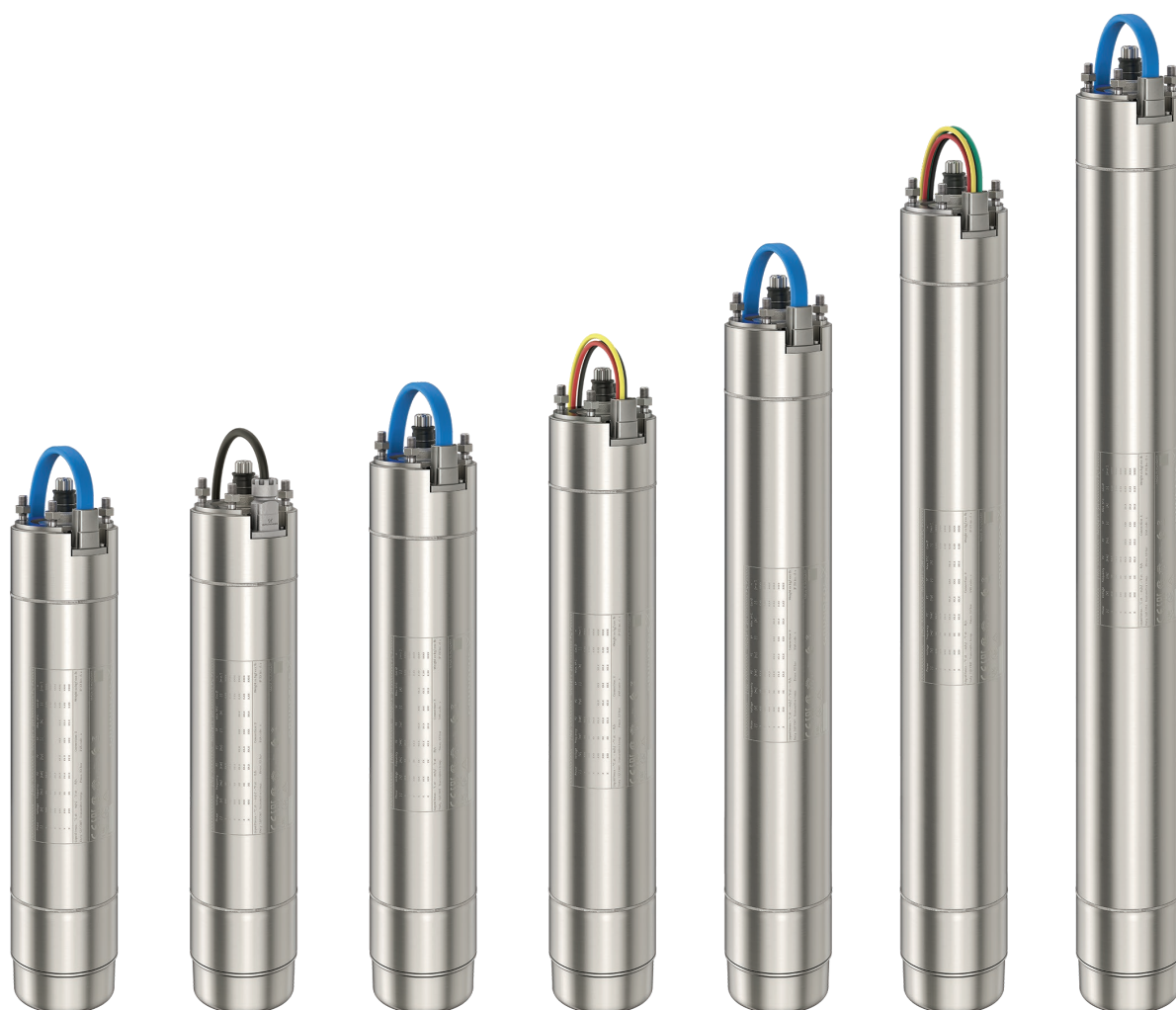


MS4000 model C

Submersible motors 50/60 Hz

Service instructions



MS4000 model C

English (GB)

Service instructions	4
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Original service instructions

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1. General information



Read this document before you start service work on the product. Service work must comply with local regulations and accepted codes of good practice.

Observe the safety instructions in the installation and operating instructions for the product.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

**DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.

**WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

**CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

**SIGNAL WORD****Description of the hazard**

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



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



Tips and advice that make the work easier.

1.3 Position numbers

Position numbers of motor parts (digits) refer to the section on exploded drawing of the MS4000 model C. Position numbers of service tools (letters) refer to the section on Service tools.

Related information

[4. Service tools](#)

[13. Exploded drawing of MS4000 model C](#)

1.4 Before disassembling the product

1. Switch off the power supply to the motor.
2. Disconnect the power supply cable in accordance with local regulations.

1.5 Before assembling the product

1. Clean and check all parts.
2. Replace any defective part.
3. Order the necessary service kits.
4. Always replace the O-rings when the motor is serviced.

1.6 During assembling of the product

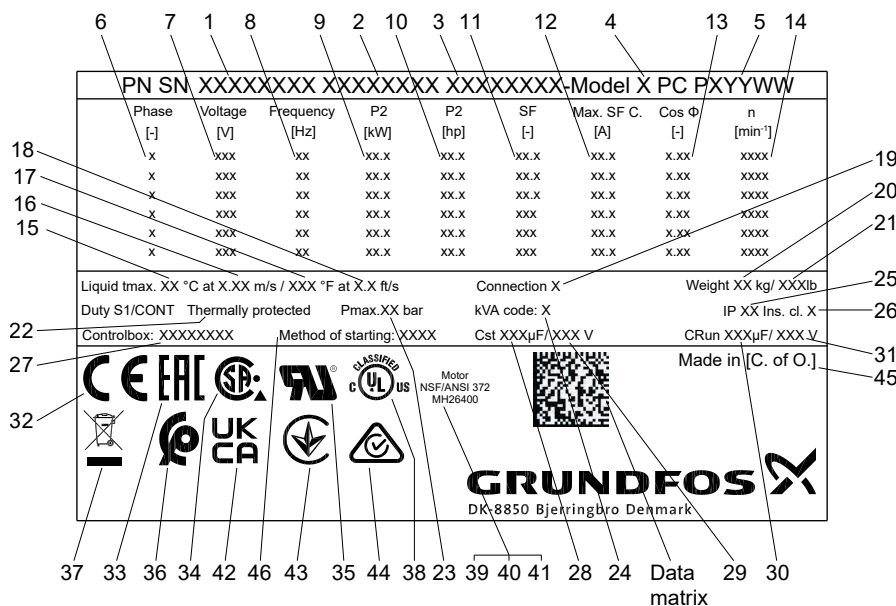
1. Lubricate the O-rings.
2. Tighten all screws to the correct torque. See the section on tightening torques and lubricants.

Related information

[3. Tightening torques and lubricants](#)

2. Identification

2.1 Nameplate of the MS4000 model C



Pos.	Description
1	Product number
2	Serial number
3	Motor type designation
4	Model code
5	Production code (plant X, year YY, week WW)
6	Phases
7	Voltage
8	Frequency
9	Power in kW
10	Power in HP
11	Service factor
12	Maximum service factor current
13	Cos φ
14	RPM
15	Maximum medium temperature in Celsius (continuous operation)
16	Minimum cooling flow speed in m/s at maximum temperature
17	Maximum medium temperature in Fahrenheit (continuous operation)
18	Minimum cooling flow speed in ft/s at maximum temperature
19	Wiring connection
20	Net weight in kilograms
21	Net weight in pounds
22	Thermal protection
23	Maximum ambient pressure in bars
24	KVA code
25	IP class
26	Insulation class
27	Motor starter box (only for single phase motors)
28	Start capacitor capacitance
29	Start capacitor voltage
30	Run capacitor capacitance

Pos.	Description
31	Run capacitor voltage
32	Pictogram for CE marking
33	Pictogram for EAC marking
34	Pictogram for cCSAus marking
35	Pictogram for UR marking
36	Pictogram for MOROCCO marking
37	Pictogram for WEEE marking
38	Pictogram for cULus marking
39	
40	Text according to cULus Classified
41	
42	Pictogram for UKCA marking
43	Pictogram for SEPRO marking
44	Pictogram for RCM marking
45	Country of origin
46	Method of starting

2.2 Product number key

Example	7C	19	79	10			
Motor code		Voltage code	Configuration code	Power code			
Motor code							
7C	MS4000 Model C						
Voltage code	Voltage range		Thread				
	50 Hz	60 Hz					
08	3 × 340-360-380 V	3 × 440 V	M8				
09	3 × 200 V	3 × 200-220 V	M8				
10	3 × 220-230 V		M8				
17	3 × 440-460 V		M8				
18	3 × 500-525 V		M8				
19	3 × 380-400-415 V	3 × 440-460-480 V	M8				
21	1 × 220-230 V		M8				
24	1 × 240 V		M8				
25	1 × 240 V		M8				
28		3 × 208-220-230 V	M8				
30		3 × 208-220-230 V	5/16"-24 UNF				
31		3 × 230 V	5/16"-24 UNF				
32		3 × 208 V	5/16"-24 UNF				
33		3 × 380-400-415 V	M8				
35		3 × 440-460 V	5/16"-24 UNF				
39		3 × 575 V	5/16"-24 UNF				
45		1 × 230 V	5/16"-24 UNF				
65	3 × 400 V	3 × 400-440 V	M8				
75	1 × 220-240 V		M8				
Configuration code	Material version	Elastomers	Shaft seal	Bearing system	Motor liquid	Tempcon	Temperature version
21	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	SML3	Without	T4
23	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	SML3	Without	T4
24	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	SML3	Without	T4
25	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	SML3	Without	T4
27	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	SML3	Without	T4
29	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	SML3	Without	T4
31	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	SML3	With	T4
33	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	SML3	With	T4
34	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	SML3	With	T4
35	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	SML3	With	T4
37	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	SML3	With	T4
39	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	SML3	With	T4
41	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	SML3	Without	T6
43	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	SML3	Without	T6
44	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	SML3	Without	T6
45	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	SML3	Without	T6
47	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	SML3	Without	T6
49	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	SML3	Without	T6
51	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	SML3	With	T6
53	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	SML3	With	T6
54	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	SML3	With	T6
55	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	SML3	With	T6
57	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	SML3	With	T6
59	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	SML3	With	T6
61	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	Demineralized water	Without	T4

Example	7C		19	79		10	
	Motor code		Voltage code	Configuration code		Power code	
Configuration code	Material version	Elastomers	Shaft seal	Bearing system	Motor liquid	Tempcon	Temperature version
63	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	Demineralized water	Without	T4
64	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	Demineralized water	Without	T4
65	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	Demineralized water	Without	T4
67	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	Demineralized water	Without	T4
69	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	Demineralized water	Without	T4
71	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	Demineralized water	With	T4
73	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	Demineralized water	With	T4
74	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	Demineralized water	With	T4
75	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	Demineralized water	With	T4
77	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	Demineralized water	With	T4
79	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	Demineralized water	With	T4
81	Enclosure: 1.4301	FKM	SiC/SiC	Ceramic	Demineralized water	With	T6
83	Enclosure: 1.4301	NBR	SiC/SiC	Ceramic	Demineralized water	With	T6
84	Enclosure: 1.4301	FKM	Hard metal/Ceramic	Ceramic	Demineralized water	With	T6
85	Enclosure: 1.4301	NBR	Hard metal/Ceramic	Ceramic	Demineralized water	With	T6
87	Enclosure: 1.4539	NBR	SiC/SiC	Ceramic	Demineralized water	With	T6
89	Enclosure: 1.4539	FKM	SiC/SiC	Ceramic	Demineralized water	With	T6
Power code	Power output [kW]	Power output [hp]	Service factor (60 Hz)				
			Global/US	Japan			
02	0.37	0.50	1.60	-			
03	0.55	0.75	1.50	-			
04	0.75	1.00	1.40	1.00			
05	1.10	1.50	1.30	1.00			
06	1.50	2.00	1.25	1.00			
95	1.90	2.50	1.00	1.00			
07	2.20	3.00	1.15	1.00			
96	2.70	3.60	1.00	1.00			
08	3.00	4.00	1.15	1.00			
97	3.70	5.00	1.00	1.00			
09	3.70	5.00	1.15	1.00			
10	4.00	5.50	1.15	1.00			
11	5.50	7.50	1.15	1.00			
12	7.50	10.00	1.15	1.00			

2.3 Type key

Example	MS4000 A	R	E	S	W	D	M	X	T4	3 × 380-415/50	7.5 kW
Pos.	1	2	3	4	5	6	7	8	9	10	11

Pos.	Description		
1	Motor type		
	MS4000A	=	MS4000 asynchronous motor
2	Material version		
	Z	=	EN 1.4301
	R	=	EN 1.4539
3	Elastomers		
	B	=	NBR
	E	=	FKM
4	Shaft seal		
	C	=	Hard metal/Ceramic
	S	=	SiC/SiC
5	Bearing system		
	W	=	Ceramic
6	Motor liquid		
	L	=	SML-3
	D	=	Demineralised water
	H	=	High glycol (60 % HTF)
7	Thread		
	U	=	UNF 5/16"-24
	M	=	M8
8	Tempcon		
	J	=	With
	X	=	Without
9	Max. liquid temperature		
	T4	=	40 °C at min. 0.15 m/s
	T6	=	60 °C at min. 1.0 m/s

Pos.	Description								
10	Voltage								
			50 Hz	60 Hz	Method of starting ¹⁾	Thread	Region	Conformance	Voltage code
	1 × 220/50 PSC	=	220-240	-	3-wire PSC	M8	Global	CE	75
	1 × 240/50 PSC	=	240	-	3-wire PSC	M8	Global	CE	25
	1 × 220-230/50 CSCR	=	220-230	-	3-wire CSCR	M8	Global	CE	21
	1 × 240/50 CSCR	=	240	-	3-wire CSCR	M8	Global	CE	24
	1 × 230/60 CSCR	=	-	230	3-wire CSCR	UNF 5/16	US	cCSAus	45
	3 × 220-230/50	=	220-230	-	DOL	M8	Global	CE	10
	3 × 380/50 440/60	=	340-360-380	440	DOL	M8	Global	CE	08
	3 × 380-415/50	=	380-400-415	440-460-480	DOL	M8	Global	CE	19
	3 × 440-460/50	=	440-460	-	DOL	M8	Global	CE	17
	3 × 500-525/50	=	500-525	-	DOL	M8	Global	CE	18
	3 × 208-230/60	=	-	208-220-230	DOL	M8	Global	CE	28
	3 × 380-415/60	=	-	380-400-415	DOL	M8	Global	CE	33
	3 × 208/60	=	-	208	DOL	UNF 5/16	US	cCSAus	32
	3 × 208-230/60	=	-	208-220-230	DOL	UNF 5/16	US	cCSAus	30
	3 × 230/60	=	-	230	DOL	UNF 5/16	US	cCSAus	31
	3 × 440-460/60	=	-	440-460	DOL	UNF 5/16	US	cCSAus	35
	3 × 575/60	=	-	575	DOL	UNF 5/16	US	cCSAus	39
	3 × 200/50 220/60	=	200	200-220	DOL	M8	Japan	CE	09
	3 × 400/50 440/60	=	400	400-440	DOL	M8	Japan	CE	65
11	Motor power								
	kW	hp	Service factor (60 Hz)		Power code				
			Global/US	Japan					
	0.37	0.50	1.60	-	02				
	0.55	0.75	1.50	-	03				
	0.75	1.00	1.40	1.00	04				
	1.10	1.50	1.30	1.00	05				
	1.50	2.00	1.25	1.00	06				
	1.90	2.50	-	1.00	95				
	2.20	3.00	1.15	1.00	07				
	2.70	3.60	-	1.00	96				
	3.00	4.00	1.15	1.00	08				
	3.70	5.00	1.15	1.00	09				
	3.70	5.00	-	1.00	97				
	4.00	5.50	1.15	1.00	10				
	5.50	7.50	1.15	1.00	11				
	7.50	10.00	1.15	1.00	12				

¹⁾ The method of starting can be one of the following:

- DOL: Direct on-line
- CSCR: Capacitor-Start Capacitor-Run induction motor, requiring a CSCR motor starter box (two value capacitor motor)
- PSC: Permanent Split Capacitor, requiring a run capacitor.

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

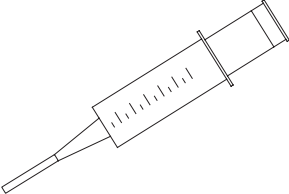
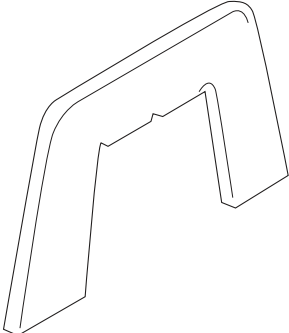
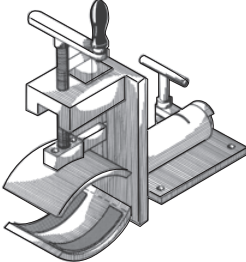
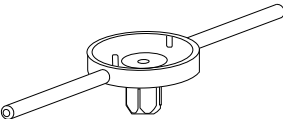
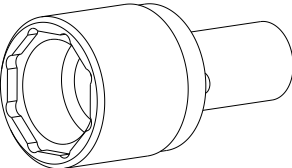
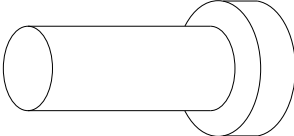
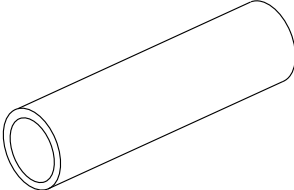
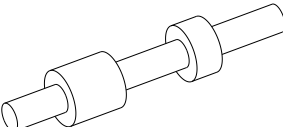
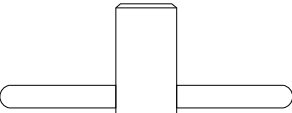
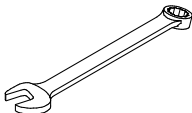
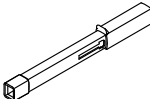
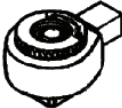
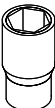
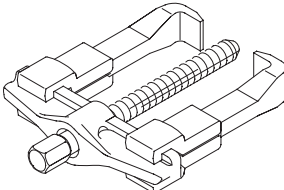
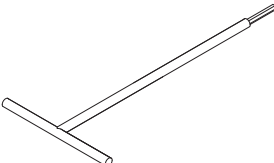
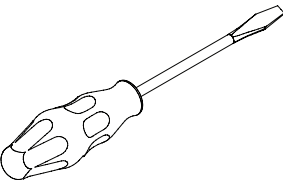
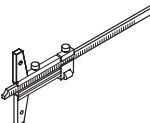
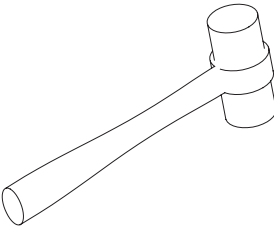
3. Tightening torques and lubricants

Pos.	Description	Quantity	Dimensions [mm]	Torque [Nm]	Lubricant
32	Shaft seal housing	1	-	40 ± 2	Shell Cassida
32b	Compression spring	1	-	-	Shell Cassida
32a	Supporting ring	1	-	-	Shell Cassida
33	Shaft seal ring, stationary	1	-	-	Shell Cassida
34	Shaft seal ring, rotating	1	-	-	Motor liquid
22	Hexagone head nut	4	M8 or UNF 5/16	-	-
21	Staybolt	4	M8 or UNF 5/16	10 ± 1	-
220a	Hexagon head screw	2	M5x5 (hex key 3 mm)	4 ± 0.4	-
1a	Filling plug	1	Hex key 6 mm	5 ± 0.5	-
1b	O-ring	1	-	-	Motor liquid
24	O-ring	1	-	-	Motor liquid
7	Bearing retainer	1	-	70 ± 0.5	-
48	Adjusting screw	1	-	-	-
49	Nut for rubber diaphragm	1	-	11 ± 1	-
47	Lock washer	1	-	-	-
46	Nut	1	M8	11 ± 1	-

Related information

[1.6 During assembling of the product](#)

4. Service tools

A	B	C	D
			
E	F	G	H
			
I	J	K	L
			
M	N	O	P
			
Q	R	S	T
			

Related information
[1.3 Position numbers](#)

4.1 Special tools

Tool	Description	Pos.	Part number
A	Filling syringe for MS 4" & 6" submersible motors	1	00SV8000
B	Shaft-height gauge for MS 4" submersible motors	2	00SV0114
C	Jaws	1	00SV7900
D	Key for bearing retainer	7	00SV7901
E	Shaft-seal housing tool	32	93021242
F	Punch for bearing pipe	5, 34	00SV7903
G	Punch for thrust bearing	6	00SV7904
H	Assembly guide for bearing pipe	5	00SV7905
I	Special key for adjustment screw	12, 48	00SV7906

4.2 Standard tools

Tool	Description	Pos.	Part number
J	Open-end spanner 13 mm or 21 mm	22, 46, 49	-
K	Torque wrench 4-20 Nm 730/2 or 20-100 Nm 730/10	220a, 32, 49, 1a, 46, 7	-
L	Ratchet insert tool 735/10	-	-
M	Top key head 13 mm	22, 46	-
N	Ring insert tool 21 mm	49	-
O	Puller for thrust bearing	6	-
P	Allen key 3 mm or 6 mm T-key	220a, 1a	-
Q	Flat head screwdriver	8, 33	-
R	Hexagon head driver 3mm or 6 mm	220a, 1a	-
S	Depth gauge	2	-
T	Plastic mallet	6	-

4.3 Measuring tools

Description	Part number
Multimeter	-
Megger	-

5. Motor check/troubleshooting

Used motors must be checked and disassembled. Inspect and document the observations of each component during disassembling. Complete the following:

- Check the motor for damage and fractures.
- Check if the motor shaft spins freely.
- Confirm that the motor is filled with liquid and has no leaks at the diaphragm or shaft seal. Place the motor in an angle of 45° with the filling hole facing upwards and remove the screw (1a), then tilt it towards vertical position. The liquid should start to run out of the filling hole. If yes, then the liquid level is correct. If no liquid runs out, the level is low.

Note:

If the liquid level is too high, the liquid will start running when the screw is removed.

- Check if the height from the shaft end to the contact face of thread holes is 38.18 ± 0.12 mm.
- Confirm that the axial clearance is minimum 1 mm, maximum 1.5 mm.
- Confirm that the plug pins for the cable connection are not defective or burnt.
- Check if the winding resistance is as stated in the electrical data. See the section on winding resistance of MS4000.
- Confirm that the motor insulation resistance complies with the local regulations. See the section on insulation resistance.
- Check the motor cable and the submersible drop cable for visual damage.
- Submerge the motor cable, the splice and the submersible drop cable in water and confirm that there is no damage in the cables or splice measuring their insulation resistance with a megger.
- Measure the electrical resistance of the motor with the cable mounted on it.
- Measure the insulation resistance of the motor with the cable mounted on it, using a megger.
- Measure the electrical resistance of the motor without cable, directly at the terminals.
- Measure the insulation resistance of the motor without the cable, directly at the terminals using a megger.

Related information

[11.1 Winding resistance of the MS4000 model C](#)

[11.2 Insulation resistance](#)

6. Disassembling of the MS4000 model C

DANGER

Electric shock

Death or serious personal injury

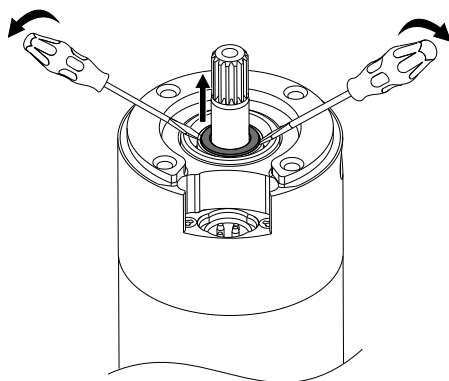


- Before starting any work on the product, make sure the motor cable ends are not live.
- Make sure the power supply cannot be accidentally switched on.

For further information, see the [MS4000 service video](#).



1. Place the motor vertically in a set of jaws (C).
Note: Make sure the motor is secure in the jaws and it cannot move.
2. Before disassembling the motor, remove the four staybolts (21) and nuts (22) from the top of the housing using a 13 mm (1/2") open-end spanner (J).
3. Disconnect the motor cable by loosening and removing the two screws (220a) using the torque wrench (K) with the 3 mm hexagon head driver (R).
Note: Do not remove the retainer washers as their function is to retain in position the screws after dismounting and thus help the mounting by having the screws ready for the operation.
4. Use two screwdrivers (Q) to manoeuvre the plug (220) out of its socket, then pull out the plug.
Note: Be careful not to damage the seal.
5. Remove the spline protector (35) and its supporting ring (35a), then remove the sand shield (27) from the shaft.
6. Loosen the shaft seal housing (32) using the shaft-seal housing tool (E) then remove it from the shaft.
7. Remove the spring (32b), the supporting ring (32a) and the stationary part of the seal ring (33) from the shaft.
8. Remove the rotating part of the seal ring (34) using two screwdrivers (Q). See the image below.



TM088253

9. Remove the filling plug (1a) using a 6 mm hexagon screw driver (R) and remove the washer (1b) too.
10. Tilt the motor and drain the motor liquid into a bucket.
11. Turn the motor to vertical position with the NDE facing upwards to prepare removing the bottom cover (13).
12. Straighten the lock washer (47) using a screwdriver (Q) before removing the nut (46).
13. Remove the nut (46) using a 13 mm (1/2") open-end spanner (J). Remove the lock washer (47) as well.

14. Remove the bottom cover (13).
15. Remove the adjusting screw (48) and the diaphragm (12) using the special key (I), then unscrew the nut for rubber diaphragm (49) using a 21 mm (3/4") open-end spanner (J).
Note: Make sure the diaphragm is loose from the stator housing before turning the adjusting screw. If the diaphragm sticks to the stator housing, it may get damaged.
16. Turn the motor to horizontal position.
17. Remove the thrust bearing retainer (7) using the key for the bearing retainer (D).
18. Remove the stationary part of the thrust bearing (3).
19. Loosen the clamping ring (8) using two screwdrivers (Q), then remove it.
20. Carefully remove the shaft and rotor with radial and thrust bearing system.
21. Clamp the shaft in a vise, then pull off the rotating part of the thrust bearing (6) by using a puller (O).
Note: Use protective jaws to avoid damaging the rotor.
22. Remove the radial bearing (4).
23. Remove the bearing pipe (5) using the punch for the bearing pipe (F) and finally remove the O-ring (24).

6.1 Component check

Before assembling the motor, clean and check all parts for damage and wear. All rubber parts must be soft, flexible and intact. If they are not so, it is recommended to replace them during service.

The following components should be checked:

Shaft seal

The sliding surface must be intact and smooth. If it is not so, it is recommended to replace it during service.

Radial bearing

The bearings must be intact, smooth and without visible wear.

Shaft with rotor

The radial bearing surfaces (sliding surfaces) on the shaft must be intact, smooth and without visible wear.

Thrust bearing

The thrust bearing, both rotating and stationary part, must be intact and the sliding surfaces must be intact and smooth.

Upthrust ring

The ring must be intact and smooth.

Motor liquid

The motor liquid must be clean and clear when the shaft seal housing is removed.

Black motor liquid may indicate damaged bearing components.

Diaphragm

The diaphragm must be soft, flexible and intact without cracks.

6.2 Replacement of the wear parts

Always replace defective parts with wear part kits. See the recommended kits and spare parts in the MS Service Kit Catalogue.

Related information

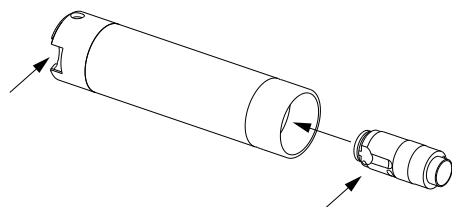
- [MS Service Kit Catalogue](#)

7. Assembling MS4000 model C

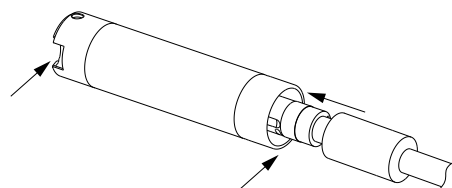
For further information, see the [MS4000 service video](#).



1. Place the stator housing (1) horizontally in the jaws (C) and tighten it.
2. Fit the O-ring (24) on the threaded side of the bearing pipe (5).
Note: Lubricate the O-ring before fitting.
3. Align the plan surface of the bearing pipe (5) to the cable connector of the stator housing (1) as shown on the drawings below.
4. Insert the bearing pipe (5) into the stator housing and push it in place using the specific assembly guide for the bearing pipe (H).



TM088292



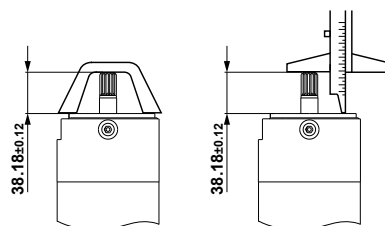
TM088293

5. Before installing the rotor assembly into the stator housing, the radial bearing (4) and the rotating thrust bearing (6) should be installed on the shaft with rotor (2).
6. First, fit the radial bearing (4) on the shaft with rotor (2).
7. Then, fit the rotating thrust bearing (6) onto the end of the shaft with rotor (2).
8. Use a plastic mallet (T) and the punch for thrust bearing (G) to fix the rotating part on the conus of the shaft.
Note: The rotating part must be put into the correct position with one hit, otherwise, the shaft height may change over time resulting in damage to the thrust bearing.
9. Fit this rotor assembly into the stator housing (1).
10. Insert the clamping ring (8).
11. Fit the stationary part of the thrust bearing (3) into the clamping ring (8).
Note: Make sure that the clamping ring (8) is aligned with the rotational stop features of the stationary thrust bearing (3).
12. Fit the bearing retainer (7) then fasten it using the key for the bearing retainer (D). See section 3. Tightening torques and lubricants.
13. Turn the motor to vertical position with the NDE facing upwards.
14. Place the adjusting screw (48) in the hole in the center of the diaphragm (12), then screw the nut for the rubber diaphragm (49) onto it using a 21 mm (3/4") open-end spanner (J). See section Tightening torques and lubricants.
15. Fit the rubber diaphragm (12) on the top of the bearing retainer (7) and fasten it using the special key for adjustment screw (I). See section Tightening torques and lubricants.

16. Turn the stator housing 180° in the jaws, so the DE is facing upwards.

17. Check the shaft height using a depth gauge (S), or a shaft height gauge (B). The shaft height must be within 38.18 ± 0.12 mm. See the figure below.

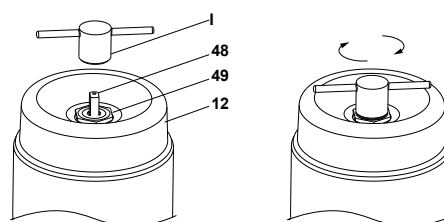
Note: Make sure that the depth gauge is square between the shaft end and the motor flange.



TM088382

18. Adjust the shaft height if necessary.

19. To adjust the shaft height, attend to the NDE of the motor and adjust the height by turning the adjusting screw (48) using the special key for the adjustment screw (I).



TM088431

20. Turn the stator housing 180° in the jaws, so the DE is facing upwards.

21. Check the shaft height. See the details in step 17.

22. Turn the stator housing 180° in the jaws so the NDE is facing upwards.

23. Fit the bottom cover (13) onto the mounted rubber diaphragm (12).

24. Fit the lock washer (47) onto the end of the adjusting screw (48).

25. Fasten the nut (46) using a 13 mm (1/2") open-end spanner (J). See section Tightening torques and lubricants.

Note: Be careful not to turn the adjusting screw when tightening the nut.

26. When the nut (46) is fastened, bend one side of the lock washer (47) against one side of the nut (46) using a screwdriver.

27. Turn the stator housing 180° in the jaws, so the DE is facing upwards.

28. Fit the rotating part of the shaft seal ring (34) onto the shaft and press it down.

29. Lubricate the recess inside the shaft seal housing (32) and the outer surface of the stationary part of the shaft seal (33). See section Tightening torques and lubricants.

30. Fit the stationary part of the seal ring (33) onto the shaft and slide it down on top of the rotating part of the shaft seal ring (34).

31. Fit the supporting ring (32a) on top of the stationary part of the shaft seal ring (33).

32. Fit the spring (32b) into the supporting ring (32a).

33. Fit the shaft seal housing (32) over the supporting ring (32a) on the top of the motor and tighten it by using the shaft-seal housing tool (E). See section Tightening torques and lubricants.

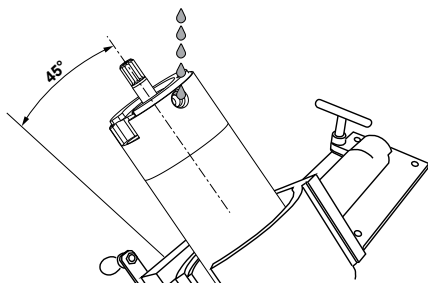
34. Fit the sand shield (27) on the shaft and push it down to the shaft seal housing (32).

35. Fit the supporting ring (35a) and the spline protector (35) on the shaft and push them down to the sand shield (27).

36. Check the shaft height again using a depth gauge (S) or a shaft-height gauge (B). The shaft height must be within 38.18 ± 0.12 mm.

Note: Make sure the depth gauge is square between the shaft end and the motor flange.

37. Move the shaft up and down to check the axial clearance. The minimum-maximum axial clearance should be 1 - 1.5 mm.
38. Check if the shaft is rotating freely.
39. To fill the motor with the motor liquid, tilt it 45° with the filling hole facing upwards. See the figure below.



40. Fill the motor with the motor liquid using a filling syringe (A). See section Filling procedure with a syringe.
41. Fit a washer (1b) onto the filling plug (1a) and insert it in the filling hole thread, then tighten the filling plug (1a) using a 6 mm hexagon head driver (R). See section Tightening torques and lubricants.
42. Tilt the motor back to vertical position, so the DE is facing upwards.
43. Replace the four staybolts (21) and nuts (22) onto the top of the housing using a 13 mm (1/2") open-end spanner (J).
44. Connect the motor cable by tightening the two screws (220a) evenly in steps using the torque wrench (K) with the 3 mm hexagon head driver (R). See section Tightening torques and lubricants.
45. Remove the motor from the set of jaws (C).
46. Perform a final check, see section Final check.

Related information

- [8. Filling procedure with a syringe](#)
- [9. Final check](#)

8. Filling procedure with a syringe

For a correct filling, vent the air inside the motor and replace it with motor liquid.

1. Incline the motor approximately 45°, so that the filling hole is at the highest point of the motor.
2. Remove the filling plug (1a).
3. Turn the shaft and inject motor liquid using a filling syringe (A) until its full.
4. Fill the syringe halfway with motor liquid.
5. Press the syringe against the filling hole in order to make full contact and good sealing properties.
6. Pull back the plunger of the syringe and turn the shaft so air is vented from inside the motor.
7. Press back the plunger to replace the air with motor liquid.
8. Repeat this filling procedure until all air in the motor is completely let out and replaced with motor liquid.
9. Refit the filling plug (1a).

Note: The nylon washer must be replaced.

Note: Motor liquid must not reach the plug hole. Use a cloth to clean the surface.

Related information

- [7. Assembling MS4000 model C](#)

9. Final check

Check if the shaft rotates freely and quietly.

Related information

- [7. Assembling MS4000 model C](#)

10. Servicing the product



WARNING **Toxic material**

Death or serious personal injury

- If a motor is used in a liquid that is contagious or toxic, the motor is classified as contaminated.

Before returning the product for service, contact Grundfos with details about the pumped liquid. Otherwise, Grundfos can deny servicing the product. Any application for service must include details about the pumped liquid. Possible costs of returning the motor are to be paid by the customer.

10.1 Fault finding the product

10.1.1 The motor does not run

Cause	Remedy
There is no power supply.	Replace the fuses. Check the electrical installation and the submersible drop cable if the new fuses burn as well.
The ELCB or the voltage-operated ELCB is tripped out.	Cut in the circuit breaker.
The VFD is defective.	Repair or replace the VFD.
The control circuit in the VFD has cut out or is defective.	Check the electrical installation.
The motor cable or drop cable is defective.	Repair or replace the motor cable or drop cable.
The motor protection has tripped out.	Investigate and fix the tripped-out alarm. Check the quality and level of voltage/Hz supplied to the motor. Check if the pump load corresponds to the motor size.
The temperature monitoring is tripped out.	Check the motor cooling conditions and operational parameters. Check the temperature limits.
The IR monitoring is tripped out (MP204).	Check the electrical installation of the MP204 for IR monitoring. Check the motor IR. Check the IR limits.
The control box for single phase motors is incorrect.	Verify that the control box corresponds to the motor size and type (single-phase CSCR or single-phase PSC).
The configuration of the VFD is incorrect.	Review the setup according to the motor nameplate data.

11. Checking the motor and cable

11.1 Winding resistance of the MS4000 model C

The following table presents some examples of winding resistance for single-phase and three-phase motors with different voltages, output power and motor temperature. For a detailed information regarding winding resistance data, visit the [Grundfos Product Center](#).

Voltage	Output power		Motor temperature version	Winding resistance line to line	Winding resistance main	Winding resistance aux
	[kW]	[hp]		[Ω]	[Ω]	[Ω]
3 × 220-230 V, 50 Hz	0.75	-	T4	5.200	-	-
			T6	6.590	-	-
	1.10	-	T4	5.200	-	-
			T6	2.460	-	-
	1.50	-	T4	4.200	-	-
			T6	2.980	-	-
	2.20	-	T4	2.520	-	-
			T6	2.510	-	-
	3.00	-	T4	1.990	-	-
			T6	1.780	-	-
	4.00	-	T4	1.380	-	-
			T6	1.280	-	-
	5.50	-	T4	0.990	-	-
			T6	0.840	-	-
	7.50	-	T4	0.710	-	-
3 × 340-380 V, 50 Hz 3 × 440 V, 60 Hz	0.75	1.00	T4	22.000	-	-
	1.10	1.50	T4	14.600	-	-
	1.50	2.00	T4	11.400	-	-
	2.20	3.00	T4	7.300	-	-
	3.00	4.00	T4	5.100	-	-
	4.00	5.50	T4	4.040	-	-
	5.50	7.50	T4	2.640	-	-
	7.50	10.00	T4	2.120	-	-
1 × 220-240 V, 50 Hz, PSC	0.37	-	T4	-	7.360	11.400
	0.55	-	T4	-	4.060	6.790
	1.10	-	T4	-	1.670	3.360
1 × 230 V, 60 Hz, CSCR	1.50	2.00	T4	-	1.660	3.750
	2.20	3.00	T4	-	1.300	2.750
	3.70	5.00	T4	-	0.770	1.880

Related information

[5. Motor check/troubleshooting](#)

11.2 Insulation resistance



The insulation resistance must be measured in accordance with local regulations.

If the rated motor voltage is below or equal to 500 V, the insulation resistance must be measured at a test voltage of 500 VDC.

If the rated motor voltage is above 500 V, the insulation resistance must be measured at a test voltage of 1000 VDC.

The table shows suggested values of insulation resistance and the test voltage in relation to the rated voltage of the motor.

Rated voltage:	≤ 500 [V]	> 500 [V]
Condition of motor and cable	[MΩ]	[MΩ]
New motor (without submersible drop cable)	≥ 200	≥ 200
Used motor which can be reinstalled in well	≥ 10	≥ 10
New motor in well	≥ 20	≥ 20
Motor in good condition in well	≥ 0.5	≥ 1
Damaged insulation	< 0.5	< 1

Related information

[5. Motor check/troubleshooting](#)

12. Parts list of the MS4000 model C

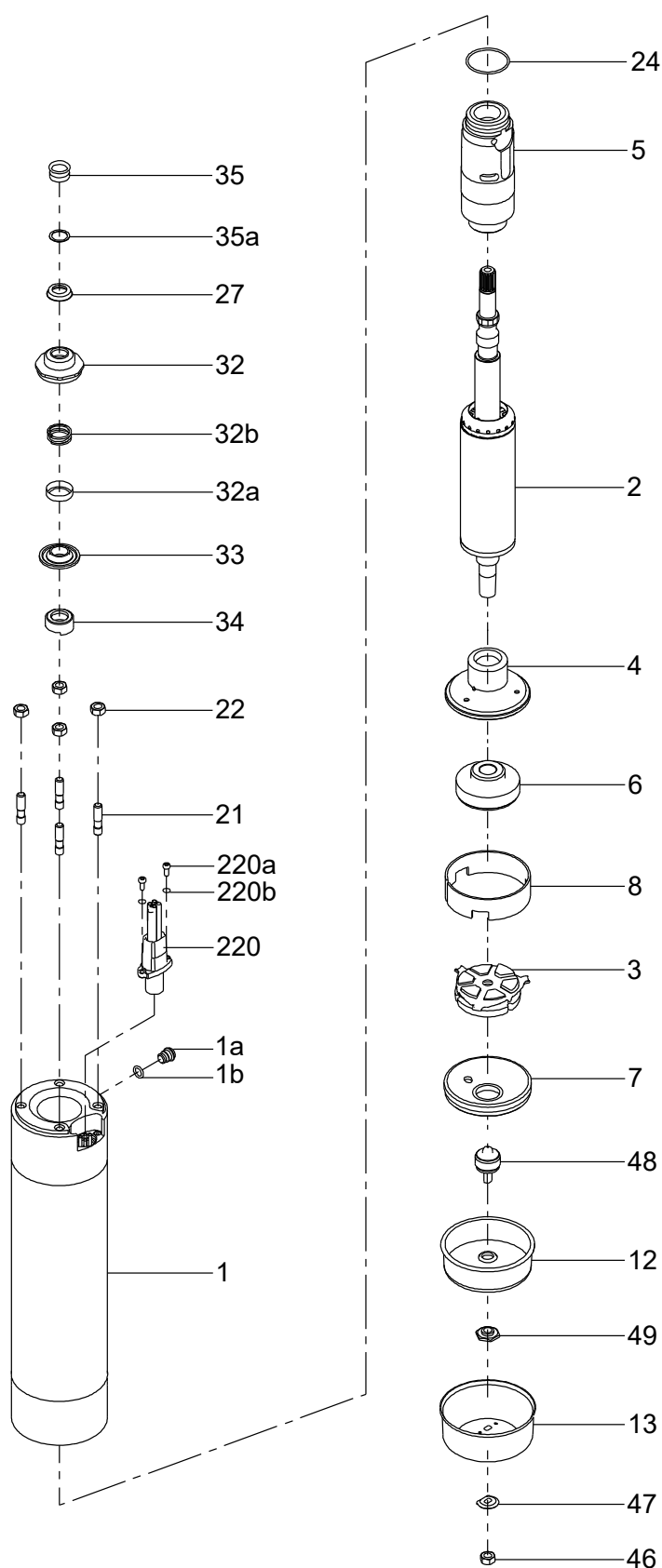
Pos.	Description	Quantity	Service kit ²⁾			
			Radial bearing	Gasket kit	Staybolt kit	Thrust bearing
35	Spline protector	1		x		
35a	Supporting ring	1		x		
27	Sand shield	1		x		
32	Shaft seal housing	1		x		
32b	Spring	1		x		
32a	Supporting ring	1		x		
33	Seal ring, stationary	1		x		
34	Seal ring, rotating	1		x		
22	Nut	4			x	
21	Staybolt	4			x	
220	Cable	1				
220a	Screw	2				
220b	Washer	2				
1a	Filling plug	1		x		
1b	Washer	1		x		
1	Stator outer encapsulation	1				
24	O-ring	1		x		
5	Bearing pipe	1	x			
2	Shaft with rotor	1				
4	Radial bearing	1	x			
6	Thrust bearing, rotating	1				x
8	Clamping ring	1				x
3	Thrust bearing, stationary	1				x
7	Bearing retainer	1				x
48	Adjusting screw	1				x
12	Diaphragm	1		x		
49	Nut for rubber diaphragm	1				x
13	Cover	1				x
47	Lock washer	1				x
46	Nut	1				x

2) Refer to the MS Service Kit Catalogue for service part number information.

Related information

- [MS Service Kit Catalogue](#)

13. Exploded drawing of MS4000 model C



Exploded drawing of the MS4000 motor

Related information

1.3 Position numbers

14. Document quality feedback

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