	0.88	0.84	4.8
MMS 8000 (-N, -R)	8"	22	30	102	75	79	80	0.80	0.85	0.86	4.4
		26	35	118	75	79	80	0.82	0.87	0.87	4.3
		30	40	134	77	81	82	0.77	0.84	0.87	5.2
		37	50	164	78	82	82	0.77	0.84	0.86	5.0
		45	60	192	80	84	85	0.75	0.83	0.86	5.7
		55	75	232	82	85	85	0.79	0.86	0.88	5.3
		63	85	265	83	85	85	0.84	0.89	0.90	4.8
		75	100	315	83	86	85	0.85	0.89	0.90	4.8
MMS 10000 (N)	10"	75	100	320	83	85	84	0.83	0.87	0.88	4.7
		92	125	395	82	85	85	0.77	0.84	0.87	4.9
		110	150	470	82	85	85	0.85	0.88	0.89	4.5
		132	180	570	82	85	84	0.86	0.89	0.89	4.2
3 x 380 V, 60 Hz											
MMS 6000 (N)	6"	3.7	5.0	11.4	66	72	74	0.69	0.77	0.80	4.2
		5.5	7.5	16.0	74	77	75	0.72	0.80	0.83	3.8
		7.5	10	21.4	77	79	77	0.73	0.81	0.84	3.5
		9.2	12.5	26.0	74	78	76	0.75	0.82	0.85	3.5
		11	15	29.5	79	81	79	0.77	0.84	0.86	3.6
		13	17.5	35.0	80	82	80	0.75	0.82	0.85	3.7
		15	20	40.5	79	82	80	0.78	0.84	0.86	3.5
		18.5	25	46.5	82	85	83	0.79	0.85	0.87	4.7
		22	30	55.5	83	85	84	0.78	0.85	0.87	4.9
		26	35	65.5	84	85	84	0.78	0.85	0.87	4.6
		30	40	75.5	84	85	84	0.76	0.84	0.87	4.7
		37.0 ¹⁾	50	94.5	84	85	83	0.76	0.84	0.87	4.5
MMS 8000 (-N, -R)	8"	22	30	59.0	75	79	80	0.80	0.85	0.86	4.4
		26	35	69.0	75	79	80	0.81	0.86	0.87	4.4
		30	40	77.0	77	81	82	0.78	0.84	0.87	5.1
		37	50	94.0	79	83	83	0.79	0.85	0.87	4.9
		45	60	110	81	85	85	0.80	0.86	0.88	5.5
		55	75	132	82	85	86	0.83	0.88	0.89	5.0
		63	85	152	83	85	85	0.81	0.87	0.89	5.3
		75	100	182	84	86	85	0.86	0.89	0.90	4.7
		92	125	220	85	87	86	0.85	0.89	0.90	4.8
		110	150	260	83	86	86	0.84	0.89	0.90	5.0
MMS 10000 (N)	10"	75	100	182	82	85	86	0.81	0.86	0.88	5.0
		92	125	224	82	86	87	0.77	0.84	0.87	5.1
		110	150	265	83	86	87	0.84	0.88	0.89	4.7
		132	180	315	84	86	87	0.84	0.88	0.89	4.8
		147	200	355	83	86	87	0.78	0.85	0.87	5.6
		170	230	415	83	86	87	0.75	0.83	0.86	5.4
190	260	475	82	86	87	0.69	0.79	0.85	5.7		

1) Also available in R-version

Electrical data

3 x 460 V, 60 Hz and 3 x 575 V, 60 Hz

Motor				Rated current I _{1/1} [A]	Motor efficiency [%]			Power factor			I _{start} I _{1/ 1}
Type	Size	Power [kW]	Power [hp]		η50 %	η75 %	η100 %	Cos φ 50 %	Cos φ 75 %	Cos φ 100%	
3 x 460 V, 60 Hz											3 x 220 V, 50 Hz
MMS 6000 (N)	6"	3.7	5.0	9.75	64	69	70	0.63	0.74	0.80	4.2
		5.5	7.5	13.8	73	76	74	0.63	0.74	0.80	4.0
		7.5	10	18.0	77	79	78	0.61	0.73	0.79	3.8
		9.2	12.5	22.0	74	77	77	0.65	0.76	0.81	3.7
		11	15	25.5	78	80	79	0.65	0.76	0.82	3.8
		13	17.5	29.5	80	82	80	0.65	0.76	0.82	4.0
		15	20	33.5	80	82	81	0.68	0.78	0.83	4.0
		18.5	25	39.0	83	85	85	0.65	0.77	0.83	5.5
		22	30	46.0	85	85	85	0.67	0.78	0.83	5.6
		26	35	54.5	84	86	84	0.69	0.80	0.85	5.0
		30	40	62.5	85	86	85	0.68	0.79	0.85	5.1
	37.0 ¹⁾	50	79.0	84	85	84	0.65	0.75	0.83	4.7	
MMS 8000 (-N, -R)	8"	22	30	48.5	75	79	81	0.73	0.81	0.84	5.3
		26	35	56.5	76	80	81	0.77	0.83	0.86	5.1
		30	40	64.0	78	82	83	0.74	0.82	0.85	5.8
		37	50	78.0	80	83	84	0.74	0.82	0.85	5.5
		45	60	92.5	82	85	86	0.71	0.80	0.85	6.4
		55	75	112	82	85	86	0.73	0.82	0.86	5.8
		63	85	126	83	86	86	0.72	0.82	0.86	6.0
		75	100	150	84	86	87	0.72	0.82	0.86	5.7
		92	125	184	85	87	87	0.74	0.83	0.87	6.0
		110	150	220	84	86	86	0.75	0.83	0.87	5.8
MMS 10000 (N)	10"	75	100	154	81	85	87	0.72	0.80	0.84	5.7
		92	125	190	82	86	87	0.69	0.78	0.83	5.5
		110	150	224	82	86	88	0.72	0.80	0.84	5.8
		132	180	265	83	86	88	0.73	0.82	0.85	5.7
		147	200	305	82	86	87	0.66	0.77	0.82	6.2
		170	230	355	82	86	87	0.66	0.76	0.82	5.9
		190	260	405	82	85	87	0.62	0.73	0.79	6.1
3 x 575 V, 60 Hz											
MMS 8000 (-N, -R)	8"	22	30	37.5	78	82	83	0.79	0.85	0.87	4.9
		26	35	44.0	78	82	83	0.81	0.85	0.87	5.0
		30	40	49.0	81	84	85	0.79	0.85	0.87	5.8
		37	50	60.5	81	85	85	0.82	0.86	0.88	5.8
		45	60	71.0	84	87	88	0.73	0.82	0.86	6.5
		55	75	86.5	84	87	89	0.72	0.81	0.86	6.5
		63	85	95.5	86	88	89	0.81	0.88	0.90	6.4
		75	100	114	86	89	89	0.84	0.89	0.91	5.8
		92	125	140	87	89	88	0.82	0.87	0.89	5.6
		110	150	176	85	88	89	0.68	0.79	0.84	5.7
MMS 10000 (N)	10"	75	100	120	82	85	87	0.78	0.84	0.87	6.1
		92	125	148	83	86	87	0.76	0.83	0.86	7.0
		110	150	176	83	86	87	0.78	0.84	0.87	7.2
		132	180	208	84	87	87	0.83	0.87	0.88	7.4
		147	200	234	83	86	88	0.76	0.83	0.86	8.0
		170	230	270	84	87	88	0.79	0.85	0.87	8.1
		190	260	300	84	87	88	0.81	0.86	0.87	8.3

1) Also available in R-version

Wiring diagram

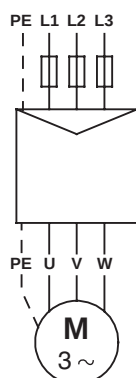
MMS motors are available for both direct-on-line and star-delta starting.

Motors wound for star-delta starting can also be connected for direct-on-line.

The starting wiring diagrams are shown below.

MMS motor, direct-on-line starting

The connection of MMS wound for direct-on-line starting:

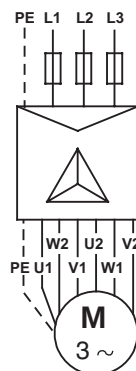


TM03 2099 3705

Fig. 13 Motors wound for direct-on-line starting

MMS motor, star-delta starting

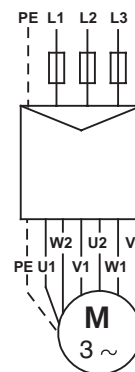
The connection of MMS wound for star-delta starting:



TM03 2100 3705

Fig. 14 Motors wound for star-delta starting

If star-delta starting is not required, but direct-on-line starting is, the MMS motor should be connected as shown in fig. 15.



TM03 2101 3705

Fig. 15 Motors wound for direct-on-line starting

MP 204

The MP 204 is an electronic motor protector, designed for the protection of an asynchronous motor or a pump.

The motor protector consists of:

- a cabinet incorporating transformers and electronics
- a control panel with operating buttons and display for reading of data.

The MP 204 operates with two sets of limits:

- a set of warning limits and
- a set of trip limits.

If one or more of the warning limits are exceeded, the motor continues to run, but the warnings will appear in the MP 204 display.

Some values only have a warning limit.

The warning can also be read out by means of the Grundfos R100 remote control.

If one of the trip limits is exceeded, the trip relay will stop the motor. At the same time, the signal relay is operating to indicate that the limit has been exceeded.

Applications

The MP 204 can be used as a stand-alone motor protector.

The MP 204 can be monitored via a Grundfos GENIbus.

The power supply to the MP 204 is in parallel with the supply to the motor. Motor currents up to 120 A are passed directly through the MP 204. The MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement. The MP 204 disconnects the contactor if, for example, the current exceeds the preset value.

Secondarily, the pump is protected via temperature measuring by a Tempcon sensor, a Pt100/Pt1000 sensor and a PTC sensor/thermal switch.

The MP 204 is designed for single- and three-phase motors. In single-phase motors, the starting and run capacitors are also measured. Cos ϕ is measured in both single- and three-phase systems.

Benefits

The MP 204 offers these benefits:

- suitable for both single- and three-phase motors
- dry-running protection
- overload protection
- very high accuracy
- made for submersible pumps.

The MP 204 - many monitoring options

The MP 204 monitors the following parameters:

- Insulation resistance before start-up
- Temperature (Tempcon, Pt sensor and PTC/thermal switch)
- Overload/underload
- Overvoltage/undervoltage
- Phase sequence
- Phase failure
- Power factor
- Power consumption
- Harmonic distortion
- Operating hours and number of starts.



TM03 1471 2205

Fig. 16 MP 204

Five sizes of single-turn transformers, 120-999 A.

Note: Monitoring of motor temperature is not possible when single-turn transformers are used.



TM03 2033 3505

Fig. 17 Single-turn transformers

Product numbers

Product	Product number
MP 204	96079927
R100	625333
Single-turn transformers	
- Current transformerratio= 200:5, I _{max} = 120 A	96095274
- Current transformerratio= 300:5, I _{max} = 300 A	96095275
- Current transformerratio= 500:5, I _{max} = 500 A	96095276
- Current transformerratio= 750:5, I _{max} = 750 A	96095277
- Current transformerratio= 1000:5, I _{max} = 1000 A	96095278

Functions

- Phase-sequence monitoring
- Indication of current or temperature (user selection)
- Indication of temperature in °C or °F (user selection)
- 4-digit, 7-segment display
- Setting and status reading with the R100
- Setting and status reading via GENIbus.

Tripping conditions

- Overload
- Underload (dry running)
- Temperature (Tempcon, Pt sensor and PTC/thermal switch)
- Phase failure
- Phase sequence
- Overvoltage
- Undervoltage
- Power factor ($\cos \phi$)
- Current unbalance.

Warnings

- Overload
 - Underload
 - Temperature (Tempcon and Pt sensor)
 - Overvoltage
 - Undervoltage
 - Power factor ($\cos \phi$)
- Note:** In connection with single- and three-phase connection.
- Run capacitor (single-phase operation)
 - Starting capacitor (single-phase operation)
 - Loss of communication in network
 - Harmonic distortion.

Learning function

- Phase sequence (three-phase operation)
- Run capacitor (single-phase operation)
- Starting capacitor (single-phase operation)
- Identification and measurement of Pt100/Pt1000 sensor circuit.

External current transformers

When fitted with external current transformers, the MP 204 can handle currents from 120 to 999 A. Grundfos can supply approved current transformers from stock (200/5A, 300/5A, 500/5A, 750/5A, 1000/5A).

R100 remote control

The R100 remote control from Grundfos allows for wireless infrared remote control of your MP 204 Motor protector.

With the R100, you get access to a full range of options such as factory setting adjustment, service and fault finding.

Ready for bus communication

The MP 204 allows for monitoring and communication via GENIbus – a Grundfos-designed bus for exchange of pump data, alarms, status information, and setpoints. This enables users to connect the MP 204 to, for instance, SCADA systems.

Technical data - MP 204

Enclosure class	IP 20
Ambient temperature	-20 °C to +60 °C
Relative air humidity	99 %
Voltage range	100-480 VAC
Current range	3-999 A
Frequency	50 to 60 Hz
IEC trip class	1-45
Special Grundfos trip class	0.1 to 30 s
Voltage variation	- 25 %/+ 15 % of nominal voltage
Approvals	EN 60947, EN 60335, UL/CSA 508
Marking	CE, cUL, C-tick
Consumption	Max. 5 W
Plastic type	Black PC / ABS

	Measuring range	Accuracy	Resolution
Current without external current transformers	3-120 A	± 1 %	0.1 A
Current with external current transformers	120-999 A	± 1 %	1 A
Phase-to-phase voltage	80-610 VAC	± 1 %	1 V
Frequency	47-63 Hz	± 1 %	0.5 Hz
Power	0-1 MW	± 2 %	1 W
Power factor	0-0.99	± 2 %	0.01
Energy consumption	0-4x10 ⁹ kWh	± 5 %	1 kWh

IO 112	Description	Product number
	The IO 112 is a measuring module and a 1-channel protection unit for use in connection with the MP 204 motor protection unit. The module can be used for protection of pump against other factors than the electrical conditions, for instance dry-running. It can also be used as a stand-alone protection module. The IO 112 interface has three inputs for measured values one potentiometer for setting of limits indicator lights indicating the • measured value of the input • value of the limit set • alarm source • pump status. Electrical data: • Supply voltage: 24 VAC ±10 % 50/60 Hz or 24 VDC ±10 % • Supply current: Min. 2.4 A; max. 8 A • Power consumption: Max. 5 W - Ambient temperature: -25 °C to +65 °C • Enclosure class: IP 20	96651601

Control functions

This table describes the protection provided by the MP 204.

Control parameter	Function	Problem	Advantage
Temperature	MS The motor temperature is measured by means of the built-in Tempcon temperature transmitter and a signal is sent to the MP 204 via the phase leads. In the MP 204, the measured temperature is compared with the factory-set value (75 °C).	Overload, frequent starts/stops, operation against blocked discharge pipe, insufficient flow velocity past the motor.	Longer motor life, safe operating conditions, service indication.
	MMS The motor temperature is measured by means of the Pt100. The signal is sent to the MP 204 where the measured temperature is compared with the factory-set value. Temperature protection requires a submersible motor with a Pt100. The motor temperature must be monitored during frequency converter operation.		
Overvoltage/undervoltage	If the set trip value is exceeded, the motor will stop.	The installation is close to a transformer. The mains do not absorb load variations.	Important installation parameter, possibility of improving operating conditions.
Overload	The motor power input is measured on each of the three phases. The registered power input is an average of these three values. If the factory-set value is exceeded, the motor will stop.	Incorrect sizing of pump/motor, voltage supply failure, defective cable, blocking, wear or corrosion.	Longer pump life, safe operating conditions, service indication.
Underload (dry running)	The motor power input is measured on each of the three phases. The registered power input is an average of these three values. If the average value is lower than the factory-set value, the motor will stop.	Pump exposed to dry running or underload, for example caused by wear.	Conventional dry-running protection is no longer necessary, no extra cables.
Current unbalance	The power input of the motor is measured on each of the three phases.	Mains load is uneven, incipient motor defect, phase voltages diverging.	Motor protection against overload, service indication.
Phase sequence	The MP 204 and motor are installed so that the phase sequence corresponds to correct direction of rotation. The MP 204 monitors changes in the phase sequence.	Two phases are wrongly connected.	Ensures correct pump performance.
Phase failure	The MP 204 checks the phases connected. Phase failure will cause an alarm.	Phase failure.	Indication of phase failure, and alarm.

R100 menus

0. GENERAL

See the operating instructions for the R100.

1. OPERATION

- Operating mode
- Actual trip
- Actual warning 1
- Actual warning 2
- Alarm log 1
- Alarm log 2
- Alarm log 3
- Alarm log 4
- Alarm log 5.

2. STATUS

Display of

- Supply overview
- Average current
- Average voltage
- Tempcon sensor
- Pt100/Pt1000 sensor
- Power input and energy consumption (described in the following)
- Energy trip counter
- Phase sequence
- Current unbalance
- Operating hours and number of starts
- Trip counter of hours and starts
- Starting capacitor
- Run capacitor
- Insulation resistance
- Cos ϕ
- Harmonic distortion.

3. LIMITS

Display and setting of warning and trip limits.

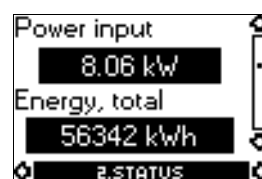
- Tempcon sensor
- Pt sensor
- Tripping current
- Current warning
- Nominal voltage
- Voltage limits
- Current unbalance
- Starting capacitor
- Run capacitor
- Insulation resistance
- Cos ϕ trip
- Cos ϕ warning.

4. INSTALLATION

Setting and display of

- Supply mains
- **Trip class** (described in the following)
- Trip delay
- External current transformers
- Power-on delay
- **Restarting** (described in the following)
- **Automatic restarting** (described in the following)
- Tempcon sensor
- Pt sensor
- Insulation resistance measurement
- PTC/hermal switch
- Resetting of trip counters
- Service interval
- Number of automatic restarts
- Units/display
- MP 204 display
- GENIbus ID number
- Learning function.

Power input and energy consumption



Actual power input and motor energy consumption.

The energy consumption is an accumulated value which cannot be reset.

The power is calculated like this:

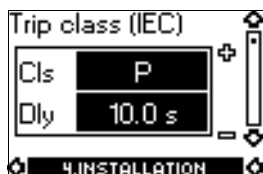
$$U_{\text{average}} = \frac{U_{L1-L2} + U_{L2-L3} + U_{L3-L1}}{3} [V]$$

$$I_{\text{average}} = \frac{I_{L1} + I_{L2} + I_{L3}}{3} [A]$$

$$\cos\phi_{\text{average}} = \frac{\cos\phi_{L1} + \cos\phi_{L2} + \cos\phi_{L3}}{3} [-]$$

$$P = U_{\text{average}} \cdot I_{\text{average}} \cdot \sqrt{3} \cdot \cos\phi_{\text{average}} [W]$$

Trip class



Line 1: Select IEC trip class (1 to 45).

If manual indication of trip delay in the case of overload is required, select trip class "P".

Factory setting:

- Cls (trip class): P.

Line 2: Select trip delay.

Factory setting:

- Dly (trip delay): 10 s.

Restarting



Set whether restarting after tripping is to be

- **Automatic** (factory setting)
- *Manual*.

Setting of time, see section "Automatic restarting".

Automatic restarting



Set the time after which the MP 204 is to attempt automatic restarting of motor after cut-out.

The time runs from the moment when the value which triggered the fault has returned to normal.

Factory setting:

- 300 s.

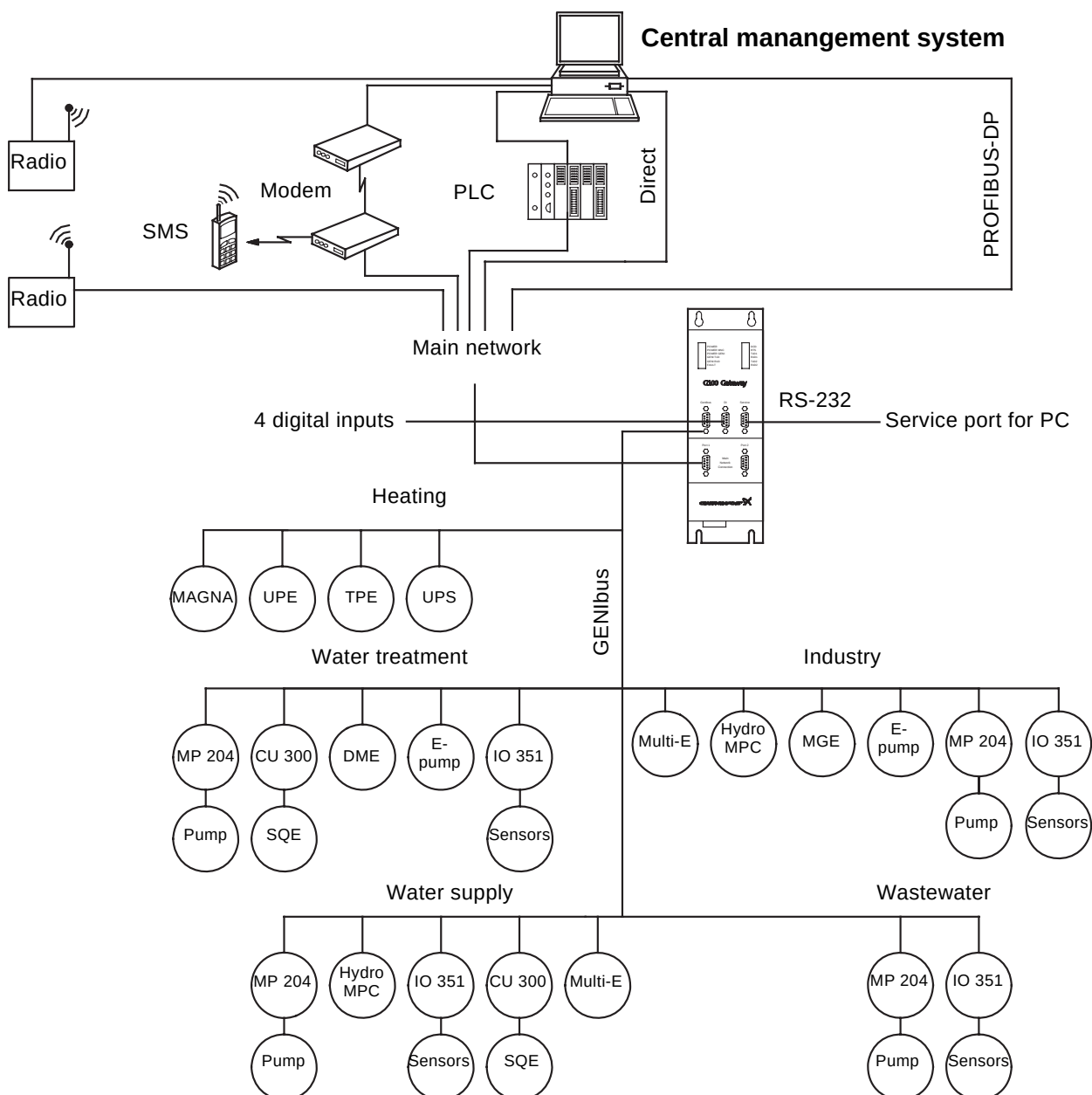
G100 - Gateway for communication with Grundfos products

The G100 offers a wide selection of options for integration of Grundfos products provided with GENIbus interface into main control and monitoring systems.

The G100 enables a pump installation to meet future demands for optimum pump operation in terms of reliability, operating costs, centralisation and automation.



GR5940



TM03 3743 0906

Product description

The G100 Gateway enables communication of operating data, such as measured values, setpoints, etc., between Grundfos products with GENIbus interface and a main network for control and monitoring.

As indicated in the illustration on page 28, the G100 is suitable for use in applications such as water supply, water treatment, wastewater, building automation and industry.

Common to the above applications is that downtime is usually costly, and extra investments are therefore often made to achieve maximum reliability by monitoring selected operating variables.

The day-to-day operation, such as starting and stopping of pumps, changing of setpoints, etc., can also be effected from the main system by communication with the G100. In addition, the G100 can be set up to send event-controlled status indications such as alarms via the SMS to mobile phones, and to make automatic alarm call-backs to a central management system.

Data logging

Besides the possibility of data communication, the G100 also offers logging of up to 350,000 time-stamped data. Subsequently, the logged data can be transmitted to the main system or a PC for further analysis in a spreadsheet or similar program.

For the data logging, the "PC Tool G100 Data Log" software tool is used. The tool is part of the PC Tool G100 package, which is included on delivery of the G100.

Other features

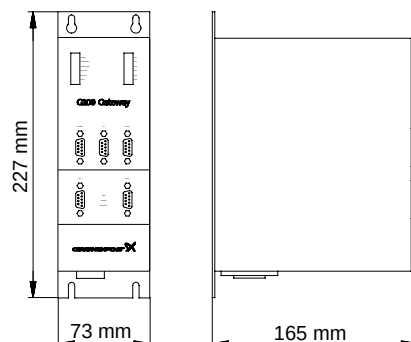
- Four digital inputs.
- Stop of all pumps in case of failing communication with the management system (optional).
- Access code for modem communication (optional).
- Alarm log.

Installation

Installation of the G100 is effected by the system integrator. The G100 is connected to the GENIbus as well as to the main network. Subsequently, all units on the GENIbus can be controlled from a central management system on the main network.

The "G100 Support Files" CD-ROM supplied with the G100 contains examples of programs to be used when the G100 is connected to the various main network systems. Included is also a description of the data points available in Grundfos products with GENIbus interface.

The "PC Tool G100" software tool can be used for the G100 installation and use.



TM01 0621 0398

Technical data

Overview of protocols

Main system	Software protocol
PROFIBUS-DP	DP
Radio	Satt Control COMLI/Modbus
Modem	Satt Control COMLI/Modbus
PLC	Satt Control COMLI/Modbus
GSM mobile phone	SMS, UCP

Other possible connections

GENIbus RS-485:	Connection of up to 32 units
Service port RS-232:	For direct connection to a PC or via radio modem
Digital inputs:	4
Voltage supply:	1 x 110-240 V, 50/60 Hz
Ambient temperature:	In operation: -20 °C to +60 °C
Enclosure class:	IP 20
Weight:	1.8 kg.

Accessories

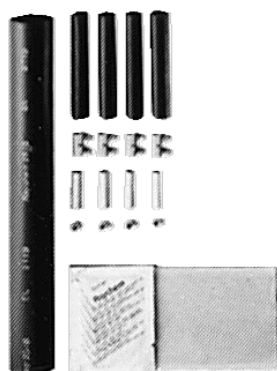
- PC Tool G100 package (supplied with the product)
- "G100 Support Files" CD-ROM (supplied with the product)

Product numbers

Product	Product number
G100 with PROFIBUS-DP expansion board*	96411135
G100 with Radio/Modem/PLC-expansion board*	96411136
G100 Basic Version ★	96411137
PC Tool G100 package	96415783

★ CD-ROM with G100 Support Files included.

Cable termination kit, type KM



TM00 7885 2296

Description

For watertight shrink-joining of motor cable and submersible drop cable.

Enables the joining of

- cables of equal size
- cables of different size
- a cable lead and a single lead

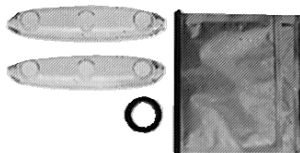
The joint is ready for use after a few minutes and requires no long hardening time as opposed to resin joints.

The joint cannot be separated.

Description	Version		Number of leads	Product number
	Motor cable	[mm ²]		
	Flat cable	6 - 10	4	116252
		10 - 16	3	
	Flat cable	16 - 25	3	116255
			4	
	3 single leads	1.5 - 6.0	3	116253
	3 single leads	10 - 25	3	116254
	4 single leads	1.5 - 6.0	4	116257
	4 single leads	6 - 25	4	116258
	Single lead *	35 - 120	1	116256

* Used for the repair or joining of single leads.
When ordering kits, please state the number required.

Cable termination kit, types M0 to M6



TM00 7884 2296

Description

For watertight shrink-joining of motor cable and submersible drop cable.

Type	Version		Product number
	Diameter of cable joint [mm ²]	Fit cables with outer diameter of	
M0	Ø40	Ø6 to Ø15	ID8903
M1	Ø46	Ø9 to Ø23	ID8904
M2	Ø52	Ø17 to Ø31	ID8905
M3	Ø77	Ø26 to Ø44	ID8906
M4	Ø97	Ø29 to Ø55	91070700
M5	Ø110	Ø40 to Ø62	96496918
M6	Ø144	Ø50 to Ø80	96496919
	Diameter of the lead [mm ²]	Number of connectors	Product number
	6 - 50	4	96626021
	19 - 95		96626022
	35 - 185		96626023
	70 - 240		96626028

Accessories for cable kit, types M0 to M6
Screw connectors only

Submersible drop cable



TM00 7882 2296

Suitable for

- continuous application in groundwater and potable water (approved for potable applications)
- connection of electrical equipment such as submersible motors
- installation depths up to 500 metres and average loads.

Insulation and sheath are made of special EPR-based elastomer materials adapted to applications in water.
Maximum permissible water temperature: 60 °C.
Maximum permissible lead service temperature: 90 °C.
Further cable sizes are available on request.

Description

Number of leads and nominal cross section [mm ²]	Outer diameter Min./Max. [mm ²]	Weight [kg/m]	Product number
1 x 16	11.0 / 14.5	0.290	ID4071
1 x 25	12.5 / 16.5	0.410	ID4072
1 x 35	14.0 / 18.5	0.560	ID4073
1 x 50	16.5 / 21.0	0.740	ID4074
1 x 70	18.5 / 23.5	1.000	ID4075
1 x 95	21.0 / 26.5	1.300	ID4076
1 x 120	23.5 / 28.5	1.650	ID4077
1 x 150	26.0 / 31.5	2.000	ID4078
1 x 185	27.5 / 34.5	2.500	ID4079
3 x 1.5	9.5 / 12.5	0.150	ID4056
3 x 2.5	11.5 / 14.5	0.220	ID4057
3 x 4.0	13.0 / 16.0	0.340	ID4058
3 x 6.0	14.5 / 20.0	0.480	ID4059
3 x 10	20.0 / 25.5	0.750	ID4060
3 x 16	22.5 / 29.5	1.100	ID4061
3 x 25	26.5 / 34.0	1.450	ID4062
4G1.5	10.5 / 13.5	0.190	ID4063
4G2.5	12.5 / 15.5	0.280	ID4064
4G4.0	14.5 / 18.0	0.390	ID4065
4G6.0	16.5 / 22.0	0.520	ID4066
4G10	22.5 / 24.5	0.950	ID4067
4G16	26.5 / 28.5	1.400	ID4068
4G25	32.0 / 34.0	1.950	ID4069
4G35	33.0 / 42.5	2.700	ID8917
4G50	38.0 / 48.5	3.600	91070691
4G70	43.0 / 54.5	4.900	91070692

Pt100

The Pt100 sensor offers these features:

- Continuous monitoring of the motor temperature
- Protection against too high motor temperature.

Protecting the motor against too high motor temperature is the simplest and cheapest way of avoiding reduced lifetime of the motor. The Pt100 ensures that operating conditions are not exceeded and indicates when it is time for service of the motor.

Monitoring and protection by means of a Pt100 require the following parts:

- Pt100 sensor
- PR 5714 relay
- Cable.

The PR 5714 relay is fitted with a Pt100 module. For both relays the following temperature limits are preset on delivery:

- 60 °C warning limit
- 75 °C stop limit.

Technical data

PR 5714 relay	
Enclosure class	IP 65 (mounted in a control panel)
Ambient temperature	-20 °C to +60 °C
Relative air humidity	95 % (condensating)
Voltage variation	• 1 x 24-230 VAC ± 10 %, 50-60 Hz. • 24-250 VDC ± 20 %.
Approvals	UL, DNV
Mark	CE

Pt100 sensor with/without PR 5714 relay and cable	Cable length [m]	PR 5714	Product number	
			MMS 6000, MMS 8000	MMS 10000, MMS 12000
	20	Yes	96494596	96437287
	40	Yes	96494597	96437288
	60	Yes	96494598	96437289
	80	Yes	96494599	96437290
	100	Yes	96494610	96437291
	20	No	96658629	96658633
	40	No	96658630	96658634
	60	No	96658631	96658635
	80	No	96658632	96658636
	100	No	96658639	96658640

GrA3187

PR 5714 relay	Voltage	Product number
	24-230 VAC, 50/60 Hz / 24-250 VDC	96621274

GrA3186

Pt100 sensor including cable	Cable length [m]	Product number	
		MMS 6000 MMS 8000	MMS 10000 MMS 12000
	20	96408957	96437784
	40	96408684	96437785
	60	96408958	96437786
	80	96408959	96437787
	100	96408960	96437788

GrA3190

Drop cables

Grundfos offers submersible drop cables for all types of applications, i.e. 3-core cables, 4-core cables, single leads.

The choice of submersible drop cable depends on the application and type of installation.

Standard version: Maximum liquid temperature +60 °C.

Tables indicating cable dimensions in borehole

The tables indicate the maximum length of drop cables in metres from motor starter to pump at direct-on-line starting, and at different cable dimensions.

The lengths of the cables are calculated by means of the maximum current for cables according to IEC 364 and HD 384.

If, for example, the operating current is 10% lower than the rated current, the cable may be 10% longer than indicated in the table.

The calculation of the cable length is based on a maximum voltage drop of 3% of the rated voltage and a water temperature of maximum 30 °C.

To minimise operating losses, the cable cross-section may be increased compared to what is indicated in the table. This is economical only if:

- the borehole provides the necessary space
- the operating time of the pump is long or
- the operating voltage is below the rated voltage.

The table values are calculated on the basis of the following formula:

Maximum cable length of a three-phase submersible pump:

$$L = \frac{U \times \Delta U}{I \times 1.73 \times 100 \times \left(\cos \varphi \times \frac{\rho}{q} + \sin \varphi \times X_L \right)} \text{ [m]}$$

where

U = Rated voltage [V]

ΔU = Voltage drop [%]

I = Rated current of the motor [A]

q = Cross-section of submersible dropcable [mm²]

X_L = Inductive resistance: 0.078 x 10⁻³ [Ω/m]

cos φ = Power factor

sin φ = $\sqrt{1 - \cos^2 \varphi}$

ρ = Specific resistance: 0.02 [Ωmm²/m]

Example

Motor size:	30 kW, MMS 8000
Rated current:	64.0 A
Rated voltage:	3 x 400 V, 50 Hz
Starting method:	Direct-on-line
Power factor:	cos φ = 0.85
Voltage drop:	3%
Cross-section:	25 mm ²
sin φ:	0.54

$$L = \frac{400 \times 3}{64.0 \times 1.73 \times 100 \times \left(0.85 \times \frac{0.02}{25} + 0.54 \times 0.078 \times 10^{-3} \right)}$$

L = 150 m.

Cable dimensions for MMS motors at 3 x 400 V,
50 Hz, direct-on-line starting
Voltage drop: 1%

Motor	[kW]	I_{L1} [A]	Cos ϕ 100 %	Maximum cable length in metres from motor starter to pump															
				Cross-section [mm ²]															
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300
MMS 6000	3.7	9.85	0.81	22	36	57	85	141	222	338	461	634							
	5.5	14.0	0.81	15	25	40	60	99	156	238	324	446	595	763	913				
	7.5	18.4	0.80	12	19	31	46	76	120	183	249	342	456	583	697	818	942		
	9.2	22.4	0.81		16	25	38	62	97	149	203	279	372	477	570	671	773	910	
	11	26.0	0.82			21	32	53	83	127	173	238	318	409	490	577	666	786	894
	13	30.0	0.82			19	28	46	72	110	150	207	276	354	425	500	578	681	775
	15	34.0	0.83				24	40	63	96	131	181	242	311	374	441	510	603	687
	18.5	40.5	0.83				20	33	53	81	110	152	203	261	314	370	428	506	577
	22	47.5	0.83					29	45	69	94	129	173	223	267	315	365	432	492
	26	56.0	0.85					24	37	57	78	108	145	187	226	267	310	368	422
	30	64.0	0.84						33	51	69	95	128	165	198	234	271	321	367
MMS 8000	37	85.5	0.79							40	54	74	99	126	150	176	203	238	269
	22	48.0	0.84					28	44	67	92	127	170	220	264	312	361	428	489
	26	56.5	0.85					23	37	57	78	107	144	186	224	265	307	365	418
	30	64.0	0.85						33	50	68	95	127	164	197	234	271	322	369
	37	78.5	0.85						27	41	56	77	104	134	161	191	221	263	301
	45	96.5	0.82							34	47	64	86	110	132	155	180	212	241
	55	114	0.85								38	53	71	92	111	131	152	181	207
	63	132	0.83									47	62	80	96	113	131	155	177
	75	152	0.86									40	53	69	83	98	114	136	156
	92	186	0.86										43	56	68	80	94	111	128
	110	224	0.87											47	56	67	78	93	107
MMS 8000	75	156	0.84										52	68	81	96	111	132	151
	92	194	0.82										43	55	66	77	89	105	120
	110	228	0.84											46	56	66	76	90	103
	132	270	0.84												47	55	64	76	87
	147	315	0.81													48	55	65	74
	170	365	0.81															56	63
	190	425	0.79															48	54
MMS 12000	147	305	0.83													49	57	67	77
	170	345	0.85														50	60	68
	190	390	0.84															53	60
	220	445	0.85																53
	250	505	0.85																
Max. current for cable [A]*				18.5	25	34	43	60	80	101	126	153	196	238	276	319	364	430	497

* At particularly favourable heat dissipation conditions eg. submerged in water, note that the value is smaller if the cable is placed in air.

Cable dimensions for MMS motors at 3 x 400 V,
50 Hz, direct-on-line starting
Voltage drop: 3%

Motor	[kW]	$I_{1/1}$ [A]	Cos φ 100%	Maximum cable length in metres from motor starter to pump															
				Cross-section [mm ²]															
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300
MMS 6000	3.7	9.85	0.81	65	108	172	256	422	665										
	5.5	14.0	0.81	46	76	121	180	297	468	713	973								
	7.5	18.4	0.80	35	58	93	139	229	360	548	747								
	9.2	22.4	0.81		47	76	113	186	292	446	608	837							
	11	26.0	0.82			64	96	158	249	380	519	715	955						
	13	30.0	0.82			56	83	137	216	330	450	620	828						
	15	34.0	0.83				73	120	189	288	394	543	726	934					
	18.5	40.5	0.83				61	100	158	242	330	456	610	784	941				
	22	47.5	0.83					86	135	206	282	388	520	668	802	946			
	26	56.0	0.85					71	112	172	235	325	436	562	677	801	930		
	30	64.0	0.84						99	152	207	286	383	494	594	701	813	964	
MMS 8000	37	85.5	0.79							119	162	223	296	378	451	529	608	713	806
	22	48.0	0.84					84	132	202	276	382	511	659	792	935			
	26	56.5	0.85					70	111	170	233	322	432	557	671	794	922		
	30	64.0	0.85						98	150	205	284	381	492	592	701	814	967	
	37	78.5	0.85						80	122	168	232	311	401	483	572	664	789	903
	45	96.5	0.82							102	140	193	257	330	396	466	539	635	723
	55	114	0.85								115	159	214	276	333	394	457	543	622
	63	132	0.83									140	187	240	289	340	394	466	531
	75	152	0.86									119	160	206	249	295	343	409	469
	92	186	0.86										130	169	203	241	281	334	383
MMS 10000	110	224	0.87											140	169	200	233	279	321
	75	156	0.84										157	203	244	288	334	395	452
	92	194	0.82										128	164	197	232	268	316	360
	110	228	0.84											139	167	197	228	271	309
	132	270	0.84												141	166	193	228	261
	147	315	0.81													143	165	194	221
	170	365	0.81															168	190
MMS 12000	190	425	0.79															143	162
	147	305	0.83													147	170	202	230
	170	345	0.85														151	179	205
	190	390	0.84															158	181
	220	445	0.85																159
Max. current for cable [A]*				18.5	25	34	43	60	80	101	126	153	196	238	276	319	364	430	497

* At particularly favourable heat dissipation conditions eg. submerged in water, note that the value is smaller if the cable is placed in air.

Cable dimensions for MMS motors at 3 x 400 V,
50 Hz, star-delta-starting
Voltage drop 1%

Motor	[kW]	I _{1/1} [A]	Cos φ 100%	Maximum cable length in metres from motor starter to pump																
				Cross-section [mm ²]																
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	
MMS 6000	3.7	9.85	0.81	37	62	99	148	244	384	585	798									
	5.5	14	0.81	26	44	70	104	172	270	412	562	773								
	7.5	18.4	0.80	20	34	54	80	132	208	317	431	593	789							
	9.2	22.4	0.81		27	44	65	107	169	257	351	483	644	826	988					
	11	26	0.82			37	55	91	144	220	300	413	552	708	849	999				
	13	30	0.82			32	48	79	125	190	260	358	478	614	735	866				
	15	34	0.83				42	69	109	166	227	313	419	539	647	763	883			
	18.5	40.5	0.83				35	58	91	140	191	263	352	453	543	641	741	877	999	
	22	47.5	0.83					49	78	119	163	224	300	386	463	546	632	747	852	
	26	56	0.85					41	65	99	136	187	252	325	391	463	537	638	731	
	30	64	0.84						57	87	120	165	221	285	343	405	469	556	636	
MMS 8000	37	85.5	0.79							69	94	129	171	218	261	305	351	412	466	
	22	48	0.84					48	76	117	160	220	295	380	457	540	626	742	848	
	26	56.5	0.85					41	64	98	134	186	249	322	387	458	532	633	724	
	30	64	0.85						57	87	119	164	220	284	342	405	470	558	639	
	37	78.5	0.85						46	71	97	134	179	232	279	330	383	455	521	
	45	96.5	0.82							59	81	111	149	191	229	269	311	367	417	
	55	114	0.85								67	92	124	159	192	227	264	314	359	
	63	132	0.83									81	108	139	167	197	227	269	307	
	75	152	0.86									69	92	119	144	170	198	236	271	
	92	186	0.86										75	97	117	139	162	193	221	
	110	224	0.87											81	97	116	135	161	185	
MMS 10000	75	156	0.84										91	117	141	166	193	228	261	
	92	194	0.82										74	95	114	134	155	183	208	
	110	228	0.84											80	96	114	132	156	178	
	132	270	0.84												81	96	111	132	151	
	147	315	0.81													83	95	112	127	
	170	365	0.81															97	110	
	190	425	0.79															83	94	
MMS 12000	147	305	0.83													85	98	116	133	
	170	345	0.85														87	104	119	
	190	390	0.84															91	104	
	220	445	0.85																92	
	250	505	0.85																	
Max. current for cable [A]*				18.5	25	34	43	60	80	101	126	153	196	238	276	319	364	430	497	

* At particularly favourable heat dissipation conditions eg. submerged in water, note that the value is smaller if the cable is placed in air.

Cable dimensions for MMS motors at 3 x 400 V,
50 Hz, star-delta starting
Voltage drop 3%

Motor	[kW]	$I_{1/1}$ [A]	Cos φ 100%	Maximum cable length in metres from motor starter to pump															
				Cross-section [mm ²]															
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300
MMS 6000	3.7	9.85	0.81	112	187	297	444	731											
	5.5	14	0.81	79	131	209	312	515	810										
	7.5	18.4	0.80	61	101	161	240	396	623	950									
	9.2	22.4	0.81		82	131	195	322	506	772									
	11	26	0.82			111	166	274	431	659	899								
	13	30	0.82			97	144	237	374	571	779								
	15	34	0.83				126	207	326	499	682	940							
	18.5	40.5	0.83				105	174	274	419	572	789							
	22	47.5	0.83					148	234	357	488	673	900						
	26	56	0.85					123	194	297	407	562	755	974					
	30	64	0.84						172	262	359	496	664	856					
MMS 8000	37	85.5	0.79							206	281	386	513	655	782	916			
	22	48	0.84					145	229	350	479	661	886						
	26	56.5	0.85					122	192	295	403	557	748	965					
	30	64	0.85						170	260	356	492	660	852					
	37	78.5	0.85						139	212	290	401	538	695	836	990			
	45	96.5	0.82							177	242	334	446	572	686	808	933		
	55	114	0.85								200	276	371	478	576	682	792	941	
	63	132	0.83									242	324	417	500	590	682	807	920
	75	152	0.86									206	277	357	431	511	595	708	813
	92	186	0.86										226	292	352	418	486	579	664
	110	224	0.87											242	292	347	404	483	555
MMS 10000	75	156	0.84										272	351	422	498	578	685	782
	92	194	0.82										222	285	341	402	464	548	623
	110	228	0.84											240	289	341	395	469	535
	132	270	0.84												244	288	334	396	452
	147	315	0.81													248	286	336	382
	170	365	0.81															290	330
	190	425	0.79															248	281
MMS 12000	147	305	0.83													255	295	349	398
	170	345	0.85														262	311	356
	190	390	0.84															274	313
	220	445	0.85																276
	250	505	0.85																
Max. current for cable [A]*				18.5	25	34	43	60	80	101	126	153	196	238	276	319	364	430	497

* At particularly favourable heat dissipation conditions eg. submerged in water, note that the value is smaller if the cable is placed in air.

Cable dimensions for MMS motors at 3 x 460 V,
60 Hz, direct-on-line starting
Voltage drop 1%

Motor	[kW]	I _{1/1} [A]	Cos φ 100%	Maximum cable length in metres from motor starter to pump																
				Cross-section [mm ²]																
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	
MMS 6000	3.7	9.75	0.80	25	42	67	100	165	260	397	541	743	989							
	5.5	13.8	0.80	18	30	48	71	117	184	280	382	525	699	894						
	7.5	18.0	0.79	14	23	37	55	91	143	217	296	406	539	689	822	963				
	9.2	22.0	0.81		18	29	44	72	114	174	237	326	436	558	668	785	906			
	11	25.5	0.82			25	37	62	97	149	203	279	373	479	574	676	781	922		
	13	29.5	0.82			22	32	53	84	128	175	242	323	414	497	585	675	797	907	
	15	33.5	0.83			19	28	47	73	112	153	211	282	363	436	514	595	704	802	
	18.5	39.0	0.83				24	40	63	96	132	181	243	312	374	442	511	604	689	
	22	46.0	0.83					34	53	82	112	154	206	265	318	374	433	512	584	
	26	54.5	0.85					28	44	68	93	128	172	221	267	316	366	435	498	
	30	62.5	0.85						39	59	81	112	150	193	233	275	320	380	435	
37	81.5	0.79							48	65	90	119	152	182	213	245	287	324		
MMS 8000	22	48.5	0.84					32	50	77	105	145	194	250	300	355	411	488	557	
	26	56.5	0.86					27	42	65	88	122	165	213	257	304	354	422	484	
	30	64.0	0.85						38	58	79	109	146	189	227	269	312	371	424	
	37	78.0	0.85						31	47	65	89	120	155	186	220	256	304	348	
	45	92.5	0.85							40	55	75	101	130	157	186	216	257	294	
	55	112	0.86								45	62	83	107	129	154	179	213	244	
	63	126	0.86									55	74	95	115	136	159	189	217	
	75	150	0.86									46	62	80	97	115	133	159	182	
	92	184	0.87										50	65	79	93	109	130	150	
	110	220	0.87											54	66	78	91	109	125	
MMS 10000	75	154	0.84											61	79	95	112	130	154	175
	92	190	0.83											50	64	77	91	105	124	141
	110	224	0.84												54	65	77	89	106	121
	132	265	0.85													55	65	75	90	103
	147	305	0.82														57	65	77	88
	170	355	0.82															56	66	75
	190	405	0.79																58	65
Max. current for cable [A]*				18.5	25	34	43	60	80	101	126	153	196	238	276	319	364	430	497	

* At particularly favourable heat dissipation conditions eg. submerged in water, note that the value is smaller if the cable is placed in air.

Cable dimensions for MMS motors at 3 x 460 V, 60 Hz,
direct-on-line starting
Voltage drop 3%

Motor	[kW]	I _{1/1} [A]	Cos φ 100%	Maximum cable length in metres from motor starter to pump																
				Cross-section [mm ²]																
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	
MMS 6000	3.7	9.75	0.80	76	127	202	301	496	781											
	5.5	13.8	0.80	54	90	143	213	351	552	841										
	7.5	18.0	0.79	42	70	111	165	272	428	651	887									
	9.2	22.0	0.81		55	88	132	217	342	522	712	979								
	11	25.5	0.82			75	112	185	292	446	609	838								
	13	29.5	0.82			65	97	160	252	385	526	725	968							
	15	33.5	0.83			57	85	140	220	336	459	633	847							
	18.5	39.0	0.83				73	120	189	289	395	544	728	936						
	22	46.0	0.83					102	160	245	335	461	617	794	953					
	26	54.5	0.85					84	132	203	278	384	515	664	800	947				
	30	62.5	0.85						116	177	242	335	449	579	698	826	959			
37	81.5	0.79							144	196	269	357	457	545	638	734	860	973		
MMS 8000	22	48.5	0.84					95	150	230	315	434	582	750	901					
	26	56.5	0.86					80	126	194	265	367	494	639	770	913				
	30	64.0	0.85						113	173	236	327	438	566	681	806	936			
	37	78.0	0.85						93	142	194	268	360	464	559	661	768	913		
	45	92.5	0.85							119	164	226	303	391	471	558	648	770	881	
	55	112	0.86								134	185	249	322	388	461	536	638	732	
	63	126	0.86									165	221	286	345	409	476	567	651	
	75	150	0.86									138	186	241	290	344	400	477	547	
	92	184	0.87										151	195	236	280	327	390	449	
	110	220	0.87											163	197	234	273	326	375	
MMS 10000	75	154	0.84										183	236	284	335	389	461	526	
	92	190	0.83										149	192	231	272	315	372	424	
	110	224	0.84											162	195	230	267	317	362	
	132	265	0.85												165	195	226	269	308	
	147	305	0.82													170	196	231	263	
	170	355	0.82														168	199	226	
	190	405	0.79															173	196	
Max. current for cable [A]*				18.5	25	34	43	60	80	101	126	153	196	238	276	319	364	430	497	

* At particularly favourable heat dissipation conditions eg. submerged in water, note that the value is smaller if the cable is placed in air.

Sizing of cable

Calculation of the cross-section of the cable

Formula designations

U = Rated voltage [V]

ΔU = Voltage drop [%]

I = Rated current of the motor [A]

q = Cross-section [mm²]

X_L = Inductive resistance 0.078×10^{-3} [Ω/m]

$\cos\phi$ = Power factor

$\sin\phi = \sqrt{1 - \cos^2\phi}$

L = Length of cable [m]

Δp = Power loss [W]

$\rho = 1/\chi$

Materials of cable:

Copper: $\chi = 52 \text{ m}/\Omega \times \text{mm}^2$

Aluminium: $\chi = 35 \text{ m}/\Omega \times \text{mm}^2$

For calculation of the cross-section of the submersible drop cable, use the following formula:

DOL

$$q = \frac{I \cdot 1.73 \cdot 100 \cdot L \cdot \rho \cdot \cos\phi}{U \cdot \Delta U - (I \cdot 1.73 \cdot 100 \cdot L \cdot X_L \cdot \sin\phi)}$$

Star-delta

$$q = \frac{I \cdot 100 \cdot L \cdot \rho \cdot \cos\phi}{U \cdot \Delta U - (I \cdot 1.73 \cdot 100 \cdot L \cdot X_L \cdot \sin\phi)}$$

The values of the rated current (I) and the power factor ($\cos\phi$) can be read in the tables on pages 14-20.

Calculation of the power loss

For calculation of the power loss in the submersible drop cable, use the following formula:

$$\Delta p = \frac{3 \cdot L \cdot \rho \cdot I^2}{q}$$

Example:

Motor size: 45 kW, MMS 8000
 Rated current: $I_{1/1} = 96.5 \text{ A}$
 Voltage: 3 x 400 V, 50 Hz
 Starting method: Direct-on-line
 Required cable length: 200 m
 Water temperature: 25 °C

Cable selection:

Choice A: **3 x 150 mm²**
 Choice B: **3 x 185 mm²**

Calculation of power loss

Choice A:

$$\Delta p_A = \frac{3 \cdot L \cdot \rho \cdot I^2}{q}$$

$$\Delta p_A = \frac{3 \cdot 200 \cdot 0.02 \cdot 96.5^2}{150}$$

$$\Delta p_A = \mathbf{745 \text{ W}}$$

Choice B:

$$\Delta p_B = \frac{3 \cdot 200 \cdot 0.02 \cdot 96.5^2}{185}$$

$$\Delta p_B = \mathbf{604 \text{ W}}$$

Savings

Operating hours/year: h = 4000.

Annual saving (A):

$$A = (\Delta p_A - \Delta p_B) \cdot h = (745 \text{ W} - 604 \text{ W}) \cdot 4000 = 564000 \text{ Wh} = 564 \text{ kWh}$$

By choosing the cable size 3 x 185 mm² instead of 3 x 150 mm², an annual saving of 564 kWh is achieved.

Operating time: 10 years

Saving after 10 years (A_{10}):

$$A_{10} = A \cdot 10 = 564 \cdot 10 = \mathbf{5640 \text{ kWh}}$$

The saving in amount must be calculated in the local currency.

3 x 220 V, 60 Hz

Motor power		Product number			
		PVC windings			
		Ceramic/carbon			
		EN-JL1040		DIN/EN 1.4401	
[kW]	[hp]	DOL	SD	DOL	SD
MMS 6000	3.7	5.0	96457631	-	96457658
	5.5	7.5	96457632	-	96457659
	7.5	10	96441900	-	96457660
	9.2	12.5	96441901	-	96457661
	11	15	96441902	-	96457662
	13	17.5	96441903	-	96457663
	15	20	96441904	-	96457664
	18.5	25	96441905	-	96457665
	22	30	96439622	-	96457666
	26	35	96439623	-	96457667
	30	40	96439624	-	96457668
	37	50	-	96446025	96457649
MMS 8000	22	30	96457643	96457628	96457670
	26	35	96457644	96457629	96457671
	30	40	96457645	96457630	96457672
	37	50	96442309	96442310	96457673
	45	60	96439626	96442313	96457674
	55	75	96439627	96442315	96457675
	63	85	96439628	96442317	96457676
	75	100	96439629	96442319	96457677
MMS 10000	75	100	-	-	-
	92	125	96457647	-	96457679
	110	150	96457648	-	96457680
	132	180	96439638	-	96457682

3 x 220-230 V, 50 Hz

Motor power		Product number				
		PVC windings				
		Ceramic/carbon				
		EN-JL1040		DIN/EN 1.4401		
[kW]	[hp]	DOL	SD	DOL	SD	
MMS 6000	3.7	5.0	96432245	96432267	96444329	96444352
	5.5	7.5	96432246	96432268	96444330	96444353
	7.5	10	96432247	96432269	96444332	96444354
	9.2	12.5	96432248	96432270	96444333	96444355
	11	15	96432249	96432271	96444334	96444356
	13	17.5	96432250	96432272	96444335	96444357
	15	20	96432251	96432273	96444336	96444358
	18.5	25	96432252	96432274	96444337	96444359
	22	30	96432253	96432275	96444338	96444360
	26	35	96432254	96432276	96444339	96444361
	30	40	96432255	96432277	96444340	96444363
	37	50	-	96432278	-	96444364
MMS 8000	22	30	96432257	96432279	96444342	96444365
	26	35	96432258	96432280	96444343	96444366
	30	40	96432259	96432281	96444344	96444367
	37	50	96432260	96432282	96444345	96444368
	45	60	96432261	96432283	96444346	96444369
	55	75	96432262	96432284	96444347	96444370
	63	85	96432263	96432285	96444348	96444372
MMS 10000	75	100	-	-	-	-
	92	125	96432291	96432294	96444350	96444514
	110	150	96432292	96432295	96444351	96444515

3 x 380-415 V, 50 Hz and 3 x 460 V, 60 Hz

Motor power		Product number							
		PVC windings							
		Ceramic/carbon				SiC/SiC			
		EN-JL1040		DIN/EN 1.4401		EN-JL1040		DIN/EN 1.4401	
[kW]	[hp]	DOL	SD	DOL	SD	DOL	SD	DOL	SD
3 x 380-415 V, 50 Hz									
3 x 460 V, 60 Hz									
MMS 6000	3.7	5.0	96430655	-	96444516	-	96477813	-	96095037
	5.5	7.5	96430656	96432081	96444517	96444546	96477814	96094978	96095038
	7.5	10	96430657	96432082	96444518	96444547	96477815	96094979	96095039
	9.2	12.5	96430658	96432083	96444519	96444548	96477816	96094980	96095040
	11	15	96430659	96432084	96444520	96444549	96477817	96094981	96095041
	13	17.5	96430660	96432085	96444521	96444550	96477818	96094982	96095042
	15	20	96430661	96432086	96444522	96444551	96477819	96094983	96095043
	18.5	25	96430662	96432087	96444523	96444552	96477850	96094984	96095044
	22	30	96430663	96432088	96444524	96444553	96477851	96094985	96095045
	26	35	96430664	96432089	96444525	96444554	96477852	96094986	96095046
	30	40	96430665	96432090	96444526	96444555	96477853	96094987	96484742
	37	50	96430666	96432091	96444527	96444556	96457282	96457294	96457305
	22	30	96430667	96432092	96444528	96444557	96095117	96095127	96095177
	26	35	96430668	96432093	96444529	96444558	96095118	96095128	96095178
MMS 8000	30	40	96430669	96432094	96444530	96444559	96095119	96095129	96095179
	37	50	96430670	96432095	96444531	96444560	96095120	96095130	96486180
	45	60	96430671	96432096	96444532	96444561	96457284	96457295	96457306
	55	75	96430672	96432097	96444533	96444562	96457285	96457296	96457307
	63	85	96430673	96432098	96444534	96444563	96457286	96457297	96457308
	75	100	96430674	96432099	96444535	96444564	96457287	96457298	96457309
	92	125	96430675	96432100	96444536	96444565	96457288	96457299	96457310
	110	150	96430676	96432101	96444537	96444566	96457289	96457300	96457311
	75	100	-	-	-	-	-	-	-
	92	125	96430678	96432103	96444539	96444568	96513080	96540680	96540682
MMS 10000	110	150	96430679	96432104	96444540	96444569	96494090	96494091	96540683
	132	180	96430680	96432105	96444541	96444570	96457290	96457301	96457312
	147	200	96430681	96432106	96444542	96444571	96457291	96457302	96457313
	170	230	96438116	96438117	96444543	96444572	96457292	96457303	96457314
	190	260	96438118	96438119	96444544	96444573	96463669	96540308	96540314
3 x 380-415 V, 50 Hz									
MMS 12000	147	200	96430682	96432107	96444628	96444633	96540687	96540688	96540689
	170	230	96430683	96432108	96444629	96444634	96493224	96481314	96540690
	190	260	96430684	96432109	96444630	96444635	96457293	96457304	96457315

3 x 380-415 V, 50 Hz and 3 x 460 V, 60 Hz

Motor power		Product number							
		PE/PA windings							
		Ceramic/carbon				SiC/SiC			
		EN-JL1040		DIN/EN 1.4401		EN-JL1040		DIN/EN 1.4401	
[kW]	[hp]	DOL	SD	DOL	SD	DOL	SD	DOL	SD
3 x 380-415 V, 50 Hz									
3 x 460 V, 60 Hz									
MMS 6000	7.5	10	96094991	-	96539856	-	96540057	-	96540170
	9.2	12.5	96094992	-	96539858	-	96540058	-	96540171
	11	15	96470733	96095005	96539859	96539876	96540059	96540120	96540172
	13	17.5	96470734	96095006	96539870	96539878	96540110	96540121	96540173
	15	20	96470735	96095007	96539871	96539879	96540111	96540122	96540174
	18.5	25	96470736	96095008	96526826	96539880	96497415	96540123	96540175
	22	30	96464411	96095009	96539872	96539881	96540113	96540124	96540176
	26	35	96221394	96095010	96511389	96539882	96497110	96540125	96540177
	30	40	96470737	96095011	96539873	96539883	96509553	96540126	96540178
	37	50	96470738	96095012	96496461	96539884	96476890	96540127	96540179
MMS 8000	22	30	96095137	96095147	96529936	96530008	96530168	96530185	96530081
	26	35	96095138	96095148	96529937	96530009	96530169	96530187	96530083
	30	40	96095139	96095149	96529938	96530011	96530180	96530189	96530084
	37	50	96095140	96095150	96529939	96530012	96530182	96530191	96530085
	45	60	96470739	96095151	96530000	96530013	96476891	96530192	96481247
	55	75	96470780	96095152	96530002	96530014	96476892	96530193	96530087
	63	85	96473399	96095153	96530003	96530016	96530184	96530195	96530088
	75	100	96221395	96095154	96530004	96530017	96476893	96489499	96530089
	92	125	96473490	96095155	96530005	96530018	96476894	96489347	96530100
	110	150	96466552	96095156	96530006	96530019	96511375	96530196	96496894
MMS 10000	75	100	-	-	-	-	-	-	-
	92	125	96473394	96540275	96540290	96540295	96540300	96540304	96540310
	110	150	96526004	96540276	96540291	96540296	96540301	96540305	96540311
	132	180	96473395	96540277	96540292	96540297	96521619	96540306	96540312
	147	200	96473396	96540278	96540293	96540298	96540302	96540307	96540313
	170	230	96438116	96438117	96444543	96444572	96457292	96457303	96457314
	190	260	96438118	96438119	96444544	96444573	96463669	96540308	96540314
3 x 380-415 V, 50 Hz									
MMS 12000	147	200	96540322	96540326	96540329	96540332	96540337	96540352	96540356
	170	230	96540323	96540327	96540330	96540333	96540338	96540366	96540357
	190	260	96465240	96540328	96540331	96540334	96540339	96540353	96540358
	220	300	96430685	96432110	96444631	96444636	96540350	96540354	96540359
	250	340	96430686	96432111	96444632	96444637	96540351	96540355	96540360

3 x 500 V, 50 Hz and 3 x 575 V, 60 Hz

Motor power		Product number			
		PVC windings			
		Ceramic/carbon			
		EN-JL1040		DIN/EN 1.4401	
[kW]	[hp]	DOL	SD	DOL	SD
3 x 500 V, 60 Hz					
MMS 6000	7.5	10	96437548	-	96444574
	9.2	12.5	96437550	-	96444575
	11	15	96437552	96437567	96444576
	13	17.5	96437554	96437568	96444577
	15	20	96437555	96437569	96444578
	18.5	25	96437556	96437570	96444579
	22	30	96437561	96437571	96444580
	26	35	96437562	96437572	96444581
	30	40	96437563	96437573	96444582
	37	50	96437564	96437574	96444583
3 x 500 V, 50 Hz					
3 x 575 V, 60 Hz					
MMS 8000	22	30	96432296	96432316	96444584
	26	35	96432297	96432317	96444585
	30	40	96432298	96432318	96444586
	37	50	96432299	96432319	96444587
	45	60	96432300	96432320	96444588
	55	75	96432301	96432321	96444589
	63	85	96432302	96432322	96444590
	75	100	96432303	96432323	96444591
	92	125	96432304	96432324	96444592
	110	150	96432305	96432325	96444593
MMS 10000	75	100	-	-	-
	92	125	96432307	96432327	96444595
	110	150	96432308	96432328	96444596
	132	180	96432309	96432329	96444597
	147	200	96432310	96432330	96444598
	170	230	96438170	96438172	96444599
	190	260	96438171	96438173	96444600
3 x 500 V, 50 Hz					
MMS 12000	147	200	96432311	96432331	96444638
	170	230	96432312	96432332	96444639
	190	260	96432313	96432333	96444640
	220	300	96432314	96432334	96444641
	250	340	96432315	96432335	96444642

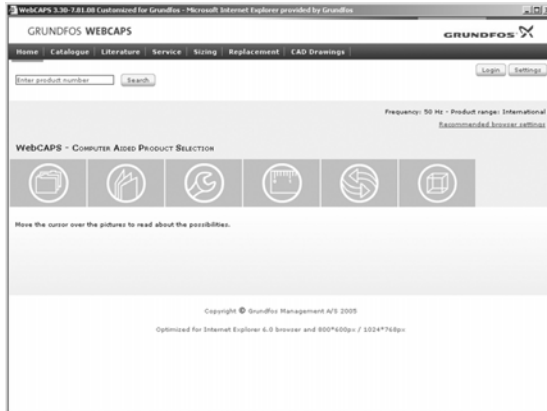
3 x 380 V, 60 Hz, PVC windings

Motor power		Product number			
		PVC windings			
		Ceramic/carbon			
		EN-JL1040		DIN/EN 1.4401	
[kW]	[hp]	DOL	SD	DOL	SD
MMS 6000	3.7	5.0	96438729	-	96457683
	5.5	7.5	96438730	-	96457684
	7.5	10	96438731	-	96457685
	9.2	12.5	96438732	-	96457686
	11	15	96438733	-	96457687
	13	17.5	96438734	-	96457688
	15	20	96438735	-	96457689
	18.5	25	96438736	-	96457690
	22	30	96438737	-	96457691
	26	35	96438738	-	96457692
	30	40	96438739	-	96457693
	37	50	96438741	96446026	96457694
MMS 8000	22	30	96453623	96453630	96457695
	26	35	96453624	96453631	96457696
	30	40	96453625	96453632	96457697
	37	50	96442311	96442312	96457699
	45	60	96439632	96442314	96457700
	55	75	96439633	96442316	96457701
	63	85	96439634	96442318	96457702
	75	100	96439635	96442320	96457703
	92	125	96439636	96442322	96457704
	110	150	96439637	96453633	96457705
MMS 10000	75	100	-	-	-
	92	125	96453627	96453635	96457707
	110	150	96453628	96453636	96457708
	132	180	96439639	96453637	96457709
	147	200	96439640	96453638	96457710
	170	230	96439641	96453639	96457711
	190	260	96453629	96453640	96457712

3 x 380 V, 60 Hz, PE/PA windings

Motor power			Product number							
			PE/PA windings							
			Ceramic/carbon				SiC/SiC			
			EN-JL1040		DIN/EN 1.4401		EN-JL1040		DIN/EN 1.4401	
[kW]	[hp]	DOL	SD	DOL	SD	DOL	SD	DOL	SD	
MMS 6000	37	50	96507886	96507887	96540392	96510921	96540395	96483156	96540397	96540399
MMS 8000	22	30	96540463	96540482	96540491	96540501	96540511	96540532	96540537	96540546
	26	35	96540464	96540483	96540492	96540502	96540512	96540533	96540538	96540547
	30	40	96540465	96540484	96540493	96540503	96540513	96540534	96540539	96540548
	37	50	96540467	96540485	96540494	96540504	96540514	96540535	96540540	96540549
	45	60	96507888	96509371	96540495	96540505	96540515	96483158	96491000	96540550
	55	75	96507889	96509372	96540496	96540506	96540517	96483160	96540541	96540551
	63	85	96540468	96540486	96540497	96540507	96540518	96483161	96540542	96540556
	75	100	96540469	96540487	96540498	96540508	96540519	96483162	96540543	96540557
	92	125	96507900	96540488	96540499	96540509	96540530	96483163	96540544	96540558
	110	150	96500150	96540490	96540500	96540510	96540531	96540536	96540545	96540559
MMS 10000	75	100	-	-	-	-	-	-	-	-
	92	125	96540571	96509374	96540585	96540602	96540609	96540614	96540622	96540671
	110	150	96540570	96509375	96540586	96540603	96540610	96540616	96540623	96540672
	132	180	96509377	96540579	96540587	96540604	96511772	96540617	96111546	96540673
	147	200	96507901	96507902	96540589	96540606	96540611	96540618	96540624	96540674
	170	230	96439641	96453639	96457711	96457729	96505267	96485244	96540625	96540675
	190	260	96453629	96453640	96457712	96457730	96540612	96540619	96540626	96540676

WebCAPS

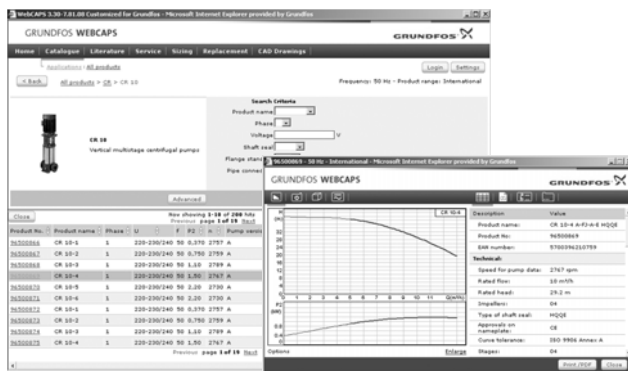


WebCAPS is a **Web**-based **Computer Aided Product Selection** program available on www.grundfos.com.

WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 20 languages.

In WebCAPS, all information is divided into 6 sections:

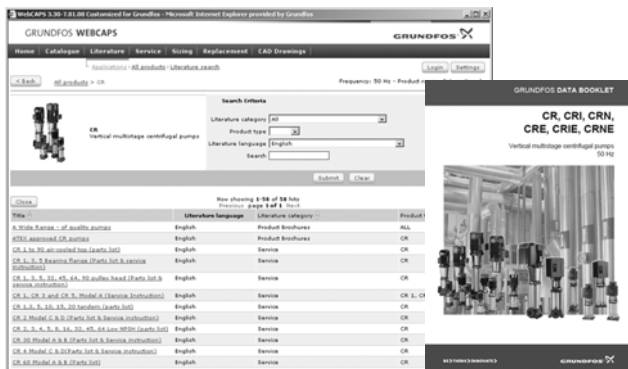
- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



Catalogue

This section is based on fields of application and pump types, and contains

- technical data
- curves (QH, Eta, P1, P2, etc.) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

In this section you can access all the latest documents of a given pump, such as

- data booklets
- installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures.



Service

This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and discontinued Grundfos pumps. Furthermore, this section contains service videos showing you how to replace service parts.



Sizing

This section is based on different fields of application and installation examples, and gives easy step-by-step instructions in how to

- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- analyse your selected pump via the built-in life cycle cost tool
- determine the flow velocity in wastewater applications, etc.



Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump. The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.



CAD drawings

In this section it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

2-dimensional drawings:

- .dxf, wireframe drawings
- .dwg, wireframe drawings.

3-dimensional drawings:

- .dwg, wireframe drawings (without surfaces)
- .stp, solid drawings (with surfaces)
- .eprt, E-drawings.



WinCAPS



Fig. 18 WinCAPS CD-ROM

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 185,000 Grundfos products in more than 20 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no Internet connection is available.

WinCAPS is available on CD-ROM and updated once a year.

V7156900 0108	GB
Repl. V71156900 0905	

Subject to alterations.



Service instructions

SQ, SQE, SQ-N

MS 3, MSE 3

Model A

50/60 Hz

1~

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1. Type identification

This section shows the nameplates, the type keys and the codes that can appear in the variant code.

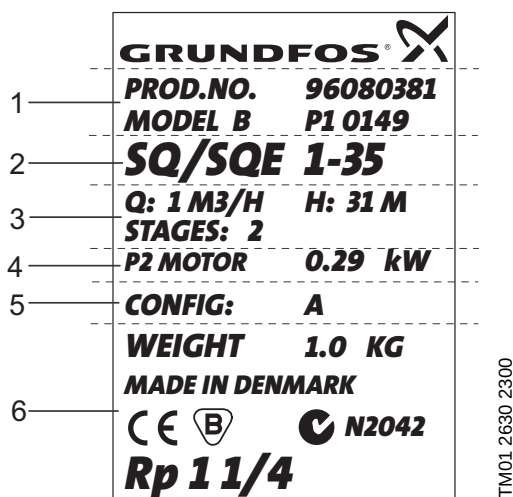
Note: As codes can be combined, a code position may contain more than one code (letter).

1.1 Nameplates

1.1.1 Nameplate, pump

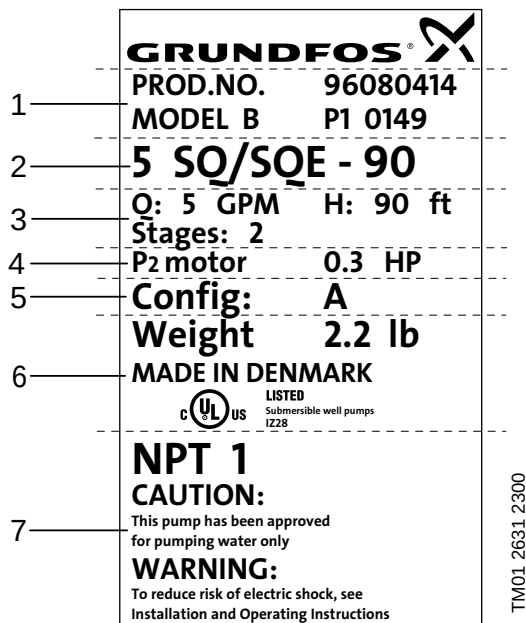
The pump nameplate is engraved into the pump sleeve.

Example of nameplate, Europe, S-AMREG, APREG, Japan, Australia



Pos.	Code	Description
1	PROD.NO. 96033602	Product number.
	MODEL A P1 9744	Production code - Bjerringbro (P1) + year-week code.
2	SQ/SQE 1 - 35	Type designation, see section 1.2.1 Type key, pump .
3	- Q: 1 m³/h - H: 31 m - Stages: 2 - P2 motor 0.29 kW	- Flow (Q) 1 [m³/h]. - Head (H) 31 [m]. - Number of stages 2. - Required input power pump 0.29 [kW].
4	Config:A	Code for dry-running cut-out value.
5	Weight 1.0 kg	Pump net weight in kg.
	MADE IN DENMARK	Country of origin: Denmark.
		Misc. marks of approval: CE etc.
6	Rp 1 ¼	Type and size of connecting thread.

Example of nameplate, N-AMREG



Pos.	Code	Description
1	PROD.NO. 96033667	Product number.
	MODEL A P1 9744	Production code - Bjerringbro (P1) + year-week code.
2	5 SQ/SQE - 90	Type designation, see section 1.2.1 Type key, pump .
3	- Q: 5 GPM - H: 86 ft - Stages: 2	- Flow (Q) 5 [GPM]. - Head (H) 86 [ft]. - Number of stages 2.
4	P2 motor 0.3 HP	Required input power pump (P2) in hp.
5	Config:A	Code for dry-running cut-out value.
6	Weight 2.2 lb	Pump net weight in pounds.
	MADE IN DENMARK	Country of origin: Denmark.
		Misc. marks of approval: UL etc.
7	NPT 1	Type and size of connecting thread.

1.1.2 Nameplate, motor

The motor nameplate is engraved into the motor sleeve.

1	GRUNDFOS 	2
	MSE3NE PROD.NO. 96030142 MODEL A P1 9744	
3	U: 1 x 200-240 V - 50/60 Hz P₁: 0.95 - 1.50 kW I: 4.9 - 7.6 A P₂: 0.7 - 1.05 kW S1/40 C 0.15 m/s IEC/EN 60034 Cl. 1	
4	P₂: 0.5 - 0.7 hp SF 1.4 SF AMP 7.6 CONT. DUTY 104 F 0.5 ft/s Ins. Cl. F Code A	
5	PF 1.0 RPM: 10700	
6	Config: B	
7	Weight 3.2/7 kg/lb IP 68 THERMALLY PROTECTED MADE IN DENMARK	
8	   N2042	

TM01 4251 4801

Pos.	Code	Description
1	MS 3	Type designation, see section 1.2.2 Type key, motor .
2	PROD.NO. 96xxxxxx	Product number.
	MODEL A P1 9949	Production code - Bjerringbro (P1) + year-week code.
3	U: 1x200-240 V - 50/60 Hz	Required electricity supply [V].
	P ₁ : 0.95 - 1.50 kW	Input power [kW].
	I: 4.9 - 7.6 A	Input current [A].
	P ₂ : 0.7 - 1.05 HP	Output power [kW].
	S1/40C 0.15 m/s IEC 34-1Cl. 1	Continuous operation up to 40°C, min. flow velocity past the motor in m/s. Standard IEC 34-1.
4	P2 0.5 - 0.7 HP	Output power (P2) in hp.
	SF 1.4 SF AMP 7.6	Service factor + max. ampere for a given SF.
	CONT. DUTY 104F 0.5 ft/s	Suitable for continuous operation at 104°F and flow = 0.5 ft/s.
	INS. CL. FCODE A	Insulation class F. Start-kVA per hp.
5	PF 1.0RPM 10700	Power factor = 1. Rated speed 10.700 rpm.
6	Config. B	Code for dry-running cut-out value.
7	Weight x.x/x kg/lb	Motor net weight in kg and pounds.
8		Misc. marks of approval: CE etc.
	THERMALLY PROTECTED	Temperature sensor built into the electronic unit.
	MADE IN DENMARK	Country of origin: Denmark.

1.2 Type keys

1.2.1 Type key, pump

Pump type key, S-AMREG, APREG, Japan, Australia

Example	SQE	2 -	35	N
Type range: • SQ = Basic version, i.e. without communication. • SQE = Electronically controllable pump offering possibility of communication via CU 300 and CU 301.				
Rated flow rate in m ³ /h.				
Head in m at rated flow. Note: Head is an approximated value.				
Material code: • Blank = Stainless steel DIN W.-Nr. 1.4301 - AISI 304. • N = Stainless steel DIN W.-Nr. 1.4401 - AISI 316.				

Pump type key, N-AMREG

Example	10	SQE -	140	N
Rated flow in US GPM.				
Type range: • SQ = Basic version, i.e. without communication. • SQE = Electronically controllable pump offering possibility of communication via CU 300 and CU 301.				
Head in ft at rated flow. Note: Head is an approximated value.				
Material code: • Blank = Stainless steel DIN W.-Nr. 1.4301 - AISI 304. • N = Stainless steel DIN W.-Nr. 1.4401 - AISI 316.				

1.2.2 Type key, motor

Example	MSE	3 -	N
Type range: • MS = Basic version, i.e. without communication. • MSE = Electronically controllable pump offering possibility of communication via CU 300 and CU 301.			
Motor diameter: 3".			
Material code: • Blank = Stainless steel DIN W.-Nr. 1.4301 - AISI 304. • N = Stainless steel DIN W.-Nr. 1.4401 - AISI 316.			

2. Torques and lubricants

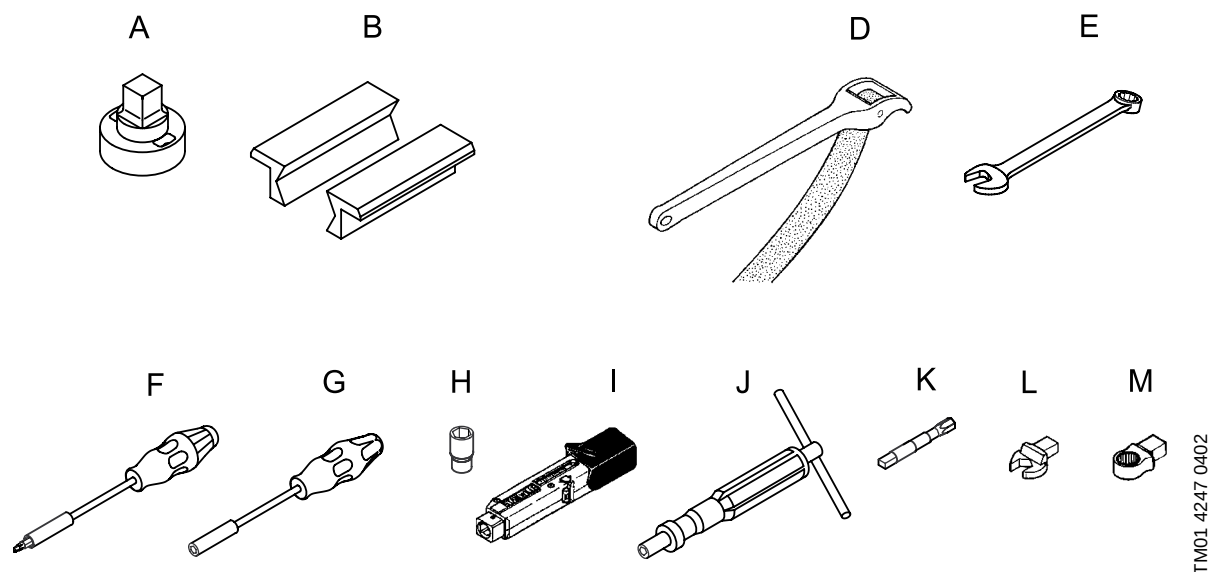
This section shows the parts and nuts that must be tightened to a certain torque and the lubricants to be used.

Pos.	Description	Number	Torque [Nm]	Lubricant
220	End cover with cable	1		Unisilkon
225	Top cover	1	15±5	Unisilkon
232	Lip seal ring	1		Unisilkon
250	Nut	4	1,0	
	Pump	1	55	

Grease, type Unisilkon, L 641, 5 g, part number 96037562.

3. Service tools

The following drawings and tables show special, standard and torque tools for pump service.



3.1 Special tools

Pos.	Description	For pos.	Additional information	Part no.
A	Key for discharge chamber	1a		SV0064
B	Protective clamps			SV0412

3.2 Standard tools

Pos.	Description	For pos.	Additional information	Part no.
D	Band pipe wrench	55		SV0853
E	Ring/open-end spanner	225	27 mm	SV0084
F	Screwdriver (torx)	18a	T10	SV0066
G	Nut driver with socket	250		SV0065
H	Socket for hexagon head screws	K-250	7 mm 1/4"	SV0457

3.3 Torque tools

Pos.	Description	For pos.	Additional information	Part no.
I	Torque wrench	L-M	40-200 Nm 14x18	SV0400
J	Torque screwdriver	K	1-6 Nm 1/4"	SV0438
K	Adapter for torque screwdriver	H-J	1/4"	SV0437
L	Open-end insert tool	A-I	24 mm 14x18	SV0624
M	Ring insert tool	I-225	27 mm 14x18	SV0527

4. Dismantling and assembly

4.1 General

When the pump has been pulled out, possibly because it was running at reduced performance, it is important to note that model A pumps are not serviceable with components/kits. In this situation the pump must be replaced with a model B pump, see section [5. Conversion lists for pumps from model A to model B](#) and to check the submersible motor, please follow the instructions in the following sections.

Position numbers of parts (digits) refer to exploded views, sectional drawings and parts lists for the motor; position numbers of tools (letters) refer to section [3. Service tools](#).

4.1.1 Before dismantling

- Disconnect the electricity supply to the motor.

4.1.2 During dismantling

- When loosening the pump from the motor, take care to apply counterpressure to the pump, see [fig. 1](#). This will prevent the pump or pump parts from being damaged, bent or twisted.

4.1.3 Before assembly

- Clean and check all motor parts, especially the shaft with rotor due to magnetism. Citric acid is recommended for decalcifying.
- Check all parts for fractures and wear.
- Order the necessary service kits and/or parts.
- Replace defective parts by new parts.

4.1.4 During assembly

- Lubricate and/or tighten threads and rubber parts according to section [2. Torques and lubricants](#).
- When tightening the pump to the motor, take care to apply counterpressure to the pump, see [fig. 1](#). This will prevent the pump or pump parts from being damaged, bent or twisted.
- Before connecting the pump to the motor, fill the motor with GRUNDFOS motor liquid SML 2, see section [4.4 Filling of motor liquid](#).

4.1.5 After assembly

- The head and flow should be tested according to the test specifications, see section [6. Test specifications](#)

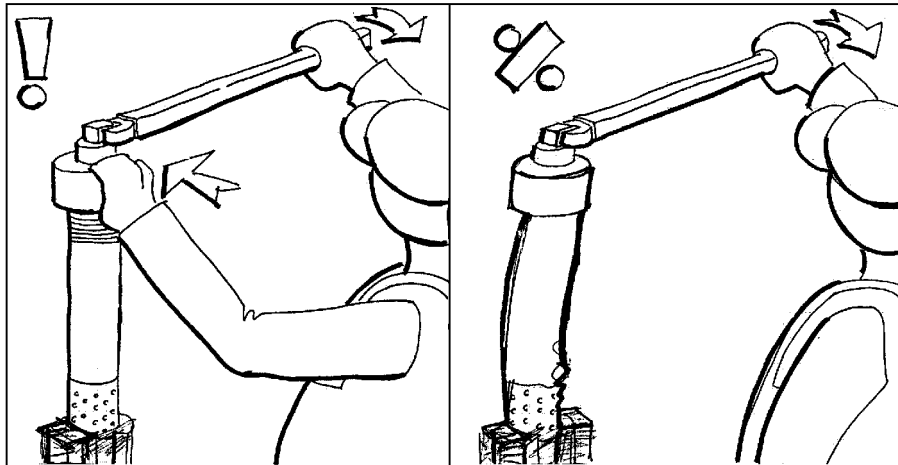
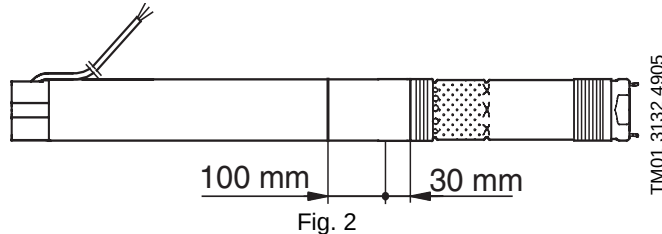


Fig. 1

4.2 Separating and connecting pump and motor

4.2.1 Dismantling

1. Slacken the screws pos. 18a and 18b and remove them together with the cable guard pos. 18.
2. If the motor is intact, the cable need not be removed. If the motor is defective, remove the nuts pos. 250 and pull the end cover with cable and socket out of the motor.
3. Place the motor in a vice, using the two protective clamps [pos. B](#).
Tighten only on the upper 100 mm of the motor, see [fig. 2](#).



4. Place a band pipe wrench [pos. D](#) on the upper pump thread and loosen the pump by max. $\frac{1}{2}$ turn (right-hand thread). *Do not remove the pump from the motor.*
5. Slacken the vice. Stand the motor with pump upright with the motor uppermost and tighten the two clamping faces of the discharge chamber in the vice.
6. Place the band pipe wrench on the pump thread close to the motor and loosen the pump (right-hand thread).
7. Lift the motor with pump off the vice and place it on a plane surface.
8. Screw the pump off the motor.

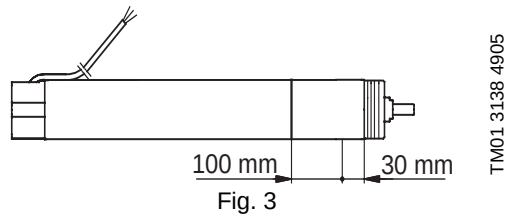
4.2.2 Assembly

1. Place the motor in a vice, using the two protective clamps [pos. B](#).
Tighten only on the upper 100 mm of the motor, see [fig. 3](#).
2. Pull the pump shaft a little out of the pump (approx. corresponding to the length of the coupling).
3. Apply a thin layer of grease to the spline inside the coupling and the thread on the motor.
4. Hold the coupling with your fingers and press the coupling home on the motor shaft.
5. Screw the pump home on the motor.
6. Turn motor and pump to a vertical position with the pump upwards and tighten the vice around the thread below the suction strainer.
7. Using the key for discharge chamber [pos. A](#), the open-end insert tool [pos. L](#) and the torque wrench [pos. I](#) tighten the discharge chamber to the sleeve.
8. Turn motor and pump to a horizontal position and place them in a vice, using the two protective clamps [pos. B](#), see [fig. 2](#).
9. Using the key for discharge chamber [pos. A](#), the open-end insert tool [pos. L](#) and the torque wrench [pos. I](#) tighten the pump to the motor.
10. Clean and apply a thin layer of grease to the end cover.
11. Push the end cover into the motor. Fit and tighten the nuts pos. 250 using the socket for hexagon head screws [pos. H](#), the adapter for torque screwdriver [pos. K](#) and the torque screwdriver [pos. J](#).
12. Place the motor cable along the motor and the pump so that it lies flat.
13. Fit the cable guard over the cable. The two tabs of the cable guard must engage with the upper edge of the pump sleeve. Fit the screws pos. 18a and 18b and tighten them.

4.3 Checking the motor

4.3.1 Dismantling

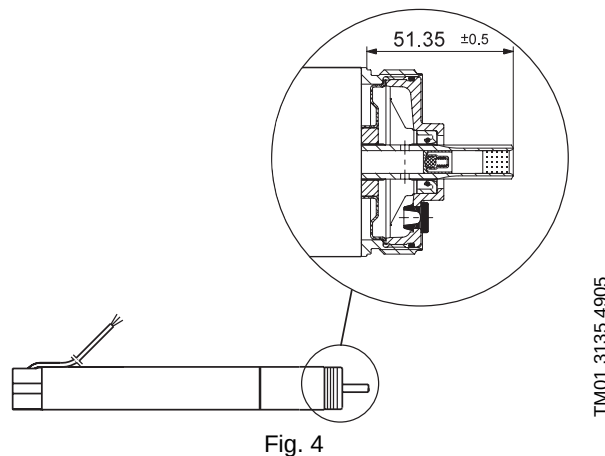
1. Place the motor in a vice, using the two protective clamps [pos. B.](#)
Tighten only on the upper 100 mm of the motor, see [fig. 3](#).



2. Prise off the filling plug [pos. 222a](#).
Please note that the motor is full of liquid.
3. Screw the top cover (right-hand thread) out of the motor using the ring of the ring/open-end spanner [pos. E](#).
4. Due to the powerful magnetism of the shaft with rotor, hold the splined shaft end firmly and pull the shaft with rotor and upper radial bearing [pos. 205](#) out of the motor.
The thrust bearing [pos. 203](#) may come out together with the shaft with rotor.
Check if the thrust bearing [pos. 203](#) is in the motor.

4.3.2 Assembly

1. Fit the thrust bearing [pos. 203](#) with the sliding surface uppermost carefully into the motor.
2. Turn the thrust bearing until its three dogs engage with the three notches at the bottom of the motor.
3. Fit the stop ring [pos. 202a](#) on the shaft with rotor with the sliding surface uppermost.
4. Turn the stop ring until the driving dogs engage with the shaft.
5. Hold the splined shaft end firmly due to magnetism and fit the shaft with rotor [pos. 202](#) carefully into the motor. The shaft with rotor must engage with the thrust bearing.
6. Check the shaft height, see [fig. 4](#).



7. Fit the upper radial bearing [pos. 205](#) carefully on the shaft with rotor and press it home in the recess of the motor.
8. Apply a thin layer of grease to the O-ring [pos. 224](#) and the lip seal ring [pos. 232](#).
9. Tighten the top cover [pos. 225](#) into the stator using the ring insert tool [pos. M](#) and the torque wrench [pos. I](#).

Make sure that the cover is under the top of the motor, see [fig. 5](#), and that the axial play is between 0.3 and 1.3 mm.

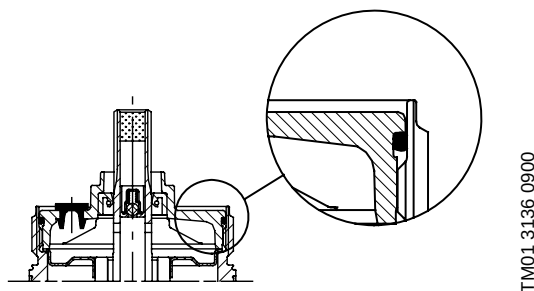


Fig. 5

10. Fill the motor with liquid, see section [4.4 Filling of motor liquid](#).

4.4 Filling of motor liquid

1. Place the motor in vertical position with an inclination of approx. 10°.
2. Remove the filling plug using a screwdriver or a similar tool.
3. Inject motor liquid into the motor with a filling syringe or the like.
4. To allow possible air to escape, move the motor from side to side.
5. Refit the filling plug and make sure that it is tight.
6. The motor is now ready for installation. Fit the pump to the motor, see section [4.2.2 Assembly](#).

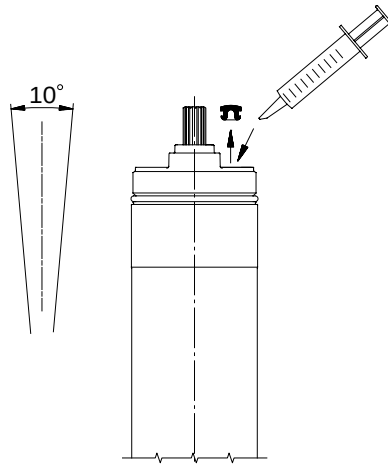


Fig. 6

TM01 1434 4597

5. Conversion lists for pumps from model A to model B

5.1 SQ/SQE 1, 5 SQ/SQE

The pump is not serviced with components/kits, but are replaced with complete pump end model B			
Product number model A		Product number model B	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 03 36 02	SQ/SQE 1 - 35	96 08 03 81	SQ/SQE 1 - 35
96 03 36 03	SQ/SQE 1 - 50	96 08 03 82	SQ/SQE 1 - 50
96 03 36 04	SQ/SQE 1 - 65	96 08 03 83	SQ/SQE 1 - 65
96 03 36 05	SQ/SQE 1 - 80	96 08 03 91	SQ/SQE 1 - 80
96 03 36 06	SQ/SQE 1 - 95	96 08 03 92	SQ/SQE 1 - 95
96 03 36 07	SQ/SQE 1 - 110	96 08 03 93	SQ/SQE 1 - 110
96 03 36 08	SQ/SQE 1 - 125	96 08 04 02	SQ/SQE 1 - 125
96 03 36 09	SQ/SQE 1 - 140	96 08 04 03	SQ/SQE 1 - 140
96 03 38 25	SQ/SQE 1 - 155	96 08 04 04	SQ/SQE 1 - 155
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 04 32 16	SQ/SQE 1 - 35 N	96 08 07 16	SQ/SQE 1 - 35 N
96 04 32 17	SQ/SQE 1 - 50 N	96 08 07 17	SQ/SQE 1 - 50 N
96 04 32 18	SQ/SQE 1 - 65 N	96 08 07 18	SQ/SQE 1 - 65 N
96 04 32 26	SQ/SQE 1 - 80 N	96 08 07 26	SQ/SQE 1 - 80 N
96 04 32 27	SQ/SQE 1 - 95 N	96 08 07 27	SQ/SQE 1 - 95 N
96 04 32 28	SQ/SQE 1 - 110 N	96 08 07 28	SQ/SQE 1 - 110 N
96 04 32 37	SQ/SQE 1 - 125 N	96 08 07 37	SQ/SQE 1 - 125 N
96 04 32 38	SQ/SQE 1 - 140 N	96 08 07 38	SQ/SQE 1 - 140 N
96 04 32 39	SQ/SQE 1 - 155 N	96 08 07 39	SQ/SQE 1 - 155 N
North America		NPT 1 1/4"	
96 03 36 67	05 SQ/SQE - 90	96 08 04 14	05 SQ/SQE - 90
96 03 36 68	05 SQ/SQE - 140	96 08 04 15	05 SQ/SQE - 140
96 03 36 69	05 SQ/SQE - 180	96 08 04 16	05 SQ/SQE - 180
96 03 36 70	05 SQ/SQE - 230	96 08 04 24	05 SQ/SQE - 230
96 03 36 71	05 SQ/SQE - 270	96 08 04 25	05 SQ/SQE - 270
96 03 36 72	05 SQ/SQE - 320	96 08 04 26	05 SQ/SQE - 320
96 03 36 73	05 SQ/SQE - 360	96 08 04 35	05 SQ/SQE - 360
96 03 36 74	05 SQ/SQE - 410	96 08 04 36	05 SQ/SQE - 410
96 03 38 27	05 SQ/SQE - 450	96 08 04 37	05 SQ/SQE - 450
JAPAN		Rp 1	
96 04 31 51	SQ/SQE 1 - 35	96 08 04 47	SQ/SQE 1 - 35
96 04 31 52	SQ/SQE 1 - 50	96 08 04 48	SQ/SQE 1 - 50
96 04 31 53	SQ/SQE 1 - 65	96 08 04 49	SQ/SQE 1 - 65
96 04 31 58	SQ/SQE 1 - 80	96 08 04 54	SQ/SQE 1 - 80
96 04 31 59	SQ/SQE 1 - 95	96 08 04 55	SQ/SQE 1 - 95
96 04 31 60	SQ/SQE 1 - 110	96 08 04 56	SQ/SQE 1 - 110
96 04 31 65	SQ/SQE 1 - 125	96 08 06 69	SQ/SQE 1 - 125
96 04 31 66	SQ/SQE 1 - 140	96 08 06 70	SQ/SQE 1 - 140
96 04 31 67	SQ/SQE 1 - 155	96 08 06 71	SQ/SQE 1 - 155
Austria		Rp 1 1/4	
96 04 05 34	SQ/SQE 1 - 35	96 08 06 83	SQ/SQE 1 - 35
96 04 05 35	SQ/SQE 1 - 50	96 08 06 84	SQ/SQE 1 - 50
96 04 05 36	SQ/SQE 1 - 65	96 08 06 85	SQ/SQE 1 - 65
96 04 05 44	SQ/SQE 1 - 80	96 08 06 93	SQ/SQE 1 - 80
96 04 05 45	SQ/SQE 1 - 95	96 08 06 94	SQ/SQE 1 - 95
96 04 05 46	SQ/SQE 1 - 110	96 08 06 95	SQ/SQE 1 - 110
96 04 05 54	SQ/SQE 1 - 125	96 08 07 04	SQ/SQE 1 - 125
96 04 05 55	SQ/SQE 1 - 140	96 08 07 05	SQ/SQE 1 - 140
96 04 05 56	SQ/SQE 1 - 155	96 08 07 06	SQ/SQE 1 - 155

5.2 SQ/SQE 2, 10 SQ/SQE

The pump is not serviced with components/kits, but are replaced with complete pump end model B			
Product number model A		Product number model B	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 03 36 12	SQ/SQE 2 - 35	96 08 03 84	SQ/SQE 2 - 35
96 03 36 13	SQ/SQE 2 - 55	*)	
96 03 36 14	SQ/SQE 2 - 70	96 08 03 94	SQ/SQE 2 - 70
96 03 36 15	SQ/SQE 2 - 85	*)	
96 03 36 16	SQ/SQE 2 - 100	96 08 04 05	SQ/SQE 2 - 100
96 03 37 99	SQ/SQE 2 - 115	96 08 04 06	SQ/SQE 2 - 115
96 03 36 17	SQ/SQE 2 - 130	*)	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 04 32 19	SQ/SQE 2 - 35 N	96 08 07 19	SQ/SQE 2 - 35 N
96 04 32 20	SQ/SQE 2 - 55 N	*)	
96 04 32 29	SQ/SQE 2 - 70 N	96 08 07 29	SQ/SQE 2 - 70 N
96 04 32 30	SQ/SQE 2 - 85 N	*)	
96 04 32 40	SQ/SQE 2 - 100 N	96 08 07 40	SQ/SQE 2 - 100 N
96 04 32 41	SQ/SQE 2 - 115 N	96 08 07 41	SQ/SQE 2 - 115 N
96 04 32 42	SQ/SQE 2 - 130 N	*)	
North America NPT 1 1/4"			
96 03 36 77	10 SQ/SQE - 110	96 08 04 17	10 SQ/SQE - 110
96 03 36 78	10 SQ/SQE - 160	*)	
96 03 36 79	10 SQ/SQE - 200	96 08 04 27	10 SQ/SQE - 200
96 03 36 80	10 SQ/SQE - 240	*)	
96 03 36 81	10 SQ/SQE - 290	96 08 04 38	10 SQ/SQE - 290
96 03 38 01	10 SQ/SQE - 330	96 08 04 39	10 SQ/SQE - 330
96 03 36 82	10 SQ/SQE - 380	*)	
JAPAN Rp 1			
96 04 31 54	SQ/SQE 2 - 35	96 08 04 50	SQ/SQE 2 - 35
96 04 31 55	SQ/SQE 2 - 55	*)	
96 04 31 61	SQ/SQE 2 - 70	96 08 06 65	SQ/SQE 2 - 70
96 04 31 62	SQ/SQE 2 - 85	*)	
96 04 31 68	SQ/SQE 2 - 100	96 08 06 72	SQ/SQE 2 - 100
96 04 31 69	SQ/SQE 2 - 115	96 08 06 73	SQ/SQE 2 - 115
Austria Rp 1 1/4			
96 04 05 37	SQ/SQE 2 - 35	96 08 06 86	SQ/SQE 2 - 35
96 04 05 38	SQ/SQE 2 - 55	*)	
96 04 05 47	SQ/SQE 2 - 70	96 08 06 96	SQ/SQE 2 - 70
96 04 05 48	SQ/SQE 2 - 85	*)	
96 04 05 57	SQ/SQE 2 - 100	96 08 07 07	SQ/SQE 2 - 100
96 04 05 58	SQ/SQE 2 - 115	96 08 07 08	SQ/SQE 2 - 115
96 04 05 59	SQ/SQE 2 - 130	*)	

*) The corresponding model B pump requires a bigger motor. Consequently, EITHER fit a smaller pump OR replace both pump and motor.

5.3 SQ/SQE 3, 15 SQ/SQE

The pump is not serviced with components/kits, but are replaced with complete pump end model B			
Product number model A		Product number model B	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 03 36 18	SQ/SQE 3 - 30	96 08 03 86	SQ/SQE 3 - 30
96 03 36 01	SQ/SQE 3 - 40	96 08 03 87	SQ/SQE 3 - 40
96 03 36 19	SQ/SQE 3 - 55	96 08 03 96	SQ/SQE 3 - 55
96 03 36 20	SQ/SQE 3 - 65	96 08 03 97	SQ/SQE 3 - 65
96 03 36 21	SQ/SQE 3 - 80	96 08 04 08	SQ/SQE 3 - 80
96 03 36 22	SQ/SQE 3 - 95	96 08 04 09	SQ/SQE 3 - 95
96 03 36 23	SQ/SQE 3 - 105	96 08 04 10	SQ/SQE 3 - 105
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 04 32 21	SQ/SQE 3 - 30 N	96 08 07 21	SQ/SQE 3 - 30 N
96 04 32 22	SQ/SQE 3 - 40 N	96 08 07 22	SQ/SQE 3 - 40 N
96 04 32 31	SQ/SQE 3 - 55 N	96 08 07 31	SQ/SQE 3 - 55 N
96 04 32 32	SQ/SQE 3 - 65 N	96 08 07 32	SQ/SQE 3 - 65 N
96 04 32 43	SQ/SQE 3 - 80 N	96 08 07 43	SQ/SQE 3 - 80 N
96 04 32 44	SQ/SQE 3 - 95 N	96 08 07 44	SQ/SQE 3 - 95 N
96 04 32 45	SQ/SQE 3 - 105 N	96 08 07 45	SQ/SQE 3 - 105 N
North America NPT 1 1/4"			
96 03 36 83	15 SQ/SQE - 70	96 08 04 19	15 SQ/SQE - 70
96 03 36 84	15 SQ/SQE - 110	96 08 04 20	15 SQ/SQE - 110
96 03 36 85	15 SQ/SQE - 150	96 08 04 29	15 SQ/SQE - 150
96 03 36 86	15 SQ/SQE - 180	96 08 04 30	15 SQ/SQE - 180
96 03 36 87	15 SQ/SQE - 220	96 08 04 41	15 SQ/SQE - 220
96 03 36 88	15 SQ/SQE - 250	96 08 04 42	15 SQ/SQE - 250
96 03 36 89	15 SQ/SQE - 290	96 08 04 43	15 SQ/SQE - 290
JAPAN Rp 1			
96 04 31 56	SQ/SQE 3 - 30	96 08 04 52	SQ/SQE 3 - 30
96 04 31 57	SQ/SQE 3 - 40	96 08 04 53	SQ/SQE 3 - 40
96 04 31 63	SQ/SQE 3 - 55	96 08 06 67	SQ/SQE 3 - 55
96 04 31 64	SQ/SQE 3 - 65	96 08 06 68	SQ/SQE 3 - 65
96 04 31 70	SQ/SQE 3 - 80	96 08 06 74	SQ/SQE 3 - 80
96 04 31 71	SQ/SQE 3 - 95	96 08 06 75	SQ/SQE 3 - 95
Austria Rp 1 1/4			
96 04 05 39	SQ/SQE 3 - 30	96 08 06 88	SQ/SQE 3 - 30
96 04 05 40	SQ/SQE 3 - 40	96 08 06 89	SQ/SQE 3 - 40
96 04 05 49	SQ/SQE 3 - 55	96 08 06 98	SQ/SQE 3 - 55
96 04 05 50	SQ/SQE 3 - 65	96 08 06 99	SQ/SQE 3 - 65
96 04 05 60	SQ/SQE 3 - 80	96 08 07 10	SQ/SQE 3 - 80
96 04 05 61	SQ/SQE 3 - 95	96 08 07 11	SQ/SQE 3 - 95
96 04 05 62	SQ/SQE 3 - 105	96 08 07 12	SQ/SQE 3 - 105

5.4 SQ/SQE 5, 22 SQ/SQE

The pump is not serviced with components/kits, but are replaced with complete pump end model B			
Product number model A		Product number model B	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 03 36 24	SQ/SQE 5 - 15	96 08 03 88	SQ/SQE 5 - 15
96 03 36 25	SQ/SQE 5 - 25	96 08 03 89	SQ/SQE 5 - 25
96 03 36 26	SQ/SQE 5 - 35	96 08 03 98	SQ/SQE 5 - 35
96 03 36 27	SQ/SQE 5 - 50	*)	
96 03 36 28	SQ/SQE 5 - 60	96 08 04 11	SQ/SQE 5 - 60
96 03 36 29	SQ/SQE 5 - 70	96 08 04 12	SQ/SQE 5 - 70
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 04 32 23	SQ/SQE 5 - 15 N	96 08 07 23	SQ/SQE 5 - 15 N
96 04 32 24	SQ/SQE 5 - 25 N	96 08 07 24	SQ/SQE 5 - 25 N
96 04 32 33	SQ/SQE 5 - 35 N	96 08 07 33	SQ/SQE 5 - 35 N
96 04 32 34	SQ/SQE 5 - 50 N	*)	
96 04 32 46	SQ/SQE 5 - 60 N	96 08 07 46	SQ/SQE 5 - 60 N
96 04 32 47	SQ/SQE 5 - 70 N	96 08 07 47	SQ/SQE 5 - 70 N
North America NPT 1 1/4"			
96 03 36 90	22 SQ/SQE - 40	96 08 04 21	22 SQ/SQE - 40
96 03 36 91	22 SQ/SQE - 80	96 08 04 22	22 SQ/SQE - 80
96 03 36 92	22 SQ/SQE - 120	96 08 04 31	22 SQ/SQE - 120
96 03 36 93	22 SQ/SQE - 160	*)	
96 03 36 94	22 SQ/SQE - 190	96 08 04 44	22 SQ/SQE - 190
96 03 36 95	22 SQ/SQE - 220	96 08 04 45	22 SQ/SQE - 220
JAPAN Rp 1			
96 03 36 24	SQ/SQE 5 - 15	96 08 03 88	SQ/SQE 5 - 15
96 03 36 25	SQ/SQE 5 - 25	96 08 03 89	SQ/SQE 5 - 25
96 03 36 26	SQ/SQE 5 - 35	96 08 03 98	SQ/SQE 5 - 35
96 03 36 27	SQ/SQE 5 - 50	*)	
96 03 36 28	SQ/SQE 5 - 60	96 08 04 11	SQ/SQE 5 - 60
Austria Rp 1 1/4			
96 04 05 41	SQ/SQE 5 - 15	96 08 06 90	SQ/SQE 5 - 15
96 04 05 42	SQ/SQE 5 - 25	96 08 06 91	SQ/SQE 5 - 25
96 04 05 51	SQ/SQE 5 - 35	96 08 07 00	SQ/SQE 5 - 35
96 04 05 63	SQ/SQE 5 - 50	*)	
96 04 05 64	SQ/SQE 5 - 60	96 08 07 13	SQ/SQE 5 - 60
96 04 05 65	SQ/SQE 5 - 70	96 08 07 14	SQ/SQE 5 - 70

*) The corresponding model B pump requires a bigger motor. Consequently, EITHER fit a smaller pump OR replace both pump and motor.

5.5 SQ/SQE 7, 30 SQ/SQE

The pump is not serviced with components/kits, but are replaced with complete pump end model B			
Product number model A		Product number model B	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 03 36 30	SQ/SQE 7 - 15	96 08 03 90	SQ/SQE 7 - 15
96 03 36 31	SQ/SQE 7 - 30	96 08 04 00	SQ/SQE 7 - 30
96 03 36 32	SQ/SQE 7 - 40	96 08 04 01	SQ/SQE 7 - 40
96 03 36 33	SQ/SQE 7 - 55	*)	
Europe, Australia , AISREG, N-APREG Rp 1 1/4			
96 04 32 25	SQ/SQE 7 - 15 N	96 08 07 25	SQ/SQE 7 - 15 N
96 04 32 35	SQ/SQE 7 - 30 N	96 08 07 35	SQ/SQE 7 - 30 N
96 04 32 36	SQ/SQE 7 - 40 N	96 08 07 36	SQ/SQE 7 - 40 N
96 04 32 48	SQ/SQE 7 - 55 N	*)	
North America		NPT 1 1/4"	
96 03 36 96	30 SQ/SQE - 40	96 08 04 23	30 SQ/SQE - 40
96 03 36 97	30 SQ/SQE - 90	96 08 04 33	30 SQ/SQE - 90
96 03 36 98	30 SQ/SQE - 130	96 08 04 34	30 SQ/SQE - 130
96 03 36 99	30 SQ/SQE - 170	*)	
JAPAN		Rp 1	
96 03 36 30	SQ/SQE 7 - 15	96 08 03 90	SQ/SQE 7 - 15
96 03 36 31	SQ/SQE 7 - 30	96 08 04 00	SQ/SQE 7 - 30
96 03 36 32	SQ/SQE 7 - 40	96 08 04 01	SQ/SQE 7 - 40
Austria		Rp 1 1/4	
96 04 05 43	SQ/SQE 7 - 15	96 08 06 92	SQ/SQE 7 - 15
96 04 05 52	SQ/SQE 7 - 30	96 08 07 02	SQ/SQE 7 - 30
96 04 05 53	SQ/SQE 7 - 40	96 08 07 03	SQ/SQE 7 - 40
96 04 05 66	SQ/SQE 7 - 55	*)	

*) The corresponding model B pump requires a bigger motor. Consequently,
EITHER fit a smaller pump OR replace both pump and motor.

6. Test specifications

SQ / SQE 1

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ1-35	2	0	43	46	50	520	4.50	560	2.40
5-SQ-90		1	31	34	36				
SQ1-50	3	0	65	70	76	720	6.30	740	3.20
5-SQ-140		1	48	53	56				
SQ1-65	4	0	87	94	101	910	9.10	930	4.00
5-SQ-180		1	65	71	74				
SQ1-80	5	0	110	118	127			1140	4.90
5-SQ-230		1	83	90	93				
SQ1-95	6	0	132	142	153			1290	5.60
5-SQ-270		1	100	108	112				
SQ1-110	7	0	154	166	178			1490	6.50
5-SQ-320		1	117	126	132				
SQ1-125	8	0	176	190	204			1730	7.50
5-SQ-360		1	134	144	152				
SQ1-140	9	0	198	214	229			1970	8.40
5-SQ-410		1	151	162	171				
SQ1-155	10	0	221	238	255			2190	9.50
5-SQ-450		1	168	181	190				

SQ / SQE 2

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ2-35	2	0	41	44	49	730	6.40	740	3.20
10-SQ-110		2	32	35	38				
SQ2-55	3	0	62	68	74	1000	8.90	1020	4.40
10-SQ-160		2	50	54	59				
SQ2-70	4	0	81	88	96			1290	5.60
10-SQ-200		2	66	71	78				
SQ2-85	5	0	100	109	119			1450	6.30
10-SQ-240		2	81	88	96				
SQ2-100	6	0	121	132	143			1840	8.00
10-SQ-290		2	100	108	118				
SQ2-115	7	0	143	155	168			2120	9.20
10-SQ-330		2	119	128	139				

Water temperature: 20-25 °C

Max. testtime: 5 min

To be tested at nominal voltage and frequency

Flow adjusted to +/- 0.02

SQ / SQE 3

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ3-30	2	0	32	35	39	720	6.30	740	3.20
15-SQ-70		3	23	26	28				
SQ3-40	3	0	51	55	61	970	8.60	1000	4.30
15-SQ-110		3	38	42	46				
SQ3-55	4	0	67	73	80			1250	5.40
15-SQ-150		3	51	56	61				
SQ3-65	5	0	84	91	99			1490	6.50
15-SQ-180		3	63	70	76				
SQ3-80	6	0	101	110	119			1770	7.70
15-SQ-220		3	76	84	91				
SQ3-95	7	0	118	128	139			1990	8.70
15-SQ-250		3	89	98	107				
SQ3-105	8	0	135	146	159			2300	10.00
15-SQ-290		3	101	113	122				

SQ / SQE 5

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ5-15	1	0	16	18	20	490	4.20	410	2.20
22-SQ-40		5	9	11	13				
SQ5-25	2	0	33	36	40	850	7.50	880	3.70
22-SQ-80		5	20	23	26				
SQ5-35	3	0	49	53	59			1200	5.20
22-SQ-120		5	31	36	40				
SQ5-50	4	0	65	71	77			1540	6.70
22-SQ-160		5	43	48	53				
SQ5-60	5	0	81	88	96			1880	8.20
22-SQ-190		5	54	61	66				
SQ5-70	6	0	97	106	115			2250	9.80
22-SQ-220		5	65	73	81				

SQ / SQE 7

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ7-15	1	0	19	20	23	690	6.00	720	3.10
30-SQ-40		7	6	9	12				
SQ7-30	2	0	38	42	46			1280	5.50
30-SQ-90		7	19	23	27				
SQ7-40	3	0	58	63	69			1820	7.90
30-SQ-130		7	32	37	42				

Water temperature: 20-25 °C

Max. testtime: 5 min

To be tested at nominal voltage and frequency

Flow adjusted to +/- 0.02