

BMS

BMS hs, BMS hp, BMST, BMSX

Service instructions



Original service instructions.

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**Warning**

Prior to service, read these service instructions carefully. Installation and service must comply with local regulations and accepted codes of good practice.

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

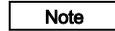
1. Symbols used in this document

**Warning**

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



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



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

2. Identification

This section shows the type key, the nameplate and the codes that can appear in the variant code.

2.1 Nameplate

1	Type : BMS 30-26 HS-E-C-P-A
2	Model : D-XXXXXX-07-310713
3	Q _{nom} : 50 m ³ /h 220 US GPM
4	H _{nom} : 804 m 2637 Feet
5	n _{min/max} : 1700 / 5500 rpm
6	p _{inlet min/max} : 1 / 35 bar 14,5 / 508 PSI
7	p _{outlet max} : 82,7 bar 1199 PSI
8	t _{min/max} : 0 / 40 °C 32 / 104 °F
9	Weight : 500 Kg 1102 LB
10	MEI ≥ N/A
	Made in DK
	CE
	TR
	GRUNDFOS®
	DK - 8850 Bjerringbro, Denmark

Fig. 1 Nameplate

Pos.	Description
1	Type designation
2	Model designation: <ul style="list-style-type: none"> • generation • product number • production code (yyww-x).
3	Rated flow rate
4	Rated head
5	Rated speed
6	Pressure gauge (fresh-water pump discharge)
7	Minimum inlet pressure and maximum outlet pressure
8	Maximum ambient temperature
9	Net weight of booster module
10	Minimum efficiency index
11	Country of origin
12	CE mark
13	TR mark

2.2 Type key

Example	BMS 30 -26 hs -E -C -P -A					
Pump						
BMS						
BMSX	include X-changer and BM hp pump					
BMST	include BMT pump					
Rated pump flow rate [m ³ /h]						
Number of stages						
Type						
hs	High-pressure pump with high-speed					
hp	High inlet pressure					
Motor						
E	PM					
Materials	Sleeve/pump/motor					
C	1.4539/904L					
Code for rubber part						
P	NBR					
Shaft seal						
A	Tungsten carbide/carbon					

3. Torques

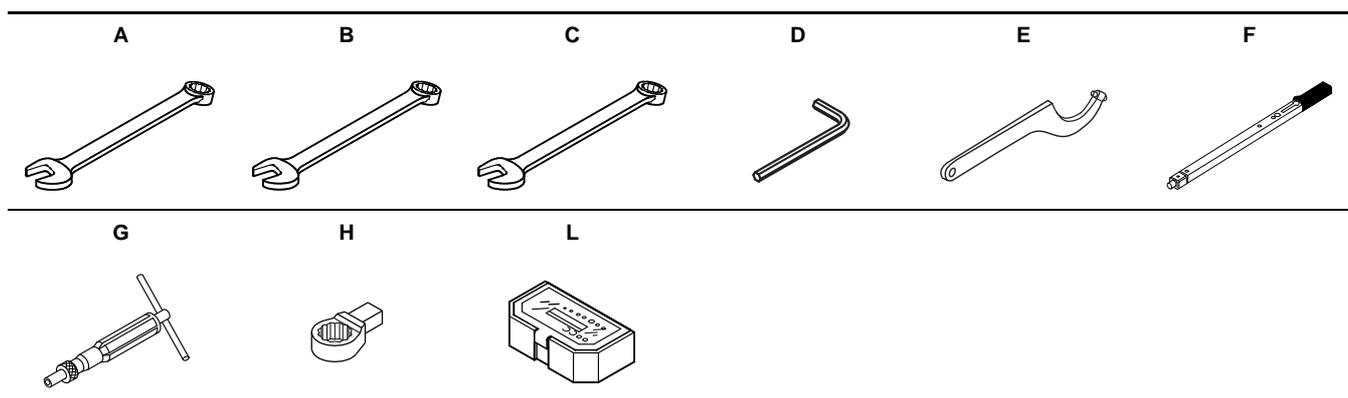
This section shows the screws and nuts that must be tightened to a certain torque and the lubricants to be used.

Pos.	Designation	Quantity	Dimensions [mm]	Torque [Nm]
377b	Hexagon screw	8	M16 x 45	140
352c	Hexagon head screw	4	M10 x 40	33
374b	Hexagon socket head cap screw	2	M6 x 25	6
41	Hexagon head screw	4	M10 x 40	33
220	Hexagon cap screw	4	M12 x 30	70

4. Service tools

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

4.1 Service tools



4.2 Standard tools

Pos.	Designation	Dimensions [mm]	For pos.	Part number
A	Open-end spanner	24	377b	SV0122
B	Open-end spanner	19	363a	00SV0054
C	Open-end spanner	17	352c	00SV0056
D	Hexagon key	6	374b	00ID1784
E	Hook spanner	40-42	371b	00ID3407

4.3 Torque tools

Pos.	Designation	Torque	For pos.	Part number
F	Torque wrench	40-200 Nm	377b	00SV0400
		20-100 Nm	352c, 220, 41	00SV0269
G	Torque screwdriver 1-6 Nm	-	374b	00SV0438
		M16	377b	00SV0524
		M12	220	00SV0271
H	Ring insert tool	M10	352c, 41	00SV0270
		M6	374b	00SV0296

4.4 Additional instructions

You find the dismantling and assembly service video at Grundfos' Installation and Service Youtube.com channel, see <http://qr.grundfos.com/i/BMSservicevideo>.

The PM Leroy-Somer motor and drive are available at the Leroy-Somer website, see <http://www.emersonindustrial.com/>

For further information, see the online documents below:

- Grundfos quick guide for BMS hs, BMS hp, BMST and BMSX: <http://net.grundfos.com/qr/i/98737800>
- Grundfos installation and operating instructions for BMS hs BMS hp, BMST and BMSX: <http://net.grundfos.com/qr/i/98567337>
- Grundfos installation and operating instructions for MGE installation: <http://net.grundfos.com/qr/i/96780071>
- Grundfos installation and operating instructions for CUE: <http://net.grundfos.com/qr/i/96706951>
- Grundfos service instructions for CUE: <http://net.grundfos.com/qr/i/96765700>
- Grundfos service instructions for SP, see Grundfos Product Center, www.grundfos.com.

5. Before dismantling

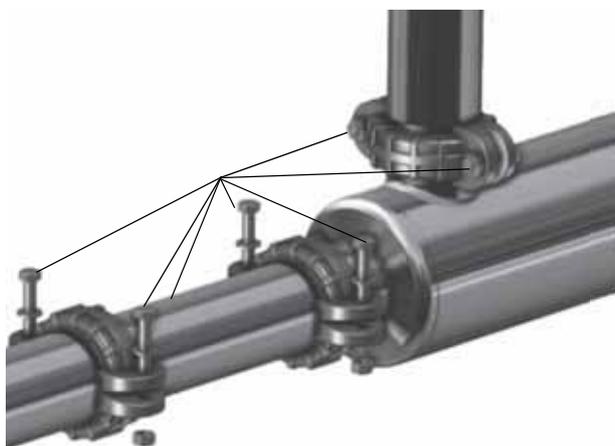
General information about BMS hs and BMS hp

The work site must be clean, free of salt or brine water and iron filings. Clean the workplace with flushing water, if it is necessary.

1. If the pump is to be repaired at a service workshop, do the following:
2. Check that the pump has not been damaged during transportation.
3. Identify the type designation. See the pump nameplate.
4. If the repair is to be done on site before dismantling the pump, check the installation:
 - wiring connections (power supply and signals)
 - hydraulic connections
 - inlet and outlet pressure and flowmeter value(s), if possible
 - protection: pressure switches, flow switches and motor protection etc.
5. Compare the motor voltage and frequency details on the motor and frequency converter nameplates with the power supply available.
 - Read and note down the trip and failure log of the frequency converter.

5.1 Dismantling pump and motor

1. Remove the Victaulic clamp at the inlet and outlet.
2. Remove the service connector, if it is installed.



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Fig. 2 Removing the Victaulic coupling and service connector

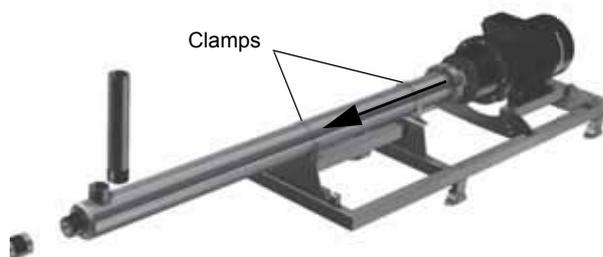
3. Remove the four M10 bolts.



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Fig. 3 Dismantling pump and motor

4. Loosen the clamps and pull the pump towards the outlet port if the pump is mounted on a base frame.



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Fig. 4 Removing pump from motor

5.2 Dismantling the thrust bearing

5. Remove the two hexagon socket head cap screws.



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Fig. 5 Loosening the hexagon socket head cap screws

6. Use the screws to pull out the thrust bearing from the bearing housing.



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Fig. 6 Removing the thrust bearing

7. Pull back the thrust bearing and shaft from the bearing housing.



Fig. 7 Shaft bearing with shaft

8. Remove the two O-rings.

Note: Always replace the O-rings and use soapy water for lubrication.



Fig. 8 Removing O-rings

5.3 Dismantling the thrust bearing and shaft seal

1. Remove the thrust bearing shaft.



Fig. 9 Removing the shaft

2. Remove the four pins.



Fig. 10 Removing the pins

3. Pull out the thrust bearing and support.

Note: Inspect the up-thrust bearing surfaces, stationary and rotary. Both must be free of scratches, cracks and any visible wear.



Fig. 11 Removing the thrust bearing and support

4. Pull out the shaft seal.



Fig. 12 Removing the shaft seal

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5.4 Assembling the thrust bearing

5. Note down the position of the pin.



Fig. 13 Position of the pin

6. Note down the position of the hole.



Fig. 14 Position of the hole

7. Mount the shaft seal.



Fig. 15 Mounting of shaft seal

8. Note down the position of the holes in the thrust bearing.



Fig. 16 Position of the thrust bearing

Note *The round hole in the stationary part of the bearing must be paired with the oval hole at the bearing housing.*

9. Assembly of support and thrust bearing

10. Insert the four pins.



Fig. 17 Inserting the pins

Note *Make sure that the thrust bearing is moving freely in all four axes.*

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TM06 4576 2515

5.5 Dismantling the rotating shaft seal part

1. Loosen and remove the shaft seal (left-hand thread). For service tool, see section 4. *Service tools*.



Fig. 18 Loosening the shaft seal

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2. Remove the shaft seal and O-ring.



Fig. 19 Shaft seal and O-ring

TM06 4580 2515

Note *Always replace the O-rings. Use soapy water for lubrication.*

3. Mount a new O-ring and shaft seal.
4. Tighten the shaft seal.



Fig. 20 Tightening the shaft seal

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5. Remove the support bearing and replace it.



Fig. 21 Support bearing

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6. Insert the inner and outer O-rings.

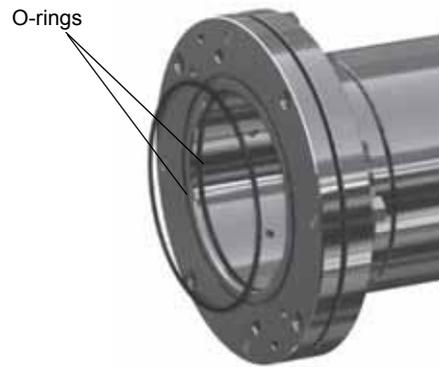


Fig. 22 Replacing the O-ring

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Note *Always replace the O-rings. Use soapy water for lubrication.*

7. Insert the complete thrust bearing.



Fig. 23 Mounting the thrust bearing

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8. Mount the two hexagon socket head cap screws.



Fig. 24 Assembling the thrust bearing

5.6 Dismantling the pump and sleeve

9. Unscrew the 4 x M10 bolts.



Fig. 25 Dismantling the pump and sleeve

10. Remove the flange and loosen the bearing housing union nut.



Fig. 26 Loosening the union nut

11. Use an open-end spanner to help separate the pump and sleeve.



Fig. 27 Separating the pump and sleeve

12. Pull out the pump.

13. Check the SP service instruction in Grundfos Product Center for more information about dismantling and repairing the pump.



Fig. 28 Pulling out the pump

14. Replace the two O-rings.



Fig. 29 Replacing the O-rings

Note Always replace the O-rings. Use soapy water for lubrication.

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TM06 4588 2515

TM06 4586 2515

TM06 4589 2515

TM06 4587 2515

TM06 4590 2515

15. Replace the O-ring.



Fig. 30 Replacing the O-ring

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Note Always replace the O-rings. Use soapy water for lubrication.

5.7 Assembling the pump

16. Mount the pump again. Make sure that the guide pins point downwards during assembly.



Fig. 31 Guide pins

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17. Tighten the union nut by hand.



Fig. 32 Tightening the union nut

TM06 4593 2515

18. Loosen the union nut by 90 ° angle. Use markings if needed. The union nut is loosen again in order to create a small gap between the pump and sleeve flange.



Fig. 33 Union nut is turned 90 °

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19. Tighten the four screws with 33 Nm.



Fig. 34 Tightening the screws

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20. Connect the pump and motor again. Make sure that the mark "UP" points upwards so the drain hole points downwards.



Fig. 35 Correct position of "UP"

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5.8 Aligning pump and motor

5.8.1 Before aligning pump and motor

Before aligning the pump and motor, make sure that the drain holes are pointing downwards. At the same time, the inlet pipe must point upwards (position 12 o'clock).

This has to be done to ensure correct operation of the pump as well as easy service and maintenance. You can change the position of the inlet pipe at a later time. Carefully follow the instructions in section [5.8.2 Aligning motor and pump](#).

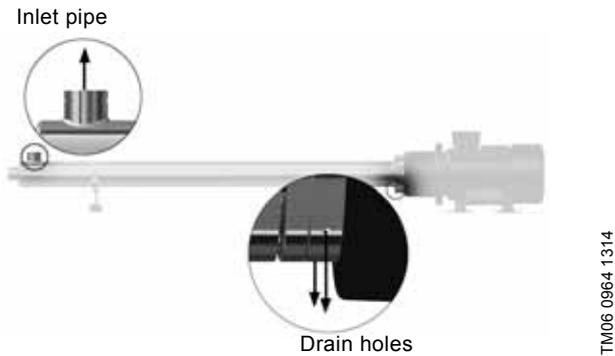


Fig. 36 Position of drain holes

5.8.2 Aligning motor and pump

Align the motor and pump before you tighten the bolts. To ensure correct installation, follow this procedure:

Step	Description	Picture
1	Fit all four bolts for motor and pump connection. Do not tighten the bolts yet.	TM05 9234 3613
2	Adjust the gap by means of a feeler gauge or similar tool. Tighten one bolt by hand.	TM05 9232 3613
3	Adjust the gap 180 ° opposite the bolt you just tightened. Do not tighten the bolt. Move the pump to adjust the gap.	TM05 9251 3613
4	Move the pump, and adjust the gap by means of the feeler gauge. Tighten the bolt by hand. If the inlet pipe has to be turned, see section 5.8.3 Positioning the inlet pipe .	TM05 9345 3613

Step	Description	Picture
5	When you have adjusted the gap, cross-tighten all bolts to 33 Nm.	TM05 9346 3613
6	Fasten the support foot to the foundation.	TM05 9345 3613

Caution *The support foot must not impose any tension on the pump!*

5.8.3 Positioning the inlet pipe

To change the position of the pipe, follow this procedure.

Step	Description	Picture
1	Remove the M10 bolts. Loosen the M12 bolts.	 TM05 9347 3613
2	Mark up the pump sleeve and union nut.	 TM05 9573 4013
3	Turn the inlet pipe to the needed position, and make sure the union nut follows.	 TM05 9343 3613
4	Check the marking.	 TM05 9342 3613
5	Fit all bolts again. Tighten all bolts to 33 Nm.	 TM05 9343 3613
6	Fasten the support foot to the foundation.	 TM05 9345 3613

6. Software

In this section you find information about how to set parameters via PC.

6.1 Grundfos BMS hs

Find the newest setting software at the Leroy-Somer website:
<http://www.emersonindustrial.com>.

6.1.1 POWERDRIVE FX, MD and MD2

With MDX-SOFT, setting parameters and supervising the POWERDRIVE from a PC is very user-friendly. Numerous functions are available:

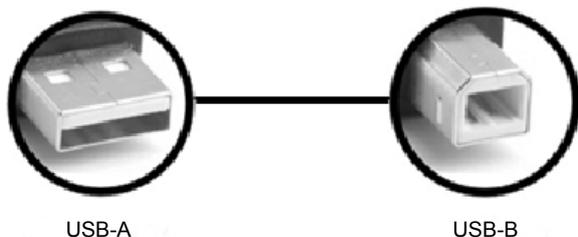
- quick commissioning with the simplified menu
- file saving
- help file
- comparison of two files or one file with the factory settings
- supervision in table or progress bar form
- diagnostics
- representation of parameters in a table.

You can download the MDX-SOFT software from the Internet at the following address: <http://www.leroy-somer.com/fr/telechargements/logiciels/>

To connect the PC to the POWERDRIVE, use an "MDXUSBisolator" isolated USB kit.

Procedure:

1. Connect the PC (USB-A) to the POWERDRIVE controller (USB-B) via the USB connection. The communication is ready when you can read the "USB" on the display of the red indicator light



USB-A

USB-B

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2. Start up the MDX commissioning software. Use the help menu displayed as a "?". Here you find a guide on how to use the program.



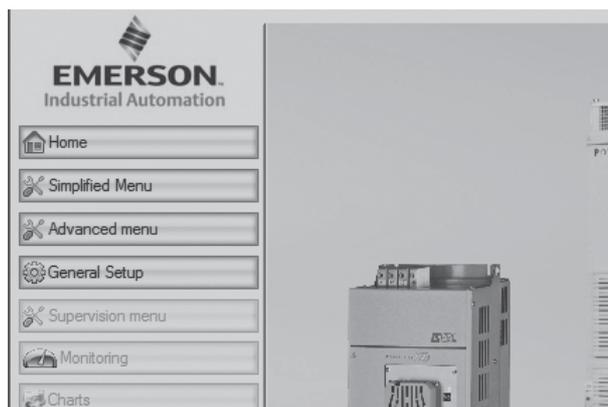
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3. Select an action
 - "Supervision only"
 - "Download drive settings"
 - "Create new file"
 - "Open existing file"
 - "Data logger".



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4. Select the needed action menu
 - "Simplified menu"
 - "Advanced menu"
 - "General setup"
 - "Supervision menu"
 - "Monitoring"
 - "Charts".



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5. Save the changes and exit the program.
6. Remove the USB connection.

6.2 Grundfos BMS hp

Grundfos BMS hp is setup by factory. The settings are default settings for a Grundfos BMSX application.

You can change the user specific parameters (duty point etc.) via either:

- Grundfos R100
- Grundfos PC tool link
- Grundfos GO.

For further information, see the installation and operating instructions for Grundfos MGE.

7. Pressure exchanger

The pressure exchanger requires no maintenance.



Warning

The water flow through the pressure exchanger must not exceed rated flow. See the pressure exchanger nameplate.



Warning

If you detect an abnormal sound, do not dismantle the unit. This action can void the warranty. Instead, call Grundfos Service.

You find information about the pressure exchanger on this website: <http://www.energyrecovery.com>.

8. Fault finding

8.1 BMS hs and BMST



Warning

Before starting work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Fault	Possible cause	Remedy
1. The pump starts or stops occasionally during operation.	a) No water supply. The low-pressure switch has cut out.	Check that the low-pressure switch functions normally and is adjusted correctly. Check that the minimum inlet pressure is correct. If not, check the feed pump. See section <i>BMS hs startup</i> in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
	a) The fuses are blown.	Check all fuses in the control circuit. Replace defective fuses. After a cut-out, find the cause of a possible short circuit. If the fuses are hot when you replace them, check that the load of the individual phases does not exceed the motor current during operation. Identify the cause of the load.
2. The pump stops during operation.	b) The frequency converter has tripped.	Reset the frequency converter.
	c) The motor/supply cable is defective.	Check the motor and cable.
	a) No or insufficient water supply to the pump.	Check that the inlet pressure during operation is at least 1 bar for BMS hs and 2 bar for BMST. If so, the water supply is OK. Stop and vent the system. Restart the pump as described in sections <i>BMS hs startup</i> , <i>BMS hp startup</i> and <i>Startup</i> in the BMS hp, BMS hs installation and operation instructions (publication number 98567337). Check the functioning of the pump.
3. The pump runs, but generates no pressure and delivers no water.	b) The piping system, pump or nozzle is choked up.	Check the piping system, pump and nozzle.
	c) The prefilter is choked up.	Clean the prefilter.
	d) The valves on the discharge side are partly closed or blocked.	Check the valves.
4. The pump runs at reduced capacity.	e) The discharge pipe is partly blocked by impurities.	Clean or replace the discharge pipe. Measure the discharge pressure, and compare the value with the calculated data. See the "Technical specifications" supplied with the system.
	f) The pump is partly blocked by impurities.	Pull the pump out of the sleeve. Dismantle, clean and check the pump. Replace any defective parts.
	g) The pump is defective.	Pull the pump out of the sleeve. Dismantle, clean and check the pump. Replace any defective parts.
	h) The prefilter is choked up.	Clean the prefilter.

8.2 BMS hp

**Warning**

Before starting work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Fault	Possible cause	Remedy
1. The pump stops occasionally during operation.	a) No or insufficient water supply. The pressure switch has cut out.	Check that the pressure switch functions normally without delay and is adjusted correctly. Check that the minimum inlet pressure is correct.
	b) The capacity is too small. The flow switch has cut out.	The discharge pipe is totally or partly blocked due to incorrect adjustment of a manually operated valve or failure in the solenoid valve or the motor-operated valve. Check these valves. The flow switch is faulty or incorrectly adjusted. Check and adjust the switch.
2. The pump does not run.	a) The fuses are blown.	Check all fuses in the control circuit. Replace defective fuses. After a cut-out, find the cause of a possible short circuit. If the fuses are hot when you replace them, check that the load of the individual phases does not exceed the motor current during operation. Identify the cause of the load. If the fuses are not hot immediately after the cut-out, identify the cause of a possible short circuit.
	b) The frequency converter has tripped.	Reset the unit.
	c) The motor/supply cable is defective.	Check the motor and cable. See section Electrical installation in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
3. The pump runs, but generates no pressure and delivers no water.	a) No or insufficient water supply to the pump or air in the system.	Check that the inlet pressure during operation is at least 1 bar. If so, the water supply is OK. Stop and vent the system. Restart the system as described in section BMSX system in the BMS hp, BMS hs installation and operation instructions (publication number 98567337). If the pump is defective, dismantle and repair or replace it.
	b) The suction parts are blocked.	Pull the pump out of the sleeve, and clean the suction parts.
4. The pump runs at reduced capacity (flow and pressure).	c) The valves on the discharge side are partly closed or blocked.	Check the valves.
	d) The discharge pipe is partly blocked by impurities.	Measure the discharge pressure, and compare the value with the calculated data. Clean or replace the discharge pipe.
	e) The pump is partly blocked by impurities.	Pull the pump out of the sleeve. Dismantle, clean and check the pump. Replace defective parts.
	f) The pump is defective.	Pull the pump out of the sleeve. Dismantle, clean and check the pump. Replace defective parts.

8.3 Pressure exchanger



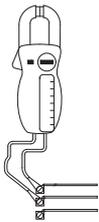
Warning

Before starting work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Fault	Possible cause	Remedy
1. Excessive sound pressure level.	a) The pressure exchanger operates above the rated flow rates on the low-pressure side, high-pressure side or both.	Immediately reduce the flow rate by adjusting the BMS hp pump and control valve (V2). Rebalance the system as described in section Startup in the BMS hp, BMS hs installation and operation instructions (publication number 98567337). To increase the system capacity, add the pressure exchanger pump(s) in parallel to the existing pumps.
	b) The pressure exchanger pump operates with little or no backpressure.	Increase the backpressure by adjusting the low-pressure reject-water valve (V3). Rebalance the system as described in section Startup in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
	c) Air in the system.	Vent the system.
2. Excessively high recovery in the SWRO system.	a) The BMS hs is operating at a flow rate that is too high.	Check that the main BMS hs flow rate does not exceed the membrane array production capacity for a given temperature, salinity and fouling factor.
	b) Increased salinity or raw-water temperature.	Adjust flow rates in the system. See section BMSX system in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
3. High salinity in the high-pressure seawater feed stream.	a) Unbalanced system.	See section Startup in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
	b) A jammed or stalled rotor short-circuits the high-pressure reject water with the high-pressure feed water. No exchange occurs; no audible rotation.	See fault number 5.
4. The low-pressure flow is lower than the high-pressure flow which entails mixing and high SWRO feed water salinity.	a) Operating pressure exchanger pumps below the rated flow rate results in low rotor rotation and increased mixing.	Increase and balance the flows through the pressure exchanger pump. Do not exceed the recommended maximum flow rates. To increase the system capacity, add pressure exchanger pump(s) in parallel to the existing pumps. See section Startup in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
	b) Malfunctioning and/or stalled BMS hp pump.	Check the rotation, operation, flow rates and pressures of the BMS hp pump.
5. Stalled rotor (no audible rotation).	a) The system operates above the rated pressure or below the rated flow capacity.	See section Startup in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
	b) Debris or foreign particles in the device.	Contact Grundfos Service.
	c) The system is not properly flow-balanced.	See section Startup in the BMS hp, BMS hs installation and operation instructions (publication number 98567337).
6. Low reject flow.	a) Excessive pressure losses through the SWRO system.	Contact Grundfos Service.
	b) Malfunctioning and/or stalled BMS hp pump.	Check the operation, flow rates and pressures of the BMS hp pump.

9. Checking the motor and cable

1. Supply voltage

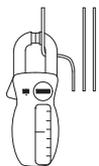


TM00 1371 3597

Measure the voltage between the phases with a voltmeter.
Connect the voltmeter to the terminals of the frequency converter.

When the motor is loaded, the voltage must be within $\pm 5\%$ of the rated voltage. If the voltage varies more than that, the motor may burn.
If the voltage is constantly too high or too low, replace the motor by a motor that corresponds to the supply voltage.
Large variations in the supply voltage indicate poor power supply, stop the pump until the defect has been found.
It may be necessary to reset the frequency converter.

2. Current consumption



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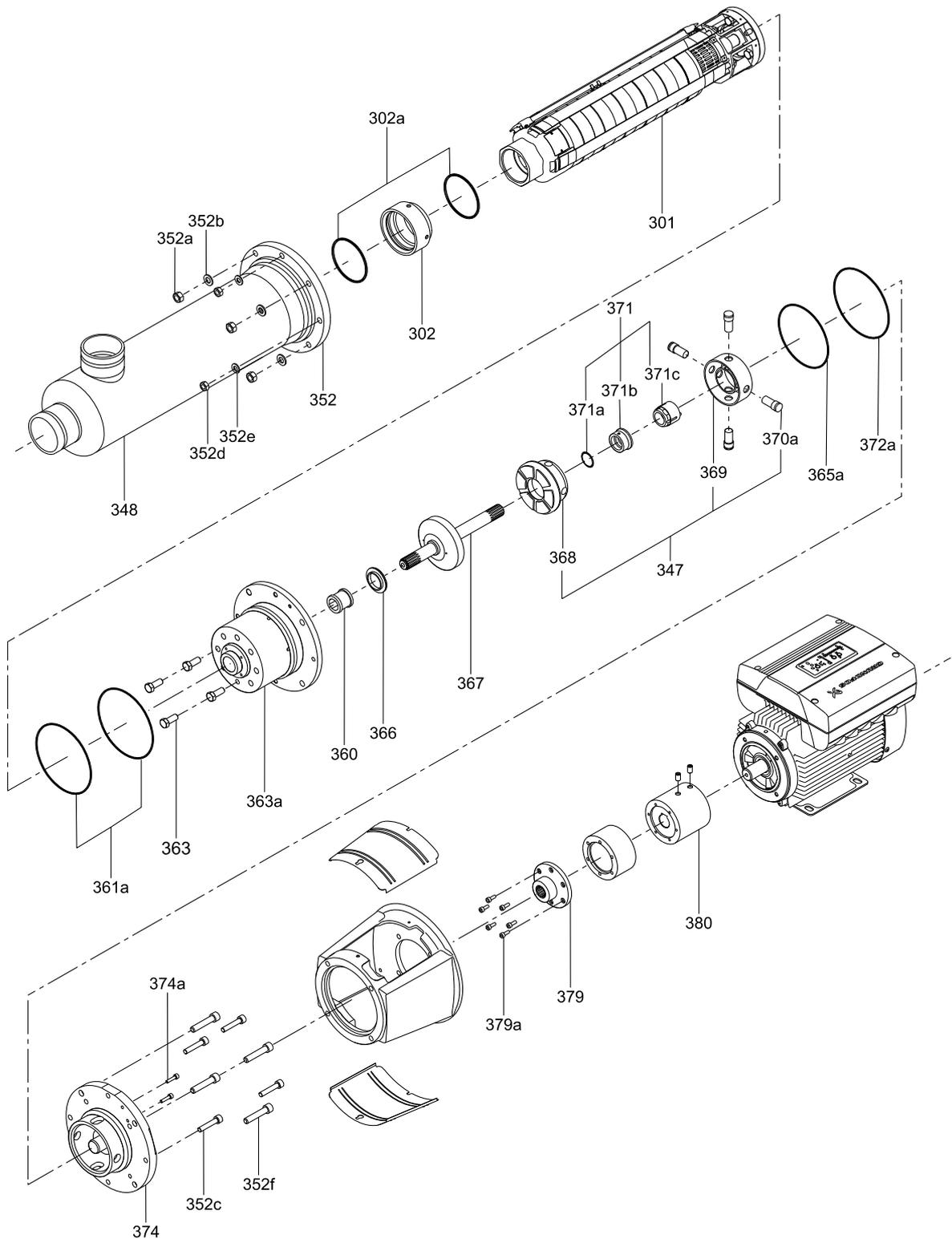
Measure the current of each phase while the pump is operating at a constant discharge pressure, if possible at the capacity where the motor is most heavily loaded.
For information on the normal operating current, see the "Technical specifications".

The difference between the current of the phase with the highest amp consumption and the one with the lowest current consumption must not exceed 10 % of the lowest current consumption.
If the difference exceeds 10 % of the lowest current consumption, or if the current exceeds the full-load current, check these possible faults:

- A damaged pump is causing the motor to be overloaded. Pull the pump out of the sleeve for overhaul.
- The motor windings are short-circuited or partly disjointed.
- Too high or too low supply voltage.
- Poor connection in leads. Weak cables.

Note

Do not perform a standard insulation test (high voltage test).



TM06 1386 2314

11. Data report, POWERDRIVE



To be completed by the Grundfos Service Technician servicing the equipment – complete all questions.				
Date of intervention		Pump Start Date		
Drive Serial No.		Failure Date		
Motor Serial No.		Total Hours		
Part No. of failed parts:		Drive Type / Model:		
Trip Log Details				
Status preceding trip (#17.11)		Trip history	Trip	Date & Time
Status at trip (#17.12)		Trip 1 (#10.20)		(#17.18 & #17.19)
Time between states (#17.13)		Trip 2 (#10.21)		(#17.20 & #17.21)
Minimum supply voltage (#17.31)		Trip 3 (#10.22)		(#17.22 & #17.23)
Maximum U,V,W temperature (#17.34)		Trip 4 (#10.23)		(#17.24 & #17.25)
Average DC BUS Voltage (#17.38)		Trip 5 (#10.24)		(#17.26 & #17.27)
Average Motor Speed (#17.39)		Trip 6 (#10.25)		N/A
Average Motor Current (#17.40)		Trip 7 (#10.26)		N/A
IGBT W av. Temp (#17.44)		Trip 8 (#10.27)		N/A
Rectifier av. Temp (#17.45)		Trip 9 (#10.28)		N/A
Average supply Voltage (#17.48)		Trip 10 (#10.29)		N/A
General Checks				
All 3-Phase wiring connections checked? Yes <input type="checkbox"/> No <input type="checkbox"/>		Fast fuses damaged? Yes <input type="checkbox"/> No <input type="checkbox"/>		
All motor connections checked? Yes <input type="checkbox"/> No <input type="checkbox"/>				
Powerdrive Diagnostics				
PROCEED TO A CONTROL AND INTERFACE BOARD TEST (#17.01 = Yes) AND INDICATE THE TEST RESULT (#17.05)				
Processing <input type="checkbox"/>	Passed <input type="checkbox"/>	Control <input type="checkbox"/>	Interface <input type="checkbox"/>	None <input type="checkbox"/>
PROCEED TO A POWER MODULE TEST (#17.02 = Yes) AND INDICATE THE POWER MODULE TEST RESULT (#17.06)				
Passed (1)	<input type="checkbox"/>	Error Motor (6)		<input type="checkbox"/>
Error U Phase (2)	<input type="checkbox"/>	Error U & V Phase (7)		<input type="checkbox"/>
Error V Phase (3)	<input type="checkbox"/>	Error V & W Phase (8)		<input type="checkbox"/>
Error W Phase (4)	<input type="checkbox"/>	Error U & W Phase (9)		<input type="checkbox"/>
Error Rectifier (5)	<input type="checkbox"/>	Error STO not connected (10)		<input type="checkbox"/>
Error code (#17.08)		Refer to the commissioning manual (#17.06) for error code details / comments		
Motor Checks				
<u>Winding insulation measurement > 20 MΩ</u>		<u>Winding Resistance Measurement</u>		
Phase U <input type="checkbox"/> - Phase V <input type="checkbox"/> - Phase W <input type="checkbox"/>		U / V phases :	Ω - V / W phases :	Ω - U / W phases : Ω
<p align="center">Site technician comments:</p>				
Warranty Department Use Only				
Return No.		Warranty?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Test Engineer		Date Issued		
Comments:				
Investigation Details:				

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