

In-line, wet-rotor, single-speed, circulator pumps

UP 43-70, UP 43-110, UP 53-45, UP 53-46



English (US) Installation and operating instructions

Original installation and operating instructions

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WARNING



Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

This booklet should be left with the owner of the pump for future reference and information regarding its operation.

1. Limited warranty

Products manufactured by GRUNDFOS PUMPS CORPORATION (Grundfos) are warranted to the original user only to be free of defects in material and workmanship for a period of 24 months from date of installation, but not more than 30 months from date of manufacture. Grundfos' liability under this warranty shall be limited to repairing or replacing at Grundfos' option, without charge, F.O.B. Grundfos' factory or authorized service station, any product of Grundfos' manufacture. Grundfos will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by Grundfos are subject to the warranty provided by the manufacturer of said products and not by Grundfos' warranty. Grundfos will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with Grundfos' printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of Grundfos' products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact Grundfos or an authorized service station for instructions. Any defective product to be returned to Grundfos or a service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Material Authorization must be included if so instructed.

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limit actions on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

2. Introduction

2.1 Safety warning

2.1.1 Read this booklet

This booklet is designed to help a certified installer install, begin operation of and troubleshoot the Grundfos UP Series 200 pumps. The booklet should be left with the owner of the pump for future reference and information regarding its operation. Should the owner experience any problems with the pump, a certified professional should be contacted.

2.2 Electrical work

All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

WARNING



A faulty motor or wiring can cause electric shock that could be fatal, whether touched directly or conducted through standing water.

For this reason, proper grounding of the pump to the power supply's grounding terminal is required for safe installation and operation.

In all installations, the above-ground metal plumbing should be connected to the power supply ground as described in Article 250-80 of the National Electrical Code.

3. Pre-installation checklist

3.1 Confirm you have the correct pump

- Read the pump nameplate to make sure it is the one you ordered.
- Compare the pump's nameplate data and its performance curve (for head, GPM, etc.) with the application in which you plan to install it.
- Will the pump do what you expect it to do?

3.2 Check the condition of the pump

The shipping carton your pump came in is specially designed around your pump during production to prevent damage.

As a precaution, it should remain in the carton until you are ready to install it. At that point, look at the pump and examine it for any damage that may have occurred during shipping.

Examine any other parts of the shipment as well for any visible damage.

3.3 Verify electrical requirements

Verification of the power supply should be made to be certain the voltage, phase and frequency match that of the pump motor. The proper operating voltage and other electrical information can be found on the pump nameplate.

These motors are designed to run on $\pm 10\%$ of the rated voltage.

Wiring diagrams can be found inside the terminal box cover and later in these installation and operating instructions. If voltage variations are larger than $\pm 10\%$, do not operate the pump.

3.4 Location

The pump is designed for indoor installation.

3.5 Pumped liquid requirements

Caution The UP Series 200 pump is intended for use with water only.

The pump can be used to circulate the following liquids:

- potable hot water
- water for hydronic heating
- water/glycol mixtures up to 50/50
- cooling water.

In domestic hot-water systems it is advisable to use bronze pumps (UP Series 200 or UPS model) only for water with a degree of hardness lower than 14 grains per gallon of hardness. For water with a higher degree of hardness, a direct-coupled TP pump is recommended. If the pump is installed in a heating system, the water should meet the requirements of accepted standards on water quality in heating systems.

In water/glycol mixtures, in order to prevent the glycol from degrading, temperatures above those for which the liquid is rated should be avoided and time spent at high temperatures minimized.

It is also important that the system is cleaned and flushed prior to the installation of the glycol mixture.

In order to avoid problems with corrosion or precipitation, the glycol liquids should be checked and maintained regularly. If further dilution of the supplied glycol is required, follow the requirements of the supplier of the glycol.

Caution Glycol with the trade name DEXCOOL® can damage the pump.

DEXCOOL® is a registered trademark of General Motors Corporation, used under license by Texaco Lubricants NA.

The pump is lubricated and cooled by the pumped liquid. Therefore, the pumped liquid must always be allowed to circulate through the pump. Extended periods without circulation will cause premature wear to the bearings and excessive motor heat. The pumped liquid must also meet the following requirements:

Minimum inlet pressure (during operation)

UP model	At these liquid temperatures					
	167 °F/ 75 °C		194 °F/ 90 °C		230 °F/ 110 °C	
	[psi]	hf	[psi]	hf	[psi]	hf
UP 43-70	0.7	1.6	4.8	11.0	15.4	35.6
UP 43-110	3.6	8.3	8.2	18.9	18.9	43.7
UP 53-45	2.9	6.7	7.5	17.3	18.1	41.6
UP 53-46	1.1	2.5	5.8	13.3	16.4	37.7

Liquid temperature range

Continuously:
14 °F (-10 °C) up to 230 °F (110 °C).
Intermittent:
< 284 °F (140 °C) for short periods of time.
Domestic hot water:
< 140 °F (60 °C).

4. Installation procedures



WARNING

Never make any connections in the pump terminal box unless the power supply has been switched off.

4.1 Electrical preparation

Terminal box position

At the bottom of the stator, closest to the pump housing, there are eight drain holes to allow condensed water to escape. The drain holes must not be blocked. The drain holes must point downwards. The terminal box must therefore point upwards in one of the positions shown in fig. 1. The following terminal box positions apply whether the piping is mounted vertically or horizontally.



Fig. 1 Possible terminal box positions

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Rotating the terminal box

To rotate the terminal box, follow these steps:

WARNING



If the pump is already installed in the system, the system must be drained or the isolation valves on both sides of the pump must be closed before the hex socket head screws are removed as the pumped liquid may be scalding hot and/or under pressure.

Do not start the pump until the system has been filled with liquid and vented.

1. Remove the four hex socket head screws holding the pump head onto the pump housing.
2. Carefully lift the pump head and rotate it so the terminal box is in the desired position. **DO NOT** locate the terminal box beneath the pump. Make sure the O-ring is properly seated in the pump housing.
3. Replace the pump head onto the pump housing.
4. Tighten the hex socket head screws evenly.
Torque to:
8 mm.....15 ft lbs
10 mm.....25 ft lbs.
5. Check to make sure the rotor turns freely. Do this by removing the vent plug in the middle of the pump nameplate. Insert a medium size flat-blade screwdriver into the slot at the exposed end of the shaft. Gently turn the shaft. If it does not turn easily, repeat steps 1 to 4 above.
6. The position of the nameplate can be changed by easing the outer edge of the plate at the cutout with a screwdriver. Turn the nameplate to the required position and push into place.
7. Refer to pages 11 and 12 for additional instructions.

4.2 Piping considerations

Thoroughly clean and flush all dirt and sediment from the system before attempting to install the pump.

Location in the piping line

The pump should never be located at the lowest point of the piping system, where dirt and sediment collect. Nor should it be located at the highest point of the piping system, where air accumulates.

Mounting positions

The arrows on the flanges of the pump indicate the direction of water flow. Although the UP Series 200 may be installed in either vertical or horizontal piping, the motor shaft must always remain horizontal, as shown in figures 1 and 2.

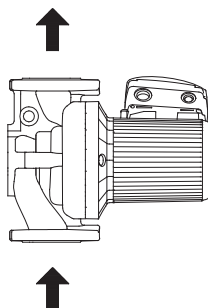


Fig. 2 Direction of water flow through the pump

Note

Pumps installed outdoors must be protected by a ventilated, watertight cover to keep out moisture and dirt.



WARNING

The pump must be positioned so that no one can accidentally come into contact with the hot surfaces of the pump.

4.3 Connect the pump

Install the pump into the piping system.

Grundfos recommends that pressure gauges be installed in the inlet and discharge flanges or pipes to check pump and system performance.

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4.4 Electrical connection

The electrical connection and protection should be carried out by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

WARNING

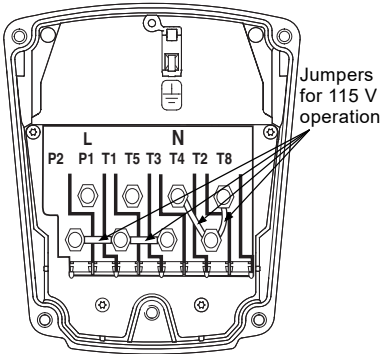


Never make any connections in the pump terminal box unless the power supply has been switched off.
The pump must be grounded.
The pump must be connected to an external main power switch.

The operating voltage and frequency are marked on the pump nameplate. Make sure that the motor is suitable for the power supply it is being installed to.
The pump should be grounded to protect against indirect contact and a ground fault interrupter can be used as extra protection.

Dual-voltage pump (single-phase)

All single-phase pumps are equipped with built-in, automatic resetting, thermal overload protection. The pump is protected at both 115 V and 230 V. The pump may also be protected by using an external contactor or motor starter.
If the pump is protected by means of a motor starter, the starter must be set to the current consumption of the pump. The current consumption is stated on the pump nameplate.
Figures 4 and 6 show the possible connections.
All UP Series 200 pumps (fig. 3 and fig. 5) come with a dual-voltage terminal box. The voltage is changed by the orientation of the jumpers as shown in fig. 9. All pumps are equipped with an internal automatic resetting thermal overload switch (terminals P1 and P2).

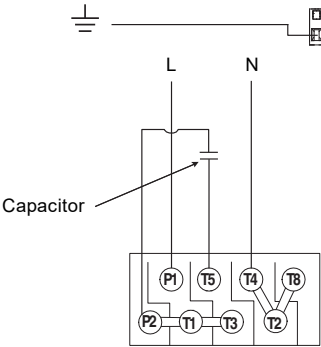


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Fig. 3 UP Series 200 dual-voltage terminal box (1 x 115 V supply)

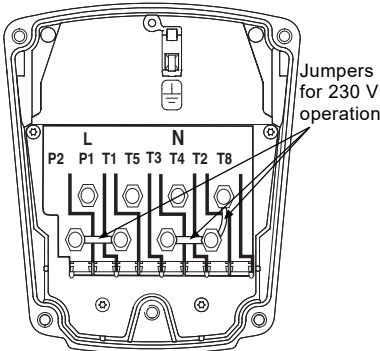
Wiring diagram

Figure 4 shows the electrical connections when using built-in motor protection with 1 x 115 V supply.



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Fig. 4 Electrical connections (1 x 115 V supply)



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Fig. 5 UP Series 200 dual-voltage terminal box (1 x 230 V supply)

Wiring diagram

Figure 6 shows the electrical connections when using built-in motor protection with 1 x 230 V supply.

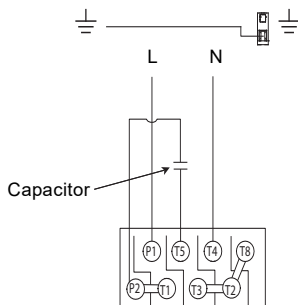


Fig. 6 Electrical connections (1 x 230 V supply)

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5. Starting the pump

5.1 Vent the piping system

After the pump has been installed and the electrical connections made, the piping system must be vented.

Caution

Never operate the pump dry - the system must first be filled with liquid and vented.

Note

Do not vent the piping system through the pump.

Instead, follow these steps:

1. Fill and pressurize the system with liquid, and vent all trapped air from the piping by suitable means.
2. If isolation valves are used, make sure they are OPEN.

WARNING



If the vent screw is to be loosened, care should be taken to ensure that the escaping scalding hot liquid does not cause personal injury or damage to components.

5.2 Voltage selection

WARNING



Never make any connections in the pump terminal box unless the power supply has been switched off.

Change the pump input voltage as follows:

The voltage is changed by the position of the jumpers in the terminals. The jumpers are fitted according to:

- figure 7 for 115 V AC
- figure 8 for 230 V AC.

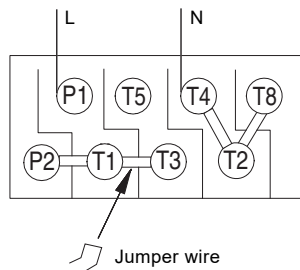


Fig. 7 Jumper position for 115 V AC

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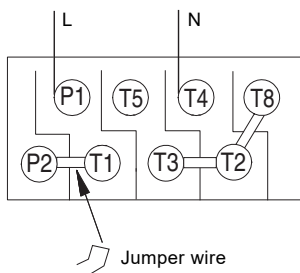


Fig. 8 Jumper position for 230 V AC

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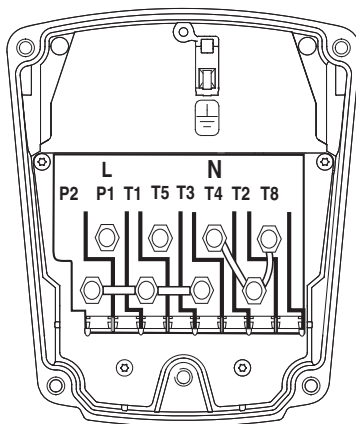


Fig. 9 Terminal box

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6. Troubleshooting

6.1 Fault finding chart

WARNING



Before removing the terminal box cover, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

The pumped liquid may be scalding hot and under high pressure. Before any removal or dismantling of the pump, the system must be drained or the isolation valves on both sides of the pump must be closed.

Fault	Cause	Remedy
1. The pump does not run.	a) One fuse in the installation is blown.	Replace the fuse.
	b) External circuit breaker is switched off.	Switch the circuit breaker on.
	c) Current-/voltage-operated ground fault interrupter has tripped.	Repair the insulation defects and reset the interrupter.
	d) The pump has been cut out by the thermal overload switch due to high liquid temperature or blocked rotor.	Check that the liquid temperature falls within the specified range. The pump will restart automatically when it has cooled to normal temperature.
	e) Rotor blocked, but the pump hasn't been cut out by the thermal overload switch.	Switch off the electrical supply and clean/repair the pump.
2. Noise in the system.	a) Air in the system.	Vent the system.
	b) The pump flow is too high.	Reduce the pump performance.
	c) The pressure is too high.	Reduce the pump performance.
3. Noise in the pump.	a) Air in the pump.	Vent the pump.
	b) The inlet pressure is too low.	Increase the inlet pressure and/or check the air volume in the expansion tank (if installed).
4. Insufficient heat in some places in the heating system.	a) The pump performance is too low.	Increase the pump performance, if possible, or replace the pump with a pump with higher flow.

6.2 Preliminary checks

Supply voltage

To check the voltage being supplied to the motor, use a voltmeter.

WARNING



Be careful, since power is still being supplied to the pump. Do not touch the voltmeter leads together while they are in contact with the power lines.

Single-phase motors

Touch one voltmeter lead to each of the lines supplying power to the pump, L and N.

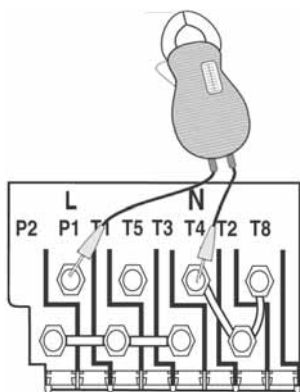


Fig. 10 Checking single-phase power

Evaluation

When the motor is under load, the voltage should be within 10 % (+ or -) of the nameplate voltage. Any variation larger than this may indicate a poor power supply and can cause damage to the motor windings. The motor should not be operated under these conditions. Contact your power supplier to correct the problem or change the motor to one requiring the voltage you are receiving.

6.3 Current measurement

To check the current, use an ammeter.

To do so, follow these steps:

1. Make sure the pump is operating.
2. Set the ammeter to the proper scale.
3. Place the tongs of the ammeter around the leg to be measured.
4. Compare the results with the amp draw information on the nameplate.

Evaluation

If the current exceeds the listed nameplate amps, then check the following:

- The voltage supplied to the pump may be too high or too low.
- The contacts on the motor starter may be burned.
- The terminals in the starter or terminal box may be loose.
- There may be a winding defect. Check the winding and insulation resistance.
- The motor windings may be shorted or grounded.
- The pump may be damaged in some way and may be causing a motor overload.
- A voltage supply or balance problem may exist.

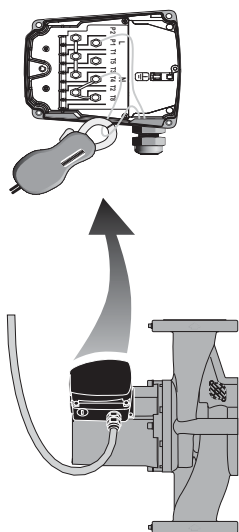


Fig. 11 Current measurement

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6.4 Insulation resistance (lead-to-ground)

To check the insulation resistance (lead-to-ground) of the motor and leads, a megohmmeter is required.

To do so, follow these steps:

- 1. Turn the POWER OFF.
- 2. Disconnect all leads to the motor.
- 3. Set the scale selector on the megohmmeter to R x 100K, touch its leads together, and adjust the indicator to zero.
- 4. Touch the leads of the megohmmeter individually to each of the motor leads and to ground (i.e. L to ground; N to ground, etc.).

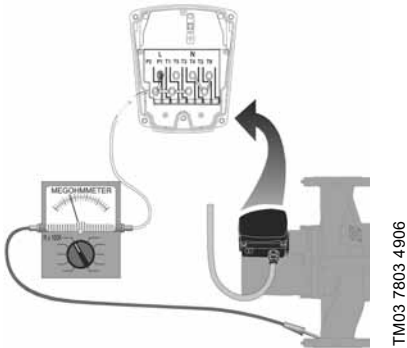


Fig. 12 Insulation resistance measurement

Evaluation

The resistance values for new motors must exceed 1,000,000 ohms. If they do not, replace the motor.

6.5 Winding resistance (line-to-line)

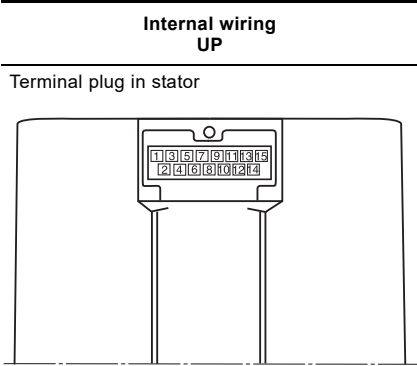
To check the winding resistance of the motor windings, a megohmmeter is required.

To do so, follow these steps:

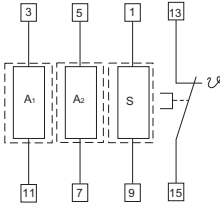
- 1. Turn the POWER OFF.
- 2. Disconnect all leads to the motor.
- 3. Set the scale selector on the megohmmeter to R x 1, touch its leads together and adjust the indicator to zero.
- 4. Using the following chart for reference, touch the leads of the megohmmeter to the appropriate pair of connectors. Check all pairs that are present and write down and label (RA₁, RA₂, RS) all readings.
- 5. Compare your readings to the matching model, phase and voltage on the chart in section 6.6 Winding resistance chart.

Evaluation

The resistance values must fall within the tolerances listed in section 6.6 Winding resistance chart. If they do not, replace the motor.



Single-phase



RA₁: Main winding

RA₂: Main winding

RS: Auxiliary winding

6.6 Winding resistance chart

UP dual voltage

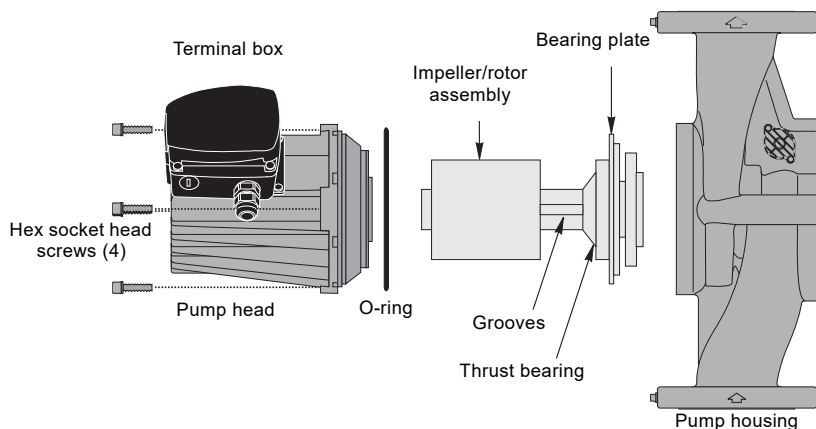
60 Hz

Pump type	[Q] 68 °F - 122 °F (20 °C - 50 °C)			
	Voltage	RA ₁	RA ₂	RS
UP 43-70	1 x 115 V	13.4 - 17.8	10.6 - 14.2	4.50 - 6.00
	1 x 230 V	13.4 - 17.8	10.6 - 14.2	4.50 - 6.00
UP 43-110	1 x 115 V	4.75 - 6.20	3.85 - 5.05	2.10 - 2.75
	1 x 230 V	4.75 - 6.20	3.85 - 5.05	2.10 - 2.75
UP 53-45	1 x 115 V	13.4 - 17.8	10.6 - 14.2	4.50 - 6.00
	1 x 230 V	13.4 - 17.8	10.6 - 14.2	4.50 - 6.00
UP 53-46	1 x 115 V	9.4 - 11.6	7.3 - 9.1	1.6 - 2.0
	1 x 230 V	9.4 - 11.6	7.3 - 9.1	1.6 - 2.0

7. Replacing components

7.1 Removing the pump head

1. Disconnect or TURN OFF the power supply.
2. Close isolation valves on either side of the pump to avoid draining the system of liquid.
3. Disconnect the leads from the terminal box.
4. Disconnect and remove the conduit from the terminal box.
5. Loosen and remove the four hex socket head screws (8 or 10 mm) which connect the pump head to the pump housing.
6. Remove the pump head from the pump housing.
7. Clean the machined surfaces in the pump housing of any foreign material.



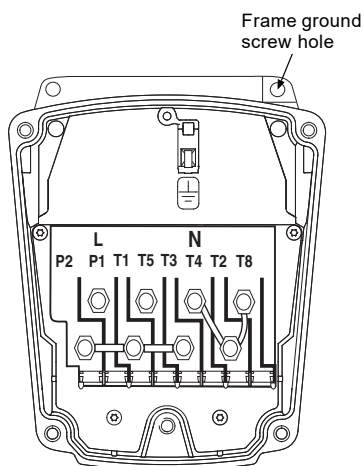
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Fig. 13 Removing and fitting the pump head

7.2 Fitting the pump head

1. Carefully remove the new pump head from its packaging. Separate the impeller/rotor assembly from the new pump head.
2. While holding the thrust bearing, carefully place the impeller/rotor assembly into the pump housing. The bearing plate should fit snugly into the lowest machined surface in the pump housing.
3. Make sure that the impeller/rotor assembly can rotate freely.
4. Place the O-ring over the rotor and locate it into the inner diameter of the pump housing.
5. Carefully place the pump head over the rotor and rotate it so the terminal box is in the position you wish, see section [4.1 Electrical preparation](#) under "Terminal box position".
6. Make sure the pump head is properly seated on the pump housing.
Do not force the two together - if there is binding, disassemble them and repeat steps 2 to 6. Tighten the hex socket head screws evenly to secure the pump head.
Torque to:
8 mm.....15 ft lb
10 mm.....25 ft lb.
7. Check to make sure the motor shaft turns freely, as explained in section [4.1 Electrical preparation](#) under "Rotating the terminal box".

7.3 Replacing the terminal box or capacitor



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If the terminal box is going to be replaced, make certain the electrical information listed on the new box matches the information listed on the old box, and that it is compatible with the pump and incoming power supply.

For all terminal boxes, it is very important to tightly secure the frame grounding screw through the terminal box, so that a proper connection between the terminal box and motor is made.

Fig. 14 Terminal box

All	1.	Before replacing the terminal box or capacitor, make sure the power is OFF.
	2.	Remove the terminal box cover by completely loosening all four torx/standard screws.
Capacitor	a.3.	Capacitor replacement: Disconnect the two capacitor leads from the terminals and unscrew the complete plastic strain relief nut. Remove capacitor wire and strain relief.
	a.4.	Screw in new complete strain relief nut and connect capacitor wires to terminals. Pull excess sheathed cable out of terminal box, being sure to leave at least 1/8" of sheath inside of terminal box.
Terminal box	b.3.	Terminal box replacement: Disconnect all wiring, remove the three Phillips-head screws holding the terminal box in place and remove the terminal box by pulling firmly and evenly on both sides.
	b.4.	Check that the clear rubber gasket is in place around the terminal box connector stem, carefully press the terminal box into the stator socket, replace the three Phillips-head terminal box screws and replace wiring.
All	5.	Replace the terminal box cover and tighten all four torx/standard screws.
	6.	Switch on power supply. The pump is now ready for operation.

8. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

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