

CM, CME

Service instructions



Original service instructions.

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1. Symbols used in this document



Warning

If these safety instructions are not observed, it may result in personal injury.

Caution

If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

Note

Notes or instructions that make the job easier and ensure safe operation.

2. Type identification

This section shows the nameplate, the type key 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).

2.1 Nameplate

Type 1		P _{max} 6 bar 6 PSI 6 MPa	
Model 2		T _{liq,max} 7 °C 7 °F	
Env 3	IP 4	T _{Amb} 5 °C 5 °F	Insulation class 8 9
50 Hz	Q _{nom} 10 m ³ /h 10 GPM	ZH 09	Q _{nom} 10 m ³ /h 10 GPM
	H _{nom} 11 m 11 PSI		H _{nom} 11 m 11 PSI
	H _{max} 12 m 12 PSI		H _{max} 12 m 12 PSI

6E802T56

Fig. 1 Pump nameplate

50 Hz	1 ~ 2 / 2 V	60 Hz	1 ~ 2 / 2 V
I _{max} 3 / 3 A	I _{max} 3 / 3 A	I _{max} 3 / 3 A	I _{max} 3 / 3 A
I _{1/1} 4 / 4 A	I _{1/1} 4 / 4 A	I _{1/1} 4 / 4 A	I _{1/1} 4 / 4 A
P ₂ 5 kW 5 HP	P ₂ 5 kW 5 HP	P ₂ 5 kW 5 HP	P ₂ 5 kW 5 HP
Capacitor 6 uF / V	Capacitor 6 uF / V	Capacitor 6 uF / V	Capacitor 6 uF / V




95120836

Fig. 2 Motor nameplate

The pump and motor nameplates are positioned on the motor fan cover or terminal box.

The data and information on the pump nameplate are described in the table below.

Pos.	Description
1	Pump type
2	Pump model
3	Environmental rating for enclosures based on NEMA type designations
4	Enclosure class
5	Maximum ambient temperature [°C] / [°F]
6	Maximum system pressure [bar] / [psi] / [MPa]
7	Maximum liquid temperature [°C] / [°F]
8	Insulation class
9	Motor protection
10	Rated flow [m ³ /h] / [GPM]
11	Head at rated flow [m] / [psi]
12	Maximum head [m] / [psi]

The data and information on the motor nameplate are described in the table below.

Pos.	Description
1	Number of phases
2	Voltage [V]
3	Maximum current [A]
4	Rated current [A]
5	Power output [kW] / [hp]
6	Single-phase pumps only: Capacitor size [μF] and voltage [V]

2.2 Type key

CM, CME

Example		CME	10	-	8	A	-	R	-	A	-	E	-	A	V	B	E	X	-	X	-	X	-	X
Type range																								Sensor
CM	Centrifugal Modular																							Sensor designation
CME:	CM with integrated frequency converter																							
Rated flow rate																								
Rated flow rate at 50 Hz [m ³ /h]																								
Number of impellers																								
Pump version																								
A:	Basic version																							
B:	Oversize motor (one flange size larger)																							
E:	Pumps with certificates and other approvals																							
HS:	High-pressure pump with high-speed MGE motor																							
I:	Altered pressure class																							
J:	Pump with a different maximum speed																							
M:	Magnet-driven pump																							
N:	CME pump with sensor (see code for "Sensor")																							
P:	Undersize motor (one flange size smaller)																							
T:	Oversize motor (two flange sizes larger)																							
V:	CME pump for Multi-E																							
X:	Special pump																							
Pipe connection																								
C:	Tri-Clamp®																							
F:	DIN flange																							
G:	ANSI flange																							
J:	JIS flange																							
P:	PJE coupling																							
R:	Whitworth thread Rp (ISO 7/1)																							
S:	Internal NPT thread																							
Materials in contact with pumped liquid																								
	Inlet and discharge parts																							EN-GJL-200
A:	Pump shaft																							EN 1.4057/AISI 431
	Impellers/chambers																							EN 1.4301/AISI 304
	Sleeve																							EN 1.4401/AISI 316
G:	Pump shaft																							EN 1.4401/AISI 316
	Impellers/chambers																							EN 1.4401/AISI 316
	Sleeve																							EN 1.4301/AISI 304
I:	Pump shaft																							EN 1.4301/AISI 304
	Impellers/chambers																							EN 1.4301/AISI 304
X:	Special version																							
Rubber parts in pump (excl. neck ring and shaft seal)																								
E:	EPDM (ethylene propylene)																							
K:	FFKM (perfluor)																							
V:	FKM (fluor)																							
Note: Gaskets between chambers of cast-iron versions are made of Tesnit BA-U.																								
Mains plug																								
A: Cable glands																								
B: Harting plug																								
C: With cable																								
Motor information																								
A: Standard motor (IP55)																								
B: Phase-insulated motor for use with frequency converter																								
C: IP54																								
D: Pt100 in stator																								
E: Angular contact bearing																								
F: Motor heater																								
G: Three-phase motor with overload protection																								
H: Single-phase motor with no overload protection																								
Supply voltage																								
A: 1 x 220 V, 60 Hz																								
B: 1 x 115/230 V, 60 Hz																								
C: 1 x 220-240 V, 50 Hz																								
D: 1 x 127 V, 60 Hz																								
E: 3 x 208-230/440-480 V, 60 Hz																								
F: 3 x 220-240/380-415 V, 50 Hz																								
G: 3 x 200/346 V, 50 Hz; 200-220/346-380 V, 60 Hz																								
H: 3 x 575 V, 60 Hz																								
I: 3 x 400 V, 50/60 Hz																								
J: 3 x 380-415 V, 50 Hz; 440-480 V, 60 Hz																								
K: 1 x 220-240 V, MGE motor																								
L: 3 x 380-480 V, MGE motor																								
M: 1 x 208-230 V, MLE motor																								
N: 3 x 460-480 V, MLE motor																								
O: 3 x 220-240/380-415 V, 50 Hz																								
3 x 220-255/380-440 V, 60 Hz																								
Material of secondary seal																								
E: EPDM (ethylene propylene)																								
K: FFKM (perfluor)																								
V: FKM (fluor)																								
Material of stationary shaft seal part																								
B: Carbon, synthetic resin-impregnated																								
Q: Silicon carbide (SiC)																								
Material of rotating seal face																								
Q: Silicon carbide (SiC)																								
V: Aluminium oxide (Al ₂ O ₃)																								
Shaft seal type designation																								
A: O-ring seal with fixed driver																								

Note

The type key cannot be used for ordering, as not all combinations are possible.

3. Tightening torques and lubricants

Pos.	Designation	Quantity	Dimensions	Torque [Nm]	Lubricant
2b	Screw, CM 1, 3, 5	2	M8 x 40	16 - 18	THREAD-EZE
	Hexagon socket head cap screw CM 10, 15, 25	2	M8 x 80	16 - 18	THREAD-EZE
11	O-ring	2	Ø18.5 x 2.0	-	-
25	Plug	2	-	10 - 12	-
26	Staybolt, CM 1, 3, 5, cast iron	4	M6	12 - 14	-
	Staybolt, CM 1, 3, 5, stainless steel	4	M8	12 - 14	-
	Staybolt, CM 10, 15, 25, cast iron	4	M8	25-27	THREAD-EZE
	Staybolt, CM 10, 15, 25, stainless steel	4	M8	20-22	-
28g	Screw	4	M6 x 14	8 - 10	THREAD-EZE
31	O-ring, CM 1, 3, 5	1	Ø114.0 x 3.90	-	Rocol 22
	O-ring, CM 10, 15, 25	1	Ø153.2 x 4.70	-	Rocol 22
67	Lock nut	1	M8	16 - 18	-
102	O-ring	1	Ø17.86 x 2.62	-	V7140084
103	Seal faces	1	-	-	Silicone oil, 350 cSt, food grade
107	O-ring	1	Ø11.5 x 3.18	-	Rocol 22
152	Screw	2	M4 x 8	2.7 - 3.3	-
		4	M5 x 12	3.5 - 4	-
155	Bearing cover plate	1	-	-	Rocol 22
157a	Gasket, MG 71, MG 80	1	Ø114.8 / 121.2 x 0.25	-	-
	Gasket, MG 90	2	Ø141.2 / 145.5	-	-
	Gasket, MG 100	-	-	-	-
158a	O-ring	1	Ø35.4 x 1.97	-	Rocol 22
159	O-ring, MG 71, MG 80	1	Ø32 x 2	-	Rocol 22
	O-ring, MG 90, MG 100	1	Ø52 x 3.0		
	O-ring, MG 112, 132	1	Ø62 x 3.0		
159a	Seal ring	1	-	-	Castrol LMX grease
181	Screw, MG 71, MG 80	4	M6 x 16	5 - 8	THREAD-EZE
	Staybolt, MG 90	4	M5 x 220	4.5 - 6	
	Staybolt, MG 90L	4	M5 x 260		
	Staybolt, MG 100	4	M5 x 270		
	Staybolt, MG 112	4	M6 x 288		

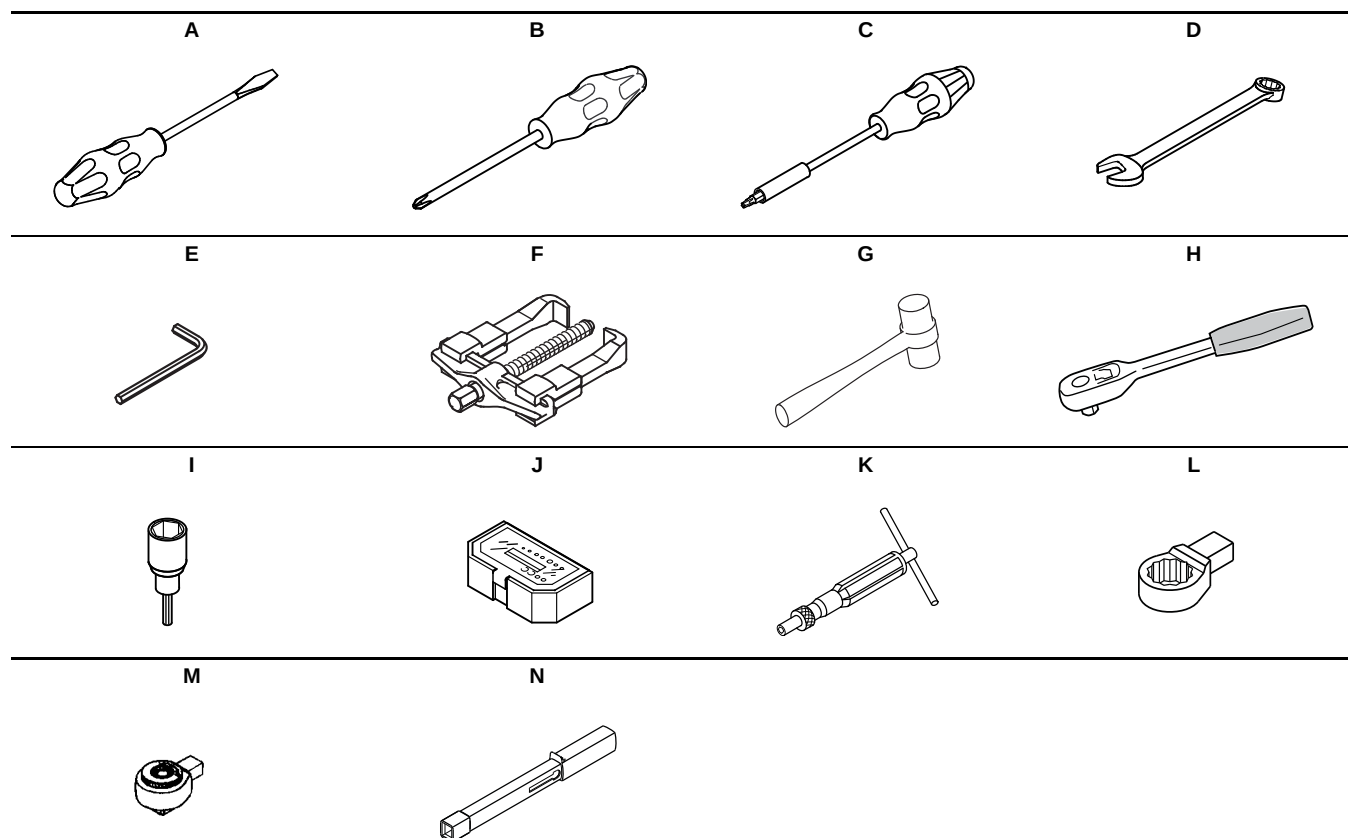
THREAD-EZE, part number 00SV9997 (0.5 l).

Rocol 22, part number 00RM2924 (1 kg).

Castrol LMX grease, part number 00RM4311.

Silicone oil, 350 cSt, food grade 00SV0862 (1 l).

4. Service tools



4.1 Standard tools

Pos.	Designation	For pos.	Further information	Part number
A	Screwdriver	103, 156	-	SV0803
B	Cross-head screwdriver	181	Ph2 x 100	SV0279
C	Torx screwdriver	J	TX30 x 115 mm	SV0335
D	Ring/open-end spanner	64c	15 mm	-
		67	13 mm	SV0055
E	Hexagon key	26	5 mm	-
			6 mm	SV0196
F	Puller for bearing	153, 154	-	-
G	Plastic hammer	156	-	SV0349
H	Ratchet handle	156	-	96777072
I	Hexagon head driver	26	M6 - 5 mm	SV0296
			M8 - 6 mm	SV0297
		181	M5 - 4 mm	-
J	Bits kit	28g, 152, 181	-	SV2010

4.2 Torque tools

Pos.	Designation	For pos.	Further information	Part number
K	Torque screwdriver	J	1-6 Nm	SV0438
L	Ring insert tool	N	13 mm - 9 x 12 mm	SV0294
M	Ratchet insert tool	I	9 x 12 mm - 1/2"	SV0295
N	Torque wrench	L, M	9 x 12 mm - 4-20 Nm	SV2092
			9 x 12 mm - 20-100 Nm	SV0269

5. Dismantling and assembly

5.1 General information

If it is necessary to dismantle the pump, either because it is choked or damaged, please follow the instructions in the following sections.

Position numbers of parts (digits) refer to section 7. *Drawings*; position numbers of tools (letters) refer to section 4. *Service tools*.

Before dismantling the pump

- Disconnect the electricity supply to the motor.
- Close the isolating valves, if fitted, to avoid draining the system.
- Remove the electric cable in accordance with local regulations.

Before assembly

- Clean and check all parts.
- Replace defective parts by new parts.
- Order the necessary service kits.
- Gaskets and O-rings should always be replaced when the pump is overhauled.

During assembly

- Lubricate and tighten screws and nuts to correct torque. See section 3. *Tightening torques and lubricants*.

5.2 CM 1, 3, 5, cast iron

5.2.1 Dismantling

1. Remove staybolts (pos. 26).
2. Remove inlet part (pos. 6).
3. Remove gasket (pos. 139b) and chamber (pos. 4e).
4. Hold clamp (pos. 64c), and remove nut (pos. 67).
5. Remove lock washers (pos. 66) and clamp (pos. 64c).
6. Remove impeller (pos. 49).
7. Remove bearing ring (pos. 47a) and short spacing pipe (pos. 64a).

Note Step 7 applies only to pumps with eight stages.

8. Remove chamber for bearing (pos. 4a), gasket (pos. 139b), impeller (pos. 49) and spacing pipe (pos. 64).

Note Step 8 applies only to pumps with eight stages.

9. Continue the dismantling until shaft seal (pos. 105).
10. Remove shaft seal (pos. 105). See fig. 3.

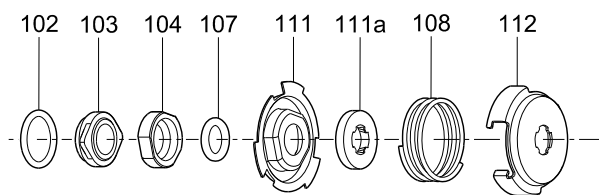


Fig. 3 Exploded view of shaft seal

Dismantling of MG 71 and MG 80, see section 5.6.1.

Note Dismantling of MG 90 and MG 100, see section 5.7.1.

It is advisable always to replace wear rings (pos. 45) and wear ring retainers (pos. 65). See section 5.8.

Note

5.2.2 Assembly

Note Assembly of MG 71 and MG 80, see section 5.6.2.
Assembly of MG 90 and MG 100, see section 5.7.2.

1. Fit O-ring (pos. 102) on the stationary shaft seal part. See fig. 4. For correct lubricant, see section 3. *Tightening torques and lubricants*.

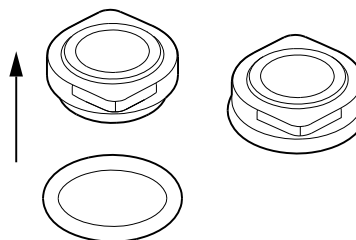


Fig. 4 Fitting the O-ring on the stationary shaft seal part

2. Press the stationary shaft seal part home. See fig. 5.



Warning
Do not touch the seal face.

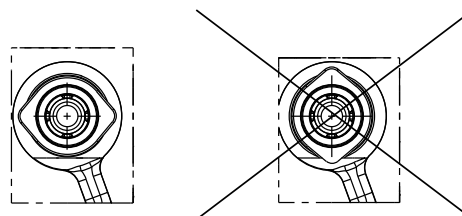


Fig. 5 Fitting the stationary shaft seal part (only SiC/SiC)

3. Fit the rotating shaft seal part (pos. 104) so that the seal face touches the stationary part.



Warning
Do not touch the seal face.

4. Fit O-ring (pos. 107) into the rotating shaft seal part (pos. 104). For correct lubricant, see section 3. *Tightening torques and lubricants*.
5. Fit retainer (pos. 111) and stop ring (pos. 111a). See fig. 6.

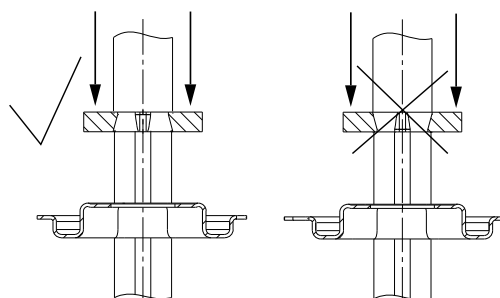


Fig. 6 Fitting the stop ring

6. Fit spring (pos. 108) and driver (pos. 112). See fig. 7.

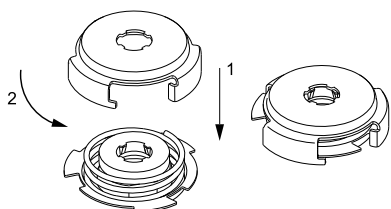


Fig. 7 Fitting the spring and driver

7. Fit impeller (pos. 49), spacing pipe (pos. 64), gasket (pos. 139b) and chamber plate (pos. 4f).
8. Continue the assembly until chamber for bearing (pos. 4a).

Note Step 8 applies only to pumps with eight stages.

9. Fit chamber for bearing (pos. 4a), short spacing pipe (pos. 64a), gasket (pos. 139b) and bearing ring (pos. 47a). See section 8. Order of assembly for chambers and impellers.

Note Step 9 applies only to pumps with eight stages.

10. Fit impeller (pos. 49), clamp (pos. 64c), washers (pos. 66) and nut (pos. 67). See fig. 8.

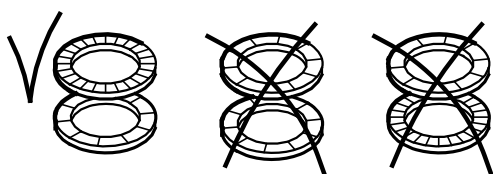


Fig. 8 Correct fitting of washers

11. Hold clamp (pos. 64c), and tighten nut (pos. 67). See section 3. Tightening torques and lubricants.
12. Fit chamber (pos. 4e) and gasket (pos. 139b).
13. Fit inlet part (pos. 6).
14. Fit and cross-tighten staybolts (pos. 26). See section 3. Tightening torques and lubricants.

5.3 CM 1, 3, 5, stainless steel

5.3.1 Dismantling

1. Remove staybolts (pos. 26).
2. Remove clamping flange (pos. 6a) and sleeve (pos. 16).
3. Remove chamber (pos. 4e).
4. Hold clamp (pos. 64c), and remove nut (pos. 67).
5. Remove lock washers (pos. 66) and clamp (pos. 64c).
6. Remove impeller (pos. 49).
7. Remove bearing ring (pos. 47a) and short spacing pipe (pos. 64a).

Note Step 7 applies only to pumps with eight or more stages.

8. Remove chamber for bearing (pos. 4a), impeller (pos. 49) and spacing pipe (pos. 64).

Note Step 8 applies only to pumps with eight or more stages.

9. Continue the dismantling until shaft seal (pos. 105).
10. Remove shaft seal (pos. 105). See fig. 9.

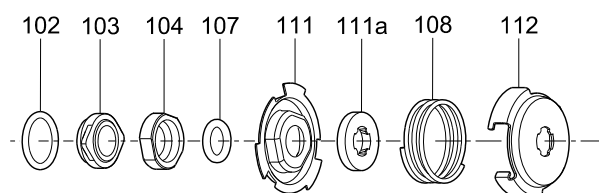


Fig. 9 Exploded view of shaft seal

11. Remove O-ring (pos. 31) and cover plate (pos. 32).

Dismantling of MG 71 and MG 80, see section 5.6.1.
Dismantling of MG 90 and MG 100, see section 5.7.1.

It is advisable always to replace wear rings (pos. 45) and wear ring retainers (pos. 65). See section 5.8.

5.3.2 Assembly

Assembly of MG 71 and MG 80, see section 5.6.2.
Assembly of MG 90 and MG 100, see section 5.7.2.

1. Fit cover plate (pos. 32) and O-ring (pos. 31). Lubricate the O-ring. See section 3. Tightening torques and lubricants.
2. Fit O-ring (pos. 102) on the stationary shaft seal part. See fig. 10. See section 3. Tightening torques and lubricants.

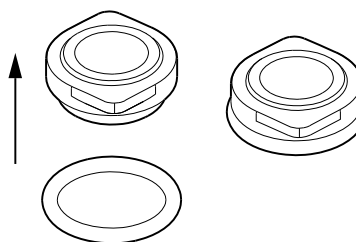


Fig. 10 Fitting the O-ring on the stationary shaft seal part

TM04 4322 1909

TM04 4326 1209

TM02 1057 0501

TM04 4327 1909

3. Press the stationary shaft seal part home. See fig. 11.



Warning
Do not touch the seal face.

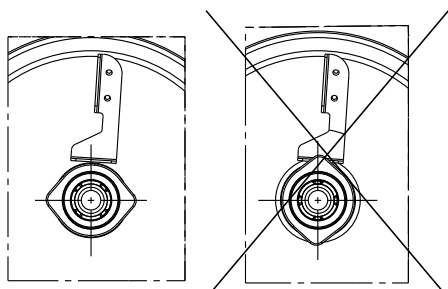


Fig. 11 Fitting the stationary shaft seal part (only SiC/SiC)

4. Fit the rotating shaft seal part (pos. 104) so that the seal face touches the stationary part.



Warning
Do not touch the seal face.

5. Fit O-ring (pos. 107) into the rotating shaft seal part (pos. 104). See section 3. *Tightening torques and lubricants*.
6. Fit retainer (pos. 111) and stop ring (pos. 111a). See fig. 12.

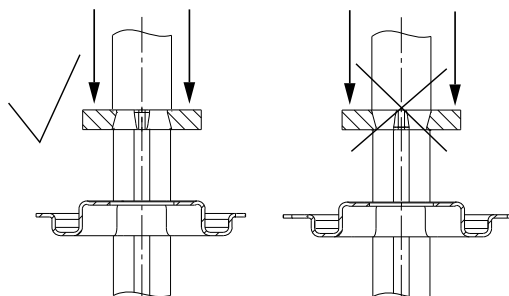


Fig. 12 Fitting the stop ring

7. Fit spring (pos. 108) and driver (pos. 112). See fig. 13.

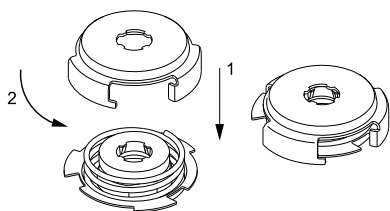


Fig. 13 Fitting the spring and driver

8. Fit impeller (pos. 49), chamber with holes (pos. 4d) and spacing pipe (pos. 64).
9. Fit impeller (pos. 49), chamber (pos. 4) and spacing pipe (pos. 64).
10. Fit impeller (pos. 49), chamber (pos. 4a), short spacing pipe (pos. 64a) and bearing ring (pos. 47a). See section 8. *Order of assembly for chambers and impellers*.

Note

Step 10 applies only to pumps with eight or more stages.

11. Fit impeller (pos. 49), clamp (pos. 64c), washers (pos. 66) and nut (pos. 67). See fig. 14.

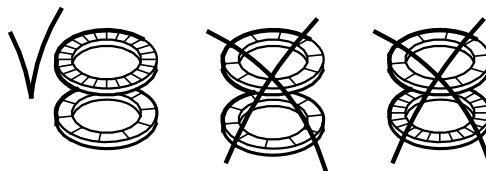


Fig. 14 Correct fitting of washers

12. Hold clamp (pos. 64c), and tighten nut (pos. 67). See section 3. *Tightening torques and lubricants*.
13. Fit chamber (pos. 4e), sleeve (pos. 16) and clamping flange (pos. 6a).

Caution **Do not forget to fit the last chamber (pos. 4e), as it is possible to assemble the pump without the last chamber.**

14. Fit and cross-tighten staybolts (pos. 26). See section 3. *Tightening torques and lubricants*.

5.4 CM 10, 15, 25, cast iron

5.4.1 Dismantling

1. Remove staybolts (pos. 26).
2. Remove inlet part (pos. 6) and gasket (pos. 139b).
3. Hold clamp (pos. 64c), and remove nut (pos. 67).
4. Remove lock washers (pos. 66) and clamp (pos. 64c).
5. Remove impeller (pos. 49) and spacing pipe (pos. 64).
6. Remove chamber (pos. 4).
7. Continue the dismantling until shaft seal (pos. 105).
8. Remove shaft seal (pos. 105). See fig. 15.

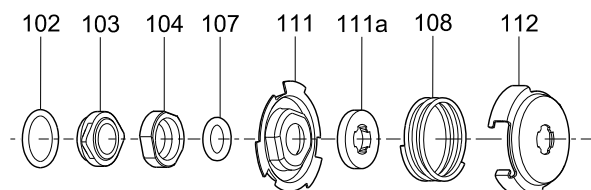


Fig. 15 Exploded view of shaft seal

9. Loosen and remove screws (pos. 2b) and discharge part (pos. 2).

Note **Dismantling of MG 71 and MG 80, see section 5.6.1.**

Dismantling of MG 90, MG 100, MG 112 and MG 132, see section 5.7.1.

Note **It is advisable always to replace wear rings (pos. 45) and wear ring retainers (pos. 65). See section 5.8.**

5.4.2 Assembly

Assembly of MG 71 and MG 80, see section 5.6.2.

Note **Assembly of MG 90, MG 100, MG 112 and MG 132, see section 5.7.2.**

1. Fit discharge part (pos. 2).
2. Fit and tighten screws (pos. 2b).
See section 3. *Tightening torques and lubricants*
3. Fit O-ring (pos. 102) on the stationary shaft seal part.
See fig. 16. See section 3. *Tightening torques and lubricants*.

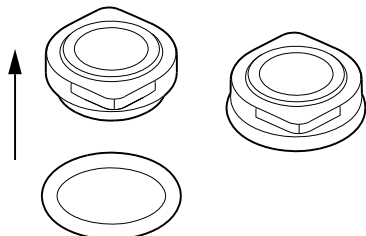


Fig. 16 Fitting the O-ring on the stationary shaft seal part

4. Press the stationary shaft seal part home. See fig. 17.



Warning
Do not touch the seal face.

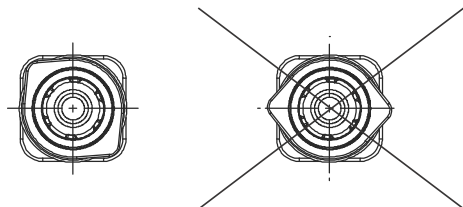


Fig. 17 Fitting the stationary shaft seal part (only SiC/SiC)

5. Fit the rotating shaft seal part (pos. 104) so that the seal face touches the stationary part.



Warning
Do not touch the seal face.

6. Fit O-ring (pos. 107) into the rotating shaft seal part (pos. 104).
See section 3. *Tightening torques and lubricants*
7. Fit retainer (pos. 111) and stop ring (pos. 111a). See fig. 18.

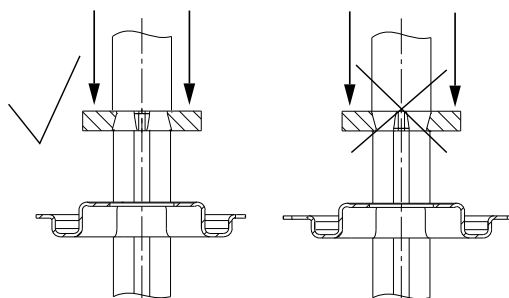


Fig. 18 Fitting the stop ring

8. Fit spring (pos. 108) and driver (pos. 112). See fig. 19.

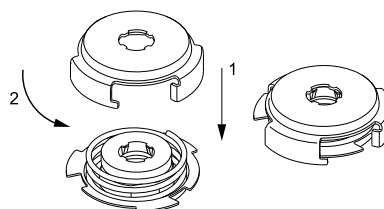


Fig. 19 Fitting the spring and driver

9. Fit short spacing pipe (pos. 64a), impeller (pos. 49), gasket (pos. 139c) and chamber (pos. 4g).
10. Fit gasket (pos. 139b), spacing pipe (pos. 64), impeller (pos. 49) and chamber (pos. 4).
11. Continue the assembly until clamp (pos. 64c). For correct fitting of chambers and impellers, see section 8. *Order of assembly for chambers and impellers*.
12. Fit impeller (pos. 49), clamp (pos. 64c), washers (pos. 66) and nut (pos. 67). See fig. 20.

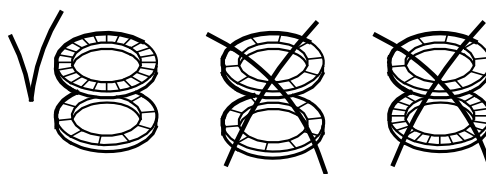


Fig. 20 Correct fitting of washers

13. Hold clamp (pos. 64c), and tighten nut (pos. 67).
See section 3. *Tightening torques and lubricants*.
14. Fit gasket (pos. 139b).
15. Fit inlet part (pos. 6).
16. Fit and cross-tighten staybolts (pos. 26).
See section 3. *Tightening torques and lubricants*.

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5.5 CM 10, 15, 25, stainless steel

5.5.1 Dismantling

1. Remove staybolts (pos. 26).
2. Remove clamping flange (pos. 6a) and sleeve (pos. 16).
3. Remove the chamber plate (pos. 4f).
4. Hold clamp (pos. 64c), and remove nut (pos. 67).
5. Remove lock washers (pos. 66) and clamp (pos. 64c).
6. Remove impeller (pos. 49).
7. Remove spacing pipe (pos. 64e), bearing ring (pos. 47a) and chamber for bearing (pos. 4a).

Note

Step 7 applies only to pumps with six or more stages.

8. Continue the dismantling until shaft seal (pos. 105).
9. Remove shaft seal (pos. 105). See fig. 21.

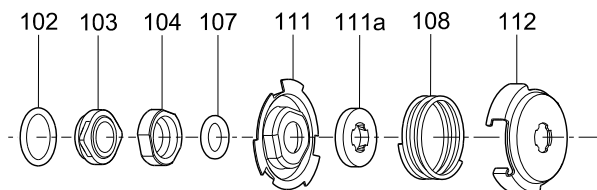


Fig. 21 Exploded view of shaft seal

10. Remove O-ring (pos. 31) and cover plate (pos. 32).

Note

Dismantling of MG 71 and MG 80, see section 5.6.1.

Dismantling of MG 90, MG 100, MG 112 and MG 132, see section 5.7.1.

Note

It is advisable always to replace wear rings (pos. 45) and wear ring retainers (pos. 65). See section 5.8.

5.5.2 Assembly

Note

Assembly of MG 71 and MG 80, see section 5.6.2.

Assembly of MG 90, MG 100, MG 112 and MG 132, see section 5.7.2.

1. Fit cover plate (pos. 32) and O-ring (pos. 31). Lubricate the O-ring. See section 3. *Tightening torques and lubricants*.
2. Fit O-ring (pos. 102) on the stationary shaft seal part. See fig. 22. For correct lubricant, see section 3. *Tightening torques and lubricants*.

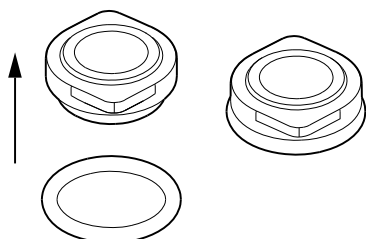


Fig. 22 Fitting the O-ring on the stationary shaft seal part

3. Press the stationary shaft seal part home. See fig. 23.



Warning

Do not touch the seal face.

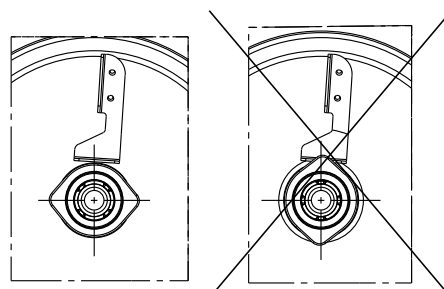


Fig. 23 Fitting the stationary shaft seal part (only SiC/SiC)

4. Fit the rotating shaft seal part (pos. 104) so that the seal face touches the stationary part.



Warning

Do not touch the seal face.

5. Fit O-ring (pos. 107) into the rotating shaft seal part (pos. 104). For correct lubricant, see section 3. *Tightening torques and lubricants*.
6. Fit retainer (pos. 111) and stop ring (pos. 111a). See fig. 24.

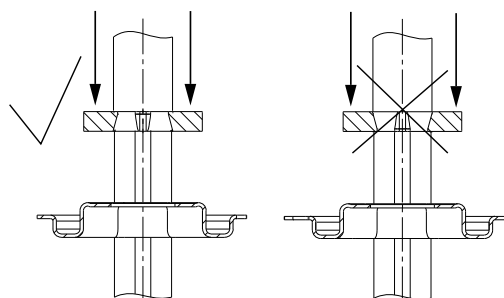


Fig. 24 Fitting the stop ring

7. Fit spring (pos. 108) and driver (pos. 112). See fig. 25.

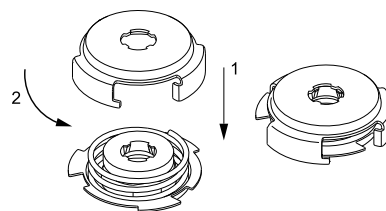


Fig. 25 Fitting the spring and driver

8. Fit short spacing pipe (pos. 64a), chamber with holes (pos. 4d) and impeller (pos. 49).
9. Continue the assembly until clamp (pos. 64c). For correct fitting of chambers and impellers, see section 8. *Order of assembly for chambers and impellers*.

10. Fit clamp (pos. 64c), washers (pos. 66) and nut (pos. 67).
See fig. 26.

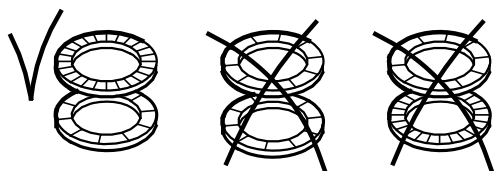


Fig. 26 Correct fitting of washers

11. Hold clamp (pos. 64c), and tighten nut (pos. 67).
See section 3. *Tightening torques and lubricants*.
12. Fit the chamber plate (pos. 4f).

Caution Do not forget to fit the chamber plate (pos. 4f), as it is possible to assemble the pump without the last chamber.

13. Fit sleeve (pos. 16) and clamping flange (pos. 6a).
14. Fit and cross-tighten staybolts (pos. 26). See section 3. *Tightening torques and lubricants*.

5.6 MG 71 and MG 80 motors

5.6.1 Dismantling

1. Remove screws (pos. 152).
2. Remove fan cover (pos. 151).
3. Remove fan (pos. 156) and seal ring (pos. 159a).
4. Remove screws (pos. 181).
5. Remove motor flange (pos. 156b) and gasket (pos. 157a).
6. Remove diverting disc (pos. 79), O-ring (pos. 158a) and bearing cover plate (pos. 155).
7. Pull shaft (pos. 51) out of stator housing (pos. 150).
8. Pull bearing (pos. 153) off shaft (pos. 51).
9. Remove O-ring (pos. 159) and spring (pos. 158).
10. Pull bearing (pos. 154) off shaft (pos. 51).

5.6.2 Assembly

1. Push bearing (pos. 154) onto shaft (pos. 51).
2. Fit spring (pos. 158) and O-ring (pos. 159). See fig. 27.

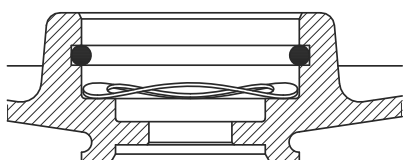


Fig. 27 Correct fitting of spring and O-ring

3. Push bearing (pos. 153) onto shaft (pos. 51).
4. Fit shaft (pos. 51) into stator housing (pos. 150).
5. Fit bearing cover plate (pos. 155), O-ring (pos. 158a) and diverting disc (pos. 79). Lubricate the surface of the cover plate (pos. 155) turning against the bearing. Lubricate the O-ring (pos. 158a).
For correct lubricant, see section 3. *Tightening torques and lubricants*.
6. Fit gasket (pos. 157a) and motor flange (pos. 156b).
7. Fit and cross-tighten screws (pos. 181). See section 3. *Tightening torques and lubricants*.
8. Fit and lubricate the seal ring (pos. 159a).
For correct lubricant, see section 3. *Tightening torques and lubricants*.
9. Fit the fan (pos. 156).
10. Fit fan cover (pos. 151).
11. Fit and tighten screws (pos. 152). See section 3. *Tightening torques and lubricants*.

5.7 MG 90, MG 100, MG 112 and MG 132 motors

5.7.1 Dismantling

1. Only cast iron pumps: Remove screws (pos. 2b).
2. Only cast iron pumps: Remove discharge part (pos. 2).
3. Remove screws (pos. 152).
4. Remove fan cover (pos. 151).
5. Remove fan (pos. 156) and seal ring (pos. 159a).
6. Remove staybolts (pos. 181).
7. Remove motor flange (pos. 156b), gasket (pos. 157a) and bearing cover (pos. 156a).
8. Remove diverting disc (pos. 79), O-ring (pos. 158a) and bearing cover plate (pos. 155).
9. Pull shaft (pos. 51) out of stator housing (pos. 150).
10. Pull bearing (pos. 153) off shaft (pos. 51).
11. Remove O-ring (pos. 159) and spring (pos. 158).
12. Pull bearing (pos. 154) off shaft (pos. 51).

5.7.2 Assembly

1. Push bearing (pos. 154) onto shaft (pos. 51).
2. Fit spring (pos. 158) and O-ring (pos. 159). See fig. 28.

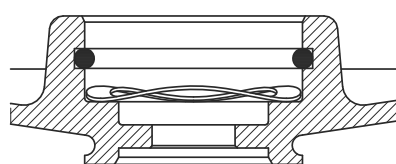


Fig. 28 Correct fitting of spring and O-ring

3. Push bearing (pos. 153) onto shaft (pos. 51).
4. Fit shaft (pos. 51) into stator housing (pos. 150).
5. Fit bearing cover plate (pos. 155), O-ring (pos. 158a) and diverting disc (pos. 79). Lubricate the surface of the cover plate (pos. 155) turning against the bearing. Lubricate the O-ring (pos. 158a).
For correct lubricant, see section 3. *Tightening torques and lubricants*.
6. Fit bearing cover (pos. 156a), gasket (pos. 157a) and motor flange (pos. 156b).
7. Fit and cross-tighten staybolts (pos. 181). See section 3. *Tightening torques and lubricants*.
8. Fit and lubricate the seal ring (pos. 159a). For correct lubricant, see section 3. *Tightening torques and lubricants*.
9. Fit the fan (pos. 156).
10. Fit fan cover (pos. 151).
11. Fit and tighten screws (pos. 152). See section 3. *Tightening torques and lubricants*.
12. Only cast iron pumps: Fit discharge part (pos. 2).
13. Only cast iron pumps: Fit and tighten screws (pos. 2b). See section 3. *Tightening torques and lubricants*.

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5.8 Checking and replacing impellers and chambers

Check	Replace
Impeller	Wear ring/wear ring retainer
Check whether it is necessary to replace the impeller due to friction between wear ring and impeller skirt. If wear has caused a noticeable (use a finger nail) groove in the impeller skirt, the impeller should be replaced. It is advisable always to replace wear rings (pos. 45) and wear ring retainers (pos. 65) when the chamber stack is dismantled.	- Prise the wear ring retainer (pos. 65) up and free of the chamber using a screwdriver. - Remove wear ring (pos. 45). - Fit a new wear ring in the chamber. See fig. 29. - Press a new wear ring retainer on the wear ring and into the chamber. <i>It must be possible to move the wear ring freely (sideways) between the retainer and the chamber.</i>
Bearing ring	
Check whether there is a visible and noticeable (use a finger nail) edge on the rotating bearing ring.	Replace both bearing rings (pos. 47a) and chamber for bearing (pos. 4a).

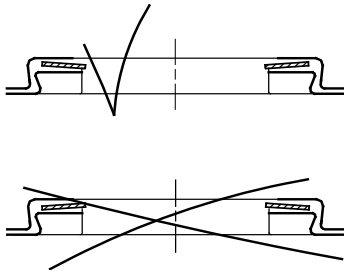


Fig. 29 Correct fitting of wear ring

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6. Fault finding



Warning

Before removing the terminal box cover, make sure that the electricity supply has been switched off.

The pumped liquid may be scalding hot and under high pressure. Before any removal or dismantling of the pump, the system must therefore be drained, or the isolating valves on either side of the pump must be closed.

Fault	Cause	Remedy
1. The pump does not run.	a) Supply failure.	Switch on the switch. Check cables and cable connections for defects and loose connections.
	b) Fuses are blown.	Check cables and cable connections for defects, and replace the fuses.
	c) Motor protection tripped.	See 2. a), b), c), d), e), f).
	d) Control-current circuit defective.	Repair or replace the control-current circuit.
2. Motor-protective circuit breaker has tripped (trips out immediately when supply is switched on).	a) Fuses are blown.	See 1. b).
	b) Contacts of the motor-protective circuit breaker or magnet coil defective.	Replace the contacts of the motor-protective circuit breaker, the magnet coil or the entire motor-protective circuit breaker.
	c) Cable connection is loose or faulty.	Check cables and cable connections for defects, and replace the fuses.
	d) Motor winding is defective.	Repair or replace the motor.
	e) The pump is mechanically blocked.	Switch off the electricity supply, and clean or repair the pump.
	f) The setting of the motor-protective circuit breaker is too low.	Set the motor-protective circuit breaker according to the rated current of the motor ($I_{1/1}$). See nameplate.
3. The motor-protective circuit breaker trips out occasionally.	a) The setting of the motor-protective circuit breaker is too low.	See 2. f).
	b) Periodic supply failure.	See 2. c).
	c) Periodically low voltage.	Check cables and cable connections for defects and loose connections. Check that the supply cable of the pump is correctly sized.
4. The motor-protective circuit breaker has not tripped out, but the pump is inadvertently out of operation.	a) See 1. a), b), d) and 2. e).	
5. The pump performance is unstable.	a) Pump inlet pressure too low.	Check the inlet conditions of the pump.
	b) Inlet pipe is partly blocked by impurities.	Remove and clean the inlet pipe.
	c) Leakage in inlet pipe.	Remove and repair the inlet pipe.
	d) Air in inlet pipe or pump.	Vent the inlet pipe/pump. Check the inlet conditions of the pump.
6. The pump runs, but gives no water.	a) Pump inlet pressure too low.	See 5. a).
	b) Inlet pipe partly blocked by impurities.	See 5. b).
	c) The foot or non-return valve is stuck in its closed position.	Remove and clean, repair or replace the valve.
	d) Leakage in inlet pipe.	See 5. c).
	e) Air in inlet pipe or pump.	See 5. d).
7. The pump runs backwards when switched off.	a) Leakage in inlet pipe.	See 5. c).
	b) Foot or non-return valve defective.	See 6. c).
	c) The foot valve is stuck in completely or partly open position.	See 6. c).
8. The pump runs with reduced performance.	a) Wrong direction of rotation.	Three-phase pumps only: Switch off the electricity supply with the external circuit breaker and interchange two phases in the pump terminal box. It is possible to check the direction of rotation by means of the installation indicator. Black: The direction of rotation is correct. White: The direction of rotation is incorrect.
	b) See 5. a), b), c), d).	

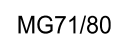
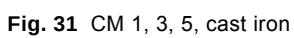


Fig. 30 CM 1, 3, 5, stainless steel



7.2 CM 10, 15, 25

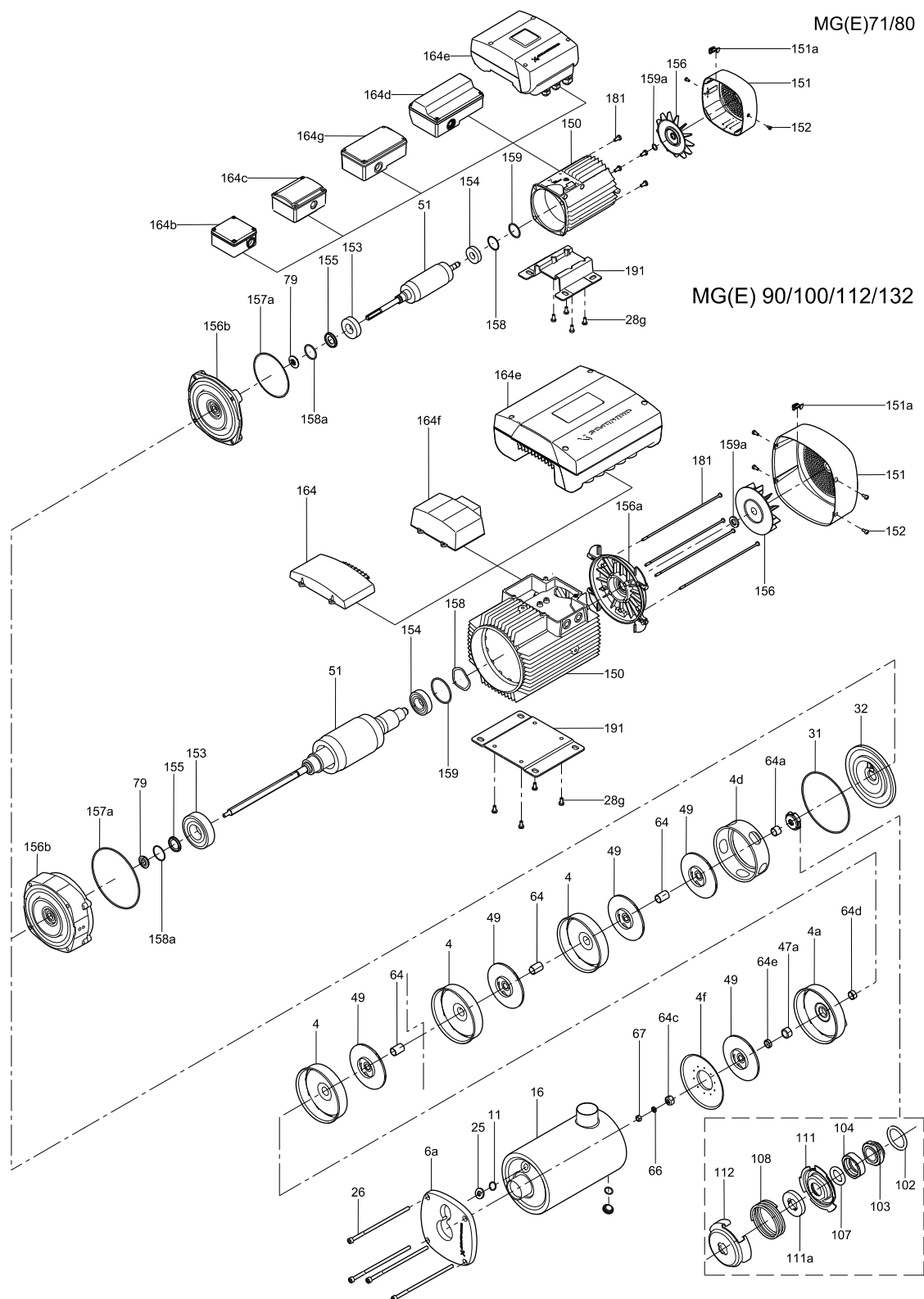


Fig. 32 CM 10, 15, 25, stainless steel

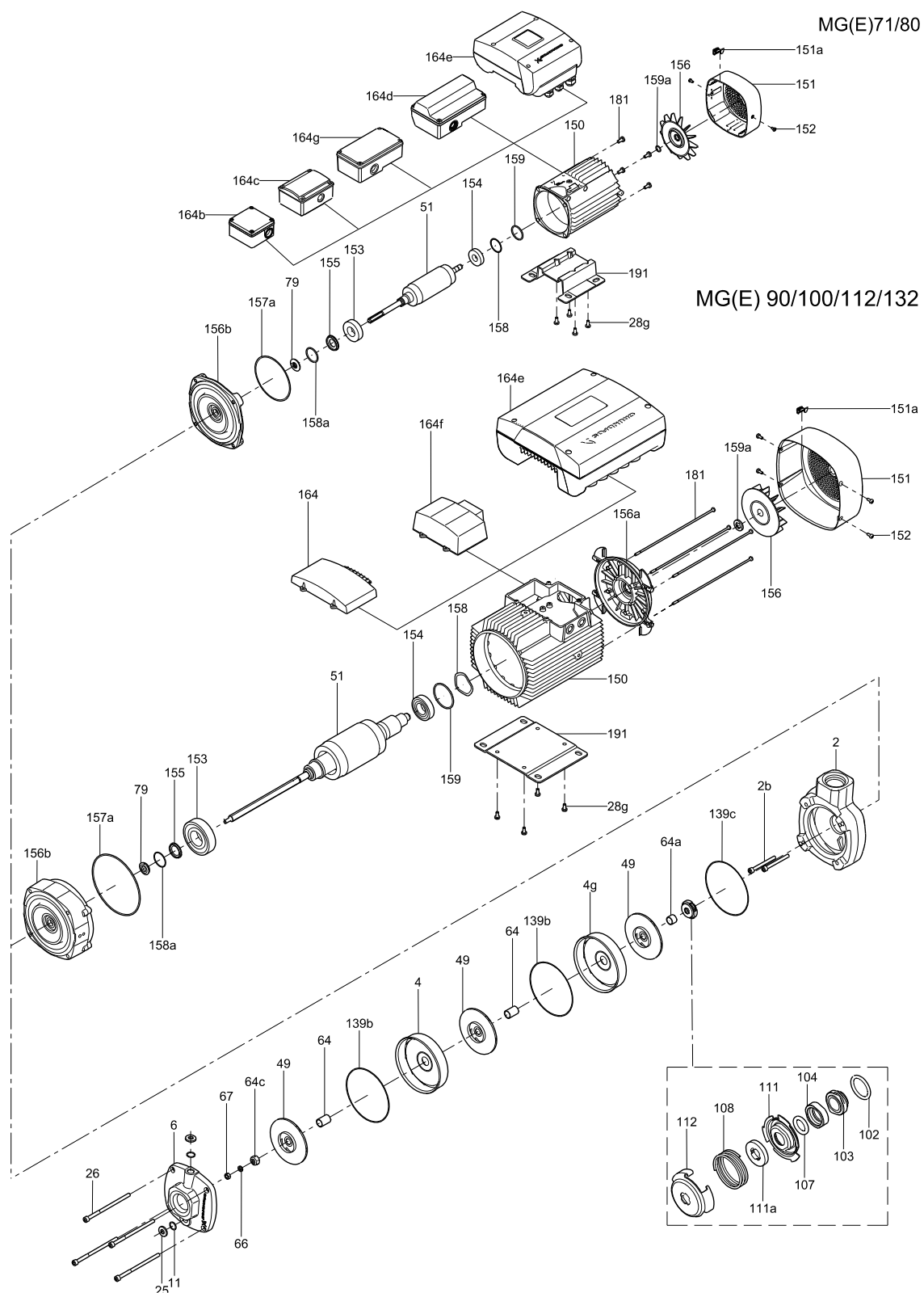


Fig. 33 CM 10, 15, 25, cast iron

8. Order of assembly for chambers and impellers

8.1 Key for CM 1, 3, 5

Bearings	
Chamber cpl.	A
Chamber with bearing cpl.	B
Chamber with holes	C
Chamber plate	D
Chamber without guide vanes	E
Impeller	F

8.2 CM 1, 3, 5, cast iron

CM 1, 3, 5, cast iron														
Pos.	2		3		4		5		6		7		8	
	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller
1*	D	F	D	F	D	F	D	F	D	F	D	F	D	F
2	E	F	A	F	A	F	A	F	A	F	A	F	A	F
3			E	F	A	F	A	F	A	F	A	F	A	F
4					E	F	A	F	A	F	A	F	A	F
5							E	F	A	F	A	F	A	F
6									E	F	A	F	A	F
7											E	F	B	F
8													E	F

* Pos. 1 is next to the motor.

8.3 CM 1, 3, 5, stainless steel

CM 1, 3, 5, stainless steel														
Pos.	2		3		4		5		6		7		8	
	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller
1*	C	F	C	F	C	F	C	F	C	F	C	F	C	F
2	E	F	A	F	A	F	A	F	A	F	A	F	A	F
3	E		E	F	A	F	A	F	A	F	A	F	A	F
4					E	F	A	F	A	F	A	F	A	F
5							E	F	A	F	A	F	A	F
6									E	F	A	F	A	F
7									E		E	F	B	F
8													E	F
9													E	

* Pos. 1 is next to the motor.

CM 1, 3, 5, stainless steel												
Pos.	9		10		11		12		13		14	
	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller
1*	C	F	C	F	C	F	C	F	C	F	C	F
2	A	F	A	F	A	F	A	F	A	F	A	F
3	A	F	A	F	A	F	A	F	A	F	A	F
4	A	F	A	F	A	F	A	F	A	F	A	F
5	A	F	A	F	A	F	A	F	A	F	A	F
6	A	F	A	F	A	F	A	F	A	F	A	F
7	A	F	A	F	A	F	A	F	A	F	A	F
8	B	F	A	F	A	F	A	F	A	F	A	F
9	E	F	B	F	A	F	A	F	A	F	A	F
10			E	F	B	F	A	F	A	F	A	F
11			E		E	F	B	F	B	F	B	F
12							E	F	A	F	A	F
13							E		E	F	A	F
14							E		E		E	F

* Pos. 1 is next to the motor.

8.4 Key for CM 10, 15, 25

Bearings	
Chamber cpl.	A
Chamber with bearing cpl.	B
Chamber with holes	C
Impeller located in cast iron component	D
Chamber without sand lift	E
Chamber plate, SS pumps	F
Chamber without guide vanes	G
Chamber without guide vanes and sand lift	H
Impeller	I

8.5 CM 10, 15, 25, cast iron

CM 10, 15, 25, cast iron										
Pos.	1		2		3		4		5	
	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller
1*	D	I	D	I	D	I	D	I	D	I
2	H		E	I	E	I	E	I	E	I
3					A	I	A	I	A	I
4							A	I	A	I
5									A	I

* Pos. 1 is next to the motor.

8.6 CM 10, 15, 25, stainless steel

CM 10, 15, 25, stainless steel

Pos.	1		2		3		4		5	
	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller
1*	C	I	C	I	C	I	C	I	C	I
2	G		A	I	A	I	A	I	A	I
3	G		G		A	I	A	I	A	I
4	F		F		F		A	I	A	I
5							F		A	I
6									G	
7									F	

* Pos. 1 is next to the motor.

CM 10, 15, 25, stainless steel

Pos.	6		7		8	
	Chamber	Impeller	Chamber	Impeller	Chamber	Impeller
1*	C	I	C	I	C	I
2	A	I	A	I	A	I
3	A	I	A	I	A	I
4	A	I	A	I	A	I
5	A	I	A	I	A	I
6	B	I	A	I	A	I
7	F		B	I	A	I
8			G		B	I
9			F		F	

* Pos 1 is next to the motor.

Subject to alterations.

Argentina

Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500 Lote 34A
1619 - Garin
Pcia. de Buenos Aires
Phone: +54-3327 414 444
Telefax: +54-3327 411 111

Australia

GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Phone: +61-8-8461-4611
Telefax: +61-8-8340 0155

Austria

GRUNDFOS Pumpen Vertrieb Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Telefax: +43-6246-883-30

Belgium

N.V. GRUNDFOS Bellux S.A.
Boomsesteenweg 81-83
B-2630 Aartselaar
Tél.: +32-3-870 7300
Télécopie: +32-3-870 7301

Belorussia

Представительство ГРУНДФОС в
Минске
220123, Минск,
ул. В. Хоружей, 22, оф. 1105
Тел.: +(37517) 233 97 65,
Факс: +(37517) 233 97 69
E-mail: grundfos_minsk@mail.ru

Bosnia/Herzegovina

GRUNDFOS Sarajevo
Trg Heroja 16,
BiH-71000 Sarajevo
Phone: +387 33 713 290
Telefax: +387 33 659 079
e-mail: grundfos@bih.net.ba

Brazil

BOMBAS GRUNDFOS DO BRASIL
Av. Humberto de Alencar Castelo Branco,
630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria

Grundfos Bulgaria EOOD
Slatina District
Iztochna Tangenta street no. 100
BG - 1592 Sofia
Tel. +359 2 49 22 200
Fax. +359 2 49 22 201
email: bulgaria@grundfos.bg

Canada

GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China

GRUNDFOS Pumps (Shanghai) Co. Ltd.
50/F Maxdo Center No. 8 XingYi Rd.
Hongqiao development Zone
Shanghai 200336
PRC
Phone: +86 21 612 252 22
Telefax: +86 21 612 253 33

Croatia

GRUNDFOS CROATIA d.o.o.
Cebini 37, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.grundfos.hr

Czech Republic

GRUNDFOS s.r.o.
Čajkovského 21
779 00 Olomouc
Phone: +420-585-716 111
Telefax: +420-585-716 299

Denmark

GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia

GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel: + 372 606 1690
Fax: + 372 606 1691

Finland

OY GRUNDFOS Pumput AB
Mestarintie 11
FIN-01730 Vantaa
Phone: +358-3066 5650
Telefax: +358-3066 56550

France

Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tél.: +33-4 74 82 15 15
Télécopie: +33-4 74 94 10 51

Germany

GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Telefax: +49-(0) 211 929 69-3799
e-mail: infoservice@grundfos.de
Service in Deutschland:
e-mail: kundendienst@grundfos.de

Greece

GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Phone: +0030-210-66 83 400
Telefax: +0030-210-66 46 273

Hong Kong

GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor
Siu Wai Industrial Centre
29-33 Wing Hong Street &
68 King Lam Street, Cheung Sha Wan
Kowloon
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary

GRUNDFOS Hungária Kft.
Park u. 8
H-2045 Törökbálint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India

GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraiakkam
Chennai 600 096
Phone: +91-44 2496 6800

Indonesia

PT GRUNDFOS Pompa
Jl. Rawa Sumur III, Blok III / CC-1
Kawasan Industri, Pulogadung
Jakarta 13930
Phone: +62-21-460 6909
Telefax: +62-21-460 6910 / 460 6901

Ireland

GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Phone: +353-1-4089 800
Telefax: +353-1-4089 830

Italy

GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Telefax: +39-02-95309290 / 95838461

Japan

GRUNDFOS Pumps K.K.
Gotanda Metalion Bldg., 5F,
5-21-15, Higashi-gotanda
Shiagawa-ku, Tokyo
141-0022 Japan
Phone: +81 35 448 1391
Telefax: +81 35 448 9619

Korea

GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Phone: +82-2-5317 600
Telefax: +82-2-5633 725

Latvia

SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60, LV-1035, Rīga,
Tālr.: + 371 714 9640, 7 149 641
Fakss: + 371 914 9646

Lithuania

GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia

GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie Industrial Park
40150 Shah Alam
Selangor
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

México

Bombas GRUNDFOS de México S.A. de
C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

Netherlands

GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +31-88-478 6332
E-mail: info_gnl@grundfos.com

New Zealand

GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway

GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tlf.: +47-22 90 47 00
Telefax: +47-22 32 21 50

Poland

GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal

Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Telefax: +351-21-440 76 90

România

GRUNDFOS Pompe România SRL
Bd. Biruintei, nr 103
Pantelimon county Ilfov
Phone: +40 21 200 4100
Telefax: +40 21 200 4101
E-mail: romania@grundfos.ro

Russia

ООО Грундфос
Россия, 109544 Москва, ул. Школьная
39
Тел. (+7) 495 737 30 00, 564 88 00
Факс (+7) 495 737 75 36, 564 88 11
E-mail grundfos.moscow@grundfos.com

Serbia

GRUNDFOS Predstavništvo Beograd
Dr. Milutina Ivkovića 2a/29
YU-11000 Beograd
Phone: +381 11 26 47 877 / 11 26 47 496
Telefax: +381 11 26 48 340

Singapore

GRUNDFOS (Singapore) Pte. Ltd.
24 Tuas West Road
Jurong Town
Singapore 638381
Phone: +65-6865 1222
Telefax: +65-6861 8402

Slovenia

GRUNDFOS d.o.o.
Šiandrova 8b, SI-1231 Ljubljana-Črnuče
Phone: +386 1 568 0610
Telefax: +386 1 568 0619
E-mail: slovenia@grundfos.si

South Africa

GRUNDFOS (PTY) LTD
Corner Mountjoy and George Allen Roads
Wilbart Ext. 2
Bedfordview 2008
Phone: (+27) 11 579 4800
Fax: (+27) 11 455 6066
E-mail: Ismart@grundfos.com

Spain

Bombas GRUNDFOS España S.A.
Camino de la Fuenteçilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Telefax: +34-91-628 0465

Sweden

GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46 31 332 23 000
Telefax: +46 31 331 94 60

Switzerland

GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-1-806 8111
Telefax: +41-1-806 8115

Taiwan

GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Phone: +886-4-2305 0868
Telefax: +886-4-2305 0878

Thailand

GRUNDFOS (Thailand) Ltd.
92 Chaloom Phrakiat Rama 9 Road,
Dokmai, Pravej, Bangkok 10250
Phone: +66-2-725 8999
Telefax: +66-2-725 8998

Turkey

GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
İhsan dede Caddesi,
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Phone: +90 - 262-679 7979
Telefax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine

ТОВ ГРУНДФОС УКРАЇНА
01010 Київ, Вул. Московська 86,
Тел.: (+38 044) 390 40 50
Факс.: (+38 044) 390 40 59
E-mail: ukraine@grundfos.com

United Arab Emirates

GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971 4 8815 166
Telefax: +971 4 8815 136

United Kingdom

GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 8TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.

GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

Usbekistan

Представительство ГРУНДФОС в
Ташкенте
700000 Ташкент ул.Усмана Носира 1-й
тулик 5
Телефон: (3712) 55-68-15
Факс: (3712) 53-36-35

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