MQ

Installation and operating instructions

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GRUNDFOS

English (US) Installation and operating instructions

Original installation and operating instructions.

CONTENTS

Warning

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

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. 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.***

3. Introduction

The MQ is a low-noise water supply system consisting of pump, motor, pressure tank and controller combined into one compact unit.
The system is suitable for both indoor and outdoor use.

The self-priming pump starts automatically when water is consumed in the installation and stops when consumption ceases. The internal, built-in non-return valve prevents backflow during priming and operation.

The MQ pump incorporates overtemperature and dry-running protection as well as a user-friendly control panel.

The built-in pressure tank reduces the number of starts and stops in case of leakage in the installation.

4. Items supplied

The MQ packaging contains these items:

- MQ water supply system with built-in non-return valve
- non-return inlet valve in plastic bag
- installation and operating instructions.

5. Applications

The MQ water supply system is designed for these typical applications:

- water pressure boosting
  (maximum inlet pressure: 40 psi)
- water supply from wells
  (maximum suction lift: 25 ft), for example
  – in private homes
  – on farms
  – in market gardens and other large gardens.

The pump is suitable for rain water.

5.1 Pumped liquids

Thin, clean, non-aggressive liquids, not containing solid particles or fibres.

6. Identification

6.1 Type key

Example	MQ	3	-35	A	-O	-A	BVBP

- Pump type
- Rated flow rate [m^3/h]
- Head [m]
- Code for pump version
  A: Standard
- Code for pipework connection
- Code for materials
  A: Standard
- Code for shaft seal

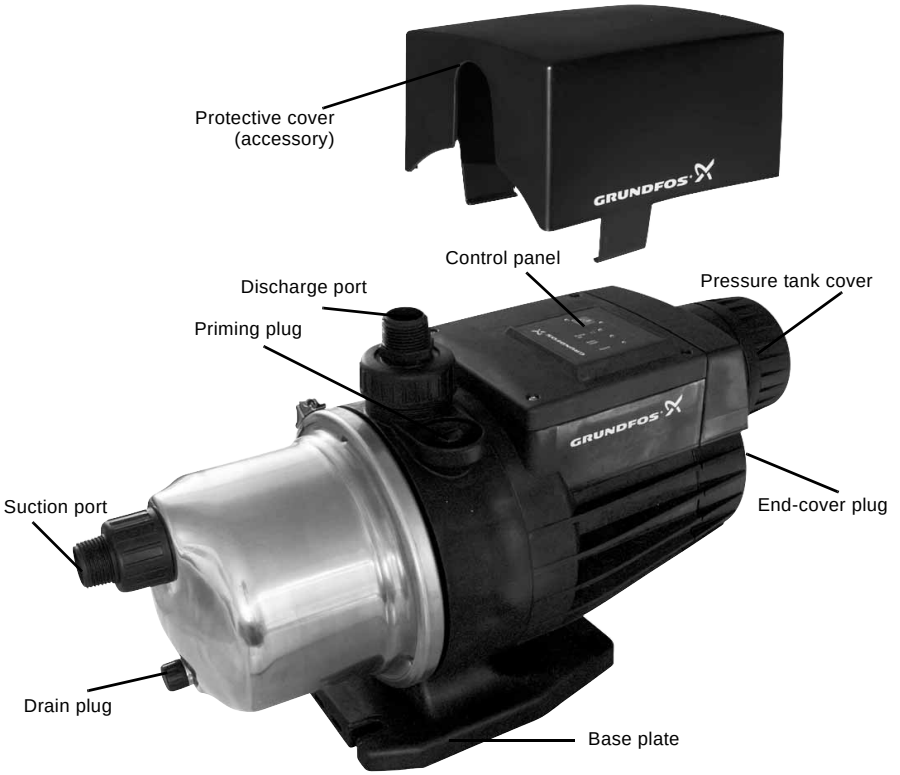

Fig. 1 MQ water supply system. Protective cover is required for outdoor use.

7. Operating conditions

	MQ 3-35	MQ 3-45
Maximum flow rate [gpm]	22	
Maximum inlet pressure [psi]	40	
Pump discharge range [psi]	15-49	18-63
Maximum combined discharge pressure: Max. Inlet + pump discharge range [psi]	55-89	58-103
Maximum suction lift [ft]; see page 19	25	
Minimum ambient temperature [°F]/[°C]	32/0	
Maximum ambient temperature [°F]/[°C]	113/45	
Minimum liquid temperature [°F]/[°C]	32/0	
Maximum liquid temperature [°F]/[°C]	95/35	
Net weight [lbs]	29	
Sound pressure level [dB(A)]	< 70	
Tank volume [oz]	13.5	
Air pressure in tank [psi]	22 to 25	
Connections	1" NPT	
Priming and drain plugs	3/8" GAS	

7.1 Suction lift

The maximum suction lift of the pump can be determined from the diagram, page 19.

Example:

If the suction lift is 10 ft, the length of the suction pipe must not exceed 72 ft.

8. Mechanical installation

8.1 Location

The pump is suitable for indoor and outdoor installation. It is resistant to sunlight.

Note

For outdoor installation, the pump must be fitted with a protective cover (accessory). See section 8.5 Protective cover and 14. Accessories.

Caution

Should the unlikely event of an internal leakage occur, pumped liquid will be drained out from the base and/or end cover instead of damaging the pump. Install the pump in such a way that no undesirable collateral damage can arise.

8.2 Foundation

Mount the pump on the base plate with horizontal suction port and vertical discharge port.

The pump must be installed horizontally.

The maximum permissible inclination angle is ± 18 °. See fig. 2.

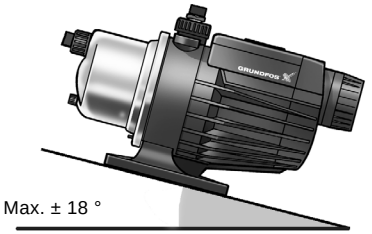

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Fig. 2 Horizontal installation of MQ

To prevent movement and vibrations, the pump and base plate can be secured to a solid foundation by means of the bolt holes in the base plate.
For pipework connection, see section *8.4 Pipework*.

The bolt holes are covered by a thin plastic layer that must be knocked out before use. See fig. 3.

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Fig. 3 Knocking out the plastic layer in bolt hole

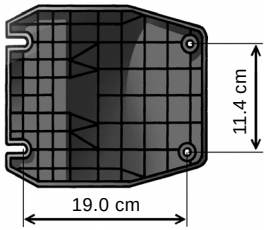

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Fig. 4 Base plate

8.3 Space requirement

For inspection and service, allow a minimum clearance of 6" behind the pump.

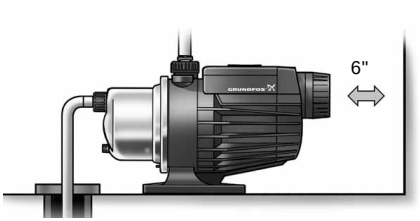

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Fig. 5 Minimum clearance behind the pump

Being self-cooling, the pump requires no space or ventilation at the sides.

Note

Ensure that the maximum ambient temperatures do not exceed the values stated in section 7. Operating conditions.

8.4 Pipework

Note

Never use unnecessary force when connecting the pipes.

The pump is supplied with 1" NPT screwed connections. Fit the connections in the suction and discharge ports. See fig. 6. The pump discharge port is flexible, ± 5 °, to facilitate the fitting.

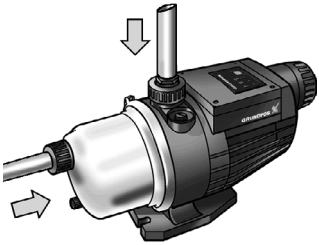

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Fig. 6 Fitting of screwed connections in suction and discharge ports

Carefully screw the discharge connection into the discharge port, using a spanner or similar tool. Hold the discharge connection, and tighten the pump discharge union nut with your hand. See fig. 7.

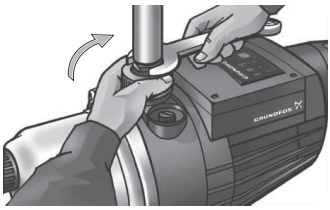

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Fig. 7 Correct: Tighten the discharge union nut with your hand

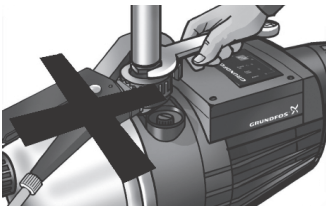

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Fig. 8 Wrong: Do **not** use a tool to tighten the discharge union nut

8.4.1 Suction pipes connected to a well

If the pump draws water from a well, we recommend to fit a foot valve to the end of the suction pipe. See fig. 9.

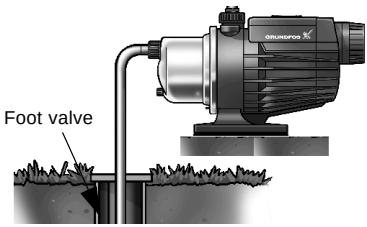

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Fig. 9 Suction pipes connected to a well

8.4.2 Suction hose instead of pipe

If a suction hose is used instead of a pipe, the hose should not exceed the lengths stated in the graph, page 19. The suction hose must be minimum ∅1". The hose must be of the non-collapsible type.

8.4.3 Long suction pipes

A separate non-return inlet valve is supplied with the pump. In case of long suction pipes, we recommend to fit the non-return inlet valve in the pump suction port. See section *8.4.4 Fitting of the non-return inlet valve*

The pipes must be adequately supported on either side of the pump to avoid straining the pump connections.

8.4.4 Fitting of the non-return inlet valve

The non-return inlet valve reduces the risk of losing pump priming in negative suction applications and improves the auto-aspiration capability, for example in water supply from a cistern.

Install the non-return inlet valve as follows, see fig. 10:

1. Remove the suction connection of the pump.
2. Fit the non-return inlet valve into the suction port in the direction shown in fig. 10.
3. Refit the pump connection.

Note ***Applications with positive inlet pressure do not require installation of the non-return inlet valve due to the fact that the MQ pump incorporates an internal non-return valve at the discharge side.***

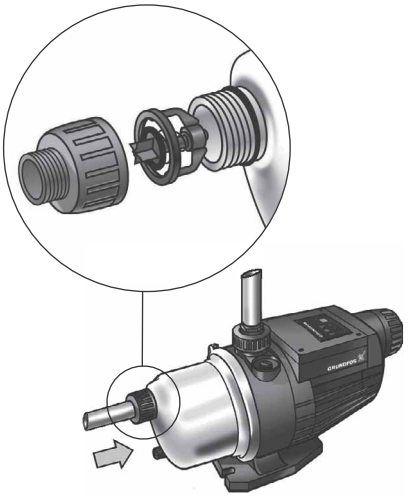

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Fig. 10 Fitting of non-return inlet valve

8.5 Protective cover

Note ***Failure to use the protective cover in outdoor installations will invalidate the warranty.***

The protective cover protects the control panel against the weather. It is available as an accessory. See section *14. Accessories*.

To fit the protective cover, click the cover onto the top of the control panel so that it engages with the top cooling ribs.

To remove the cover, pull the two clips outwards, free of the cooling ribs, and pull the cover upwards.

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Fig. 11 Protective cover

9. Electrical connection

The electrical connections and additional protection should be carried out by qualified persons in accordance with local regulations.

Warning

Non-submersible pump.

If the power cord is damaged, it must be replaced by the manufacturer, an authorized service center or by a qualified person in order to avoid risks.

Never make any connections in the pump terminal box unless the electricity supply has been switched off for at least 5 minutes.

Risk of electric shock:
This pump is supplied with a grounding conductor and grounding type attachment plug. To reduce the risk of electric shock, install only on circuit protected by a Ground-Fault-Circuit-Interrupter (GFCI).

This pump is not intended, nor has it been investigated for use in swimming pool or marine areas.

This pump has been evaluated for use with water only.

Do not start the pump until it has been filled with water (primed, see fig. 14).

Acceptable for indoor and outdoor use.

Enclosure type 3.

The operating voltage and frequency are marked on the nameplate. Make sure that the motor is suitable for the electricity supply on which it will be used.

The pump must be connected to the mains via a sheathed cable with a protective ground lead. It is possible to replace the mains supply cable. See fig. 12.

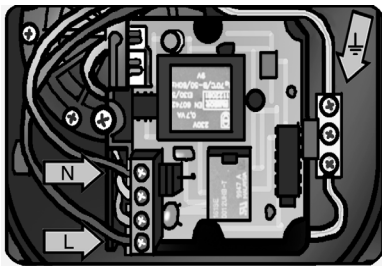

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Fig. 12 Electrical connection

Connect the mains supply cable of the pump to the electricity supply. When the cable is connected, a red and a green indicator light on the control panel will be on. See fig. 13.

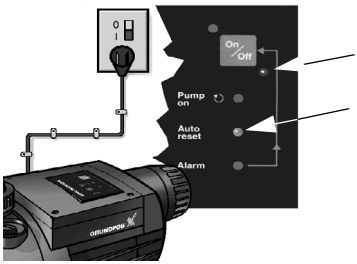

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Fig. 13 When mains supply cable is connected, these two indicator lights will be on

9.1 Generator or inverter

Note

The MQ can be powered by a generator or an inverter. However, the pump will only operate satisfactorily if the generator or inverter generates a true sinusoidal wave with the necessary power and voltage input. The generator must be sized 10 % above the P1 (input power) of the pump. For P1, see section 13.1 Dimensions.

9.2 Wiring diagram

9.2.1 115 V

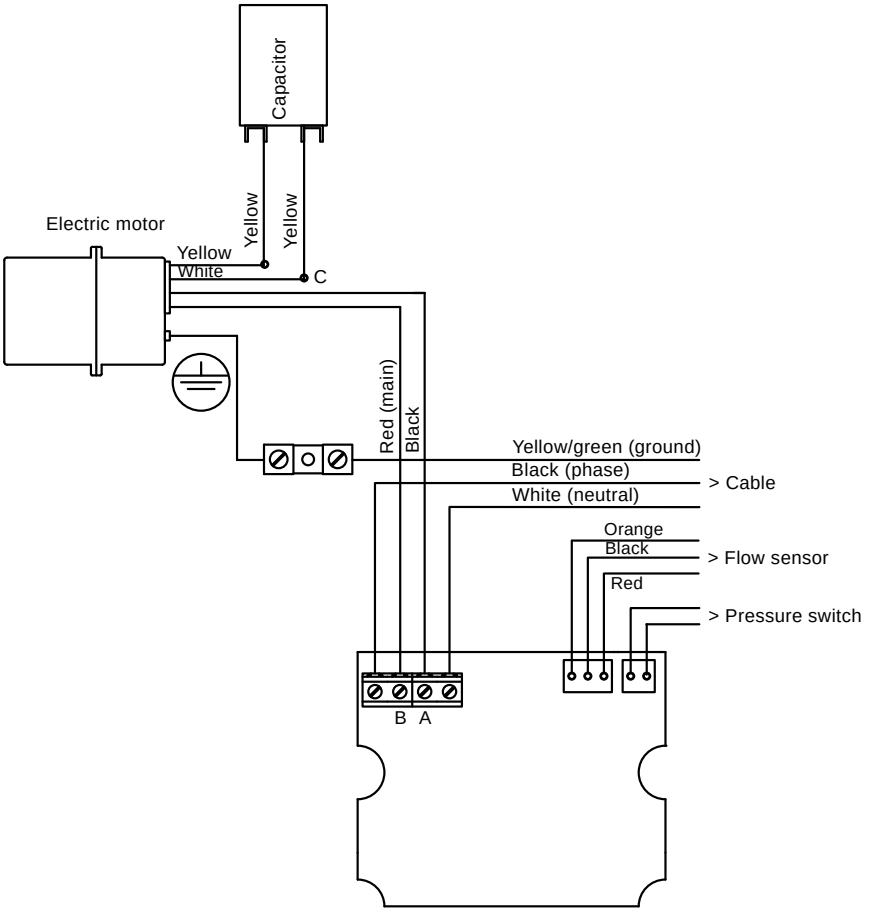

Fig. 14 Wiring diagram - 115 V

9.3 Winding resistance measurement

Motor [V/Hz]	Measuring point	Winding	Resistance [Ω ± 10 %]	Ambient temperature	
				[°F]	[°C]
115/60	A-B (black - red)	Main	1.4	70	21
	A-C (black - white)	Aux	5.5		

The measurement can be done with or without cables connected to the PCB and the capacitor.

9.3.1 230 V

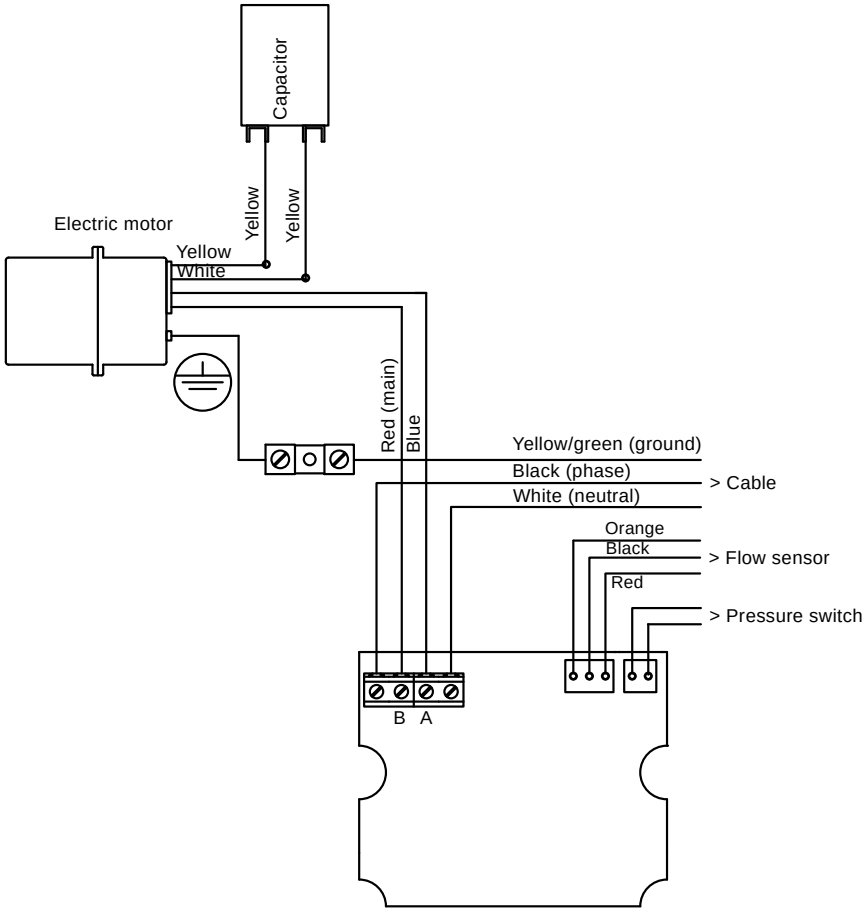

Fig. 15 Wiring diagram - 230 V

9.4 Winding resistance measurement

Motor [V/Hz]	Measuring point	Winding	Resistance [Ω ± 10 %]	Ambient temperature	
				[°F]	[°C]
230/60	A-B (blue - red)	Main	5.4	70	21
	A-C (blue - white)	Aux	5.4		

The measurement can be done with or without cables connected to the PCB and the capacitor.

9.5 Startup

Before start-up, the pump must be filled with 1.2 to 1.5 gallons of water to enable it to self-prime, see fig. 16. The pump is self-priming with a maximum suction lift of 25 ft.

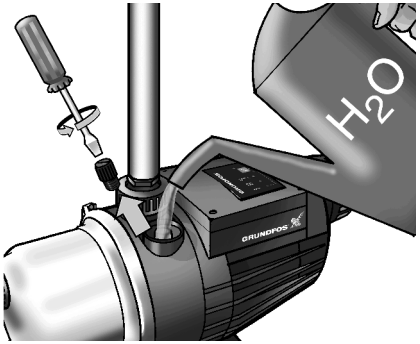

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Fig. 16 Priming the pump

When started, the pump begins to self-prime. When it has been primed, the pump will automatically change over to normal operation. If the priming has not been completed within 5 minutes, the pump will stop automatically and attempt to restart after 30 minutes. It is possible to reset the pump manually, see point 2 in the table of section *10.1 Control panel*.

Warning

Running the pump at a higher inlet pressure than recommended (44 psi) can cause the pump to leak.

Grundfos cannot be held responsible for any damage to the pump and/or its surroundings if this warning is not followed.

10. Functions

10.1 Control panel

The MQ pump is operated entirely by means of the control panel. See fig. 1. The control panel offers the possibility of starting/stopping the pump. The pump settings and operating condition are indicated by indicator lights. See fig. 17.

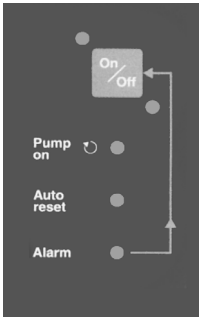

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Fig. 17 Control panel

The functions of the control panel are described in the table below:

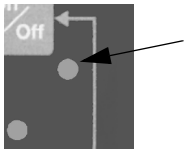
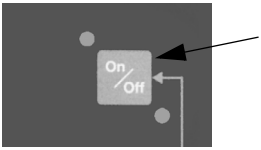
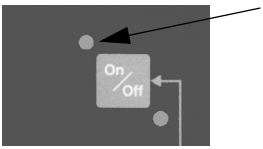
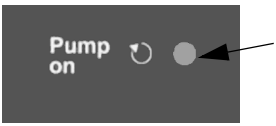
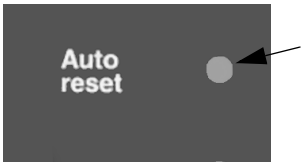
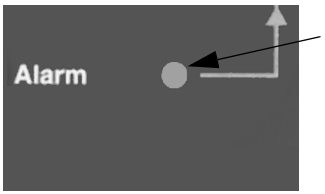
Illustration	Description
1 	**Indicator light (red):** When the indicator light is on, the pump is on standby.
2 	**On/off button:** The pump is started/stopped by means of the on/off button. The on/off button can also be used for manual resetting in case of an alarm condition: • press once for resetting and • press once more for starting.
3 	**Indicator light (green):** Indicates that the pump is ready for operation. When the indicator light is on, the pump will start automatically when water is consumed. After-run time depends on the flexibility of the discharge pipe, but will be at least 10 seconds.
4 	**Pump on (green):** The indicator light is on when the pump is running.

Illustration	Description
5 	**Auto-reset (green):** As standard, this function is activated on delivery (does not apply to pump versions for Australia). When the indicator light is • on, the Auto-reset function is activated. The pump will automatically attempt to restart every 30 minutes after an alarm/fault over a period of 24 hours. After this period, the pump will remain in the alarm condition. • off, the Auto-reset function is deactivated. The pump will not restart after an alarm/fault. The Auto-reset function can be activated/deactivated by pressing the on/off button for 5 seconds. **Note:** When water is consumed, the pump will start and stop automatically, whether the Auto-reset light is on or off.
6 	**Alarm (red):** The indicator light is on when the pump is in alarm condition. The alarm condition may have been caused by: • dry running • overtemperature • overloaded motor • seized-up motor/pump. See section *10.2 Pump stop*.

10.2 Pump stop

The pump incorporates an electronic protective function that will stop the pump in case of

- dry running
- overtemperature
- overloaded motor
- seized-up motor/pump.

The pump will restart automatically after 30 minutes (for 24 hours) in case of any type of fault if the auto-reset function is activated (the green indicator light on the control panel is on, see point 5 in the table of section *10.1 Control panel*).

Note

The pump settings are stored. After supply failure, the pump will automatically revert to its previous operating condition when the electricity supply is reconnected.

11. Maintenance

Under normal operating conditions, the pump is maintenance-free. However, it is recommended to keep the pump clean.

Warning

Do not remove the pressure tank from the pump unless it has been vented through the air escape valve.

Never touch the electronics unless the pump has been switched off for at least 5 minutes.

If there is any risk of frost damage, drain the pump through the drain hole and slacken the union nut on the discharge pipe, see fig. 18. The pump must be filled with liquid before it is started up again.
See fig. 16.

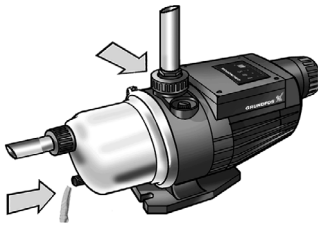


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Fig. 18 Draining the pump

11.1 Service kits

Service kits are available for the MQ pump.
The service kits consist of the following replaceable parts:

- shaft seal
- motor
- electronic units
- hydraulic components.

11.2 Shaft seal run-in

The seal faces are lubricated by the pumped liquid, meaning that there may be a certain amount of leakage from the shaft seal.

When the pump is started up for the first time, or when a new shaft seal is installed, a certain run-in period is required before the leakage is reduced to an acceptable level. The time required for this depends on the operating conditions, i.e. every time the operating conditions change, a new run-in period will be started.

Under normal conditions, the leaking liquid will evaporate, which means that no leakage will be detected.

11.3 Start-up after a long period of inactivity

The end cover incorporates a plug which can be removed by means of a suitable tool. See fig. 19. It is then possible to free the pump rotor if it has seized up as a result of inactivity. If it has been drained, the pump must be filled with liquid before start-up. See fig. 16.

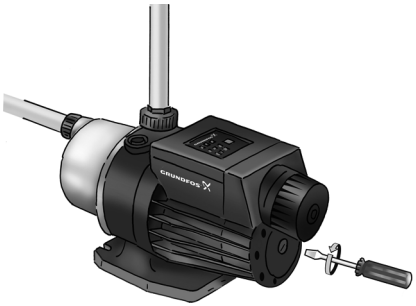

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Fig. 19 Removing the end-cover plug

12. Service

Note

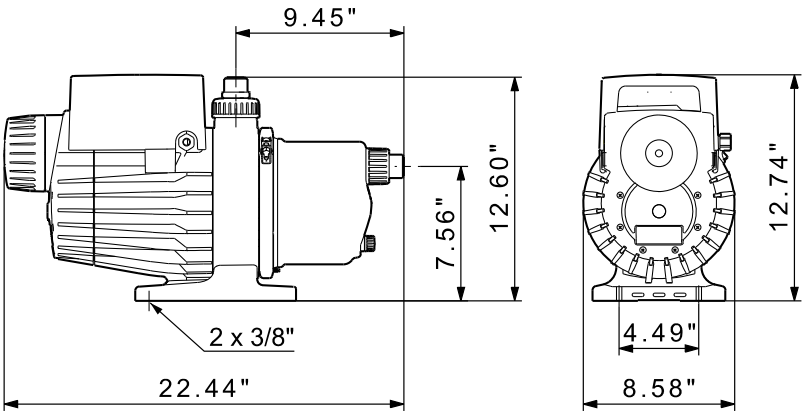
If a pump has been used for a liquid that is injurious to health or toxic, the pump will be classified as contaminated.

If Grundfos is requested to service the pump, Grundfos must be contacted with details about the pumped liquid, etc. before the pump is returned for service. Otherwise Grundfos can refuse to accept the pump for service.
Possible costs of returning the pump are paid by the customer.

However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are injurious to health or toxic.

13. Technical data

13.1 Dimensions



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13.2 Electrical data

		MQ 3-35	MQ 3-45
Enclosure type		3	
Enclosure class		IP54	
Insulation class		B	
Supply cable		6.56 ft SJTW 18 awg with/without plug	
Voltage, power consumption, P_1 [W]	1 x 115-120 V - 10/+ 6 %, 60 Hz	900 W / 8.0 A	1100 W / 10.0 A
	1 x 220-240 V - 10/+ 6 %, 60 Hz	850 W / 4.0 A	1050 W / 4.8 A

13.3 Approvals

CSA-approved for USA and Canada

Class 6861 08 - Mechanical devices - NSF/ANSI 61 Section 8 - Certified to NSF/ANSI 61

Class 6853 01 - Low lead content certification program - Plumbing products

Class 3385 01 - Liquid pumps

Class 3851 81 - Liquid pumps - Certified to US standards

14. Accessories

Model	Designation	Product number
MQ 3-35 / MQ 3-45	Protective cover	96693071

15. Fault finding chart

Fault	Cause	Remedy
1. The pump does not start.	a) Insufficient water.	Check the water supply/suction pipe.
	b) Overheating due to excessive liquid temperature (above +95 °F / +35 °C).	Supply cold liquid to the pump.
	c) Overheating due to seized-up/ choked-up pump.	Contact your pump supplier.
	d) Too low or too high supply voltage.	Check the supply voltage and correct the fault, if possible.
	e) No electricity supply.	Connect the electricity supply.
	f) No water consumption.	Open a tap. Check that the height between the top point of the discharge pipe and the pump does not exceed 50 ft.
	g) Shaft is blocked.	Rotate the shaft as described in *11.3 Start-up after a long period of inactivity*.
	h) Pump is in alarm condition.	Reset the pump by means of the on/off button. See point 2 in the table of section *10.1 Control panel*.
2. The pump does not stop.	a) Existing pipework is leaking or defective.	Repair the pipework.
	b) Non-return valve is blocked or missing.	Clean the valve or fit a new non-return valve.
3. The pump cuts out during operation.	a) Dry running.	Check the water supply/suction pipe.
	b) Overheating due to excessive liquid temperature (above +95 °F / +35 °C).	Supply cold liquid to the pump.
	c) Overheating caused by: – high ambient temperature (> 113 °F / 45 °C) – overloaded motor – seized-up motor/pump.	Contact your pump supplier.
	d) Too low supply voltage.	Check the supply voltage and correct the fault, if possible.
4. The pump starts and stops too frequently.	a) Leakage in suction pipe or air in water.	Check the water and the supply/suction pipe.
	b) Too low or too high pressure in pressure tank.	Check the pressure in the pressure tank. See section *7. Operating conditions*.
5. The pump gives electric shocks.	a) Defective ground connection.	Connect the ground connection to the pump in accordance with local regulations.
6. The pump starts when no water is consumed.	a) Internal non-return valve is defective, or the existing pipework is leaking or defective.	Clean the valve or fit a new one.

If the pump does not start when the fault has been corrected, contact your pump supplier or Grundfos for further information.

16. MQ frequently asked questions

1. **What causes the MQ to start?**

   Answer: The MQ is equipped with both an internal flow switch and pressure switch. Each of these can turn the MQ on, depending on water consumption. The pump will start when:
   The flow rate is greater than 0.3 gpm
   OR
   the pressure is below 29 psi.

2. **What causes the MQ to stop?**

   Answer: Other than the manual on/off button, only the flow switch is authorized to automatically stop the MQ during normal operation when flow drops below 0.3 gpm. The pump will shut off in 12-15 seconds after flow stops.
   Additionally, the MQ will be turned off in the event of a dry-run or overtemperature alarm.

3. **What is the maximum height of a tap above the MQ?**

   Answer: If a tap or faucet is installed at heights greater than 50 ft above the MQ, there is the potential risk that the MQ will never start.
   In cases where the MQ starts due to low pressure (low flow rates), the pressure has to fall below the pressure switch activation point (28-30 psi factory setting). To allow for the pressure of 50 ft of water, tolerances and a safety margin, we recommend a maximum height of 50 ft between the MQ and any tap.

4. **What is the purpose of the built-in pressure tank?**

   Answer: The built-in pressure tank comes from the factory, pressurized at approximately 23 psi (with the pump pressure at zero) and holds a volume of 14 ounces of water. It is designed to minimize motor startup due to small leaks.

5. **How is the dry-run condition determined?**

   Answer: The dry-run alarm is declared when the motor is running AND the flow rate is less than 1.6 gpm AND when pressure is less than the pressure switch setting. When this condition lasts for 12 seconds, the alarm will be declared after 1 minute, and the motor is stopped. The MQ attempts to automatically restart every 30 minutes for a maximum of 24 hours. If more than 24 hours pass without water, the pump must be restarted manually.

6. **What is the maximum inlet pressure allowed in the MQ?**

   Answer: For both MQ 3-35 and MQ 3-45, the maximum internal pressure allowed is 109 psi. The maximum inlet pressure when added to the MQ pressure must not exceed 109 psi. Remember that inlet pressure adds to the MQ pressure, so with a 40 psi inlet pressure supplied to the MQ 3-45, internal pressures can reach approximately 105 psi (65 + 40 psi).
   Additionally, if inlet pressures exceed the built-in pressure switch activation point (28-30 psi factory setting), the pressure switch will be unable to activate, and the ability to turn the MQ on at low flow rates will be lost. In this situation, only the flow switch will be able to turn the MQ on at flow rates above its activation point of 0.3 gpm.

7. **What is the priming capacity of the MQ?**

   Answer: Approx. 1.2 gallons.

8. **How is overload temperature/overtemperature of the MQ detected?**

   Answer: The motor has a thermal switch incorporated in the motor windings.
   The switch will cut out the motor and start again. See the table below.

Thermal protection			
	[V]	[°F]	[°C]
Cut-out	115	302	150
	230	275	135
Cut-in	Both	151	65-67

9. **Where can a pressure gauge be easily installed to measure the discharge pressure?**

   Answer: In the discharge piping or in 3/8" GAS straight thread opening used to add priming water to the pump.

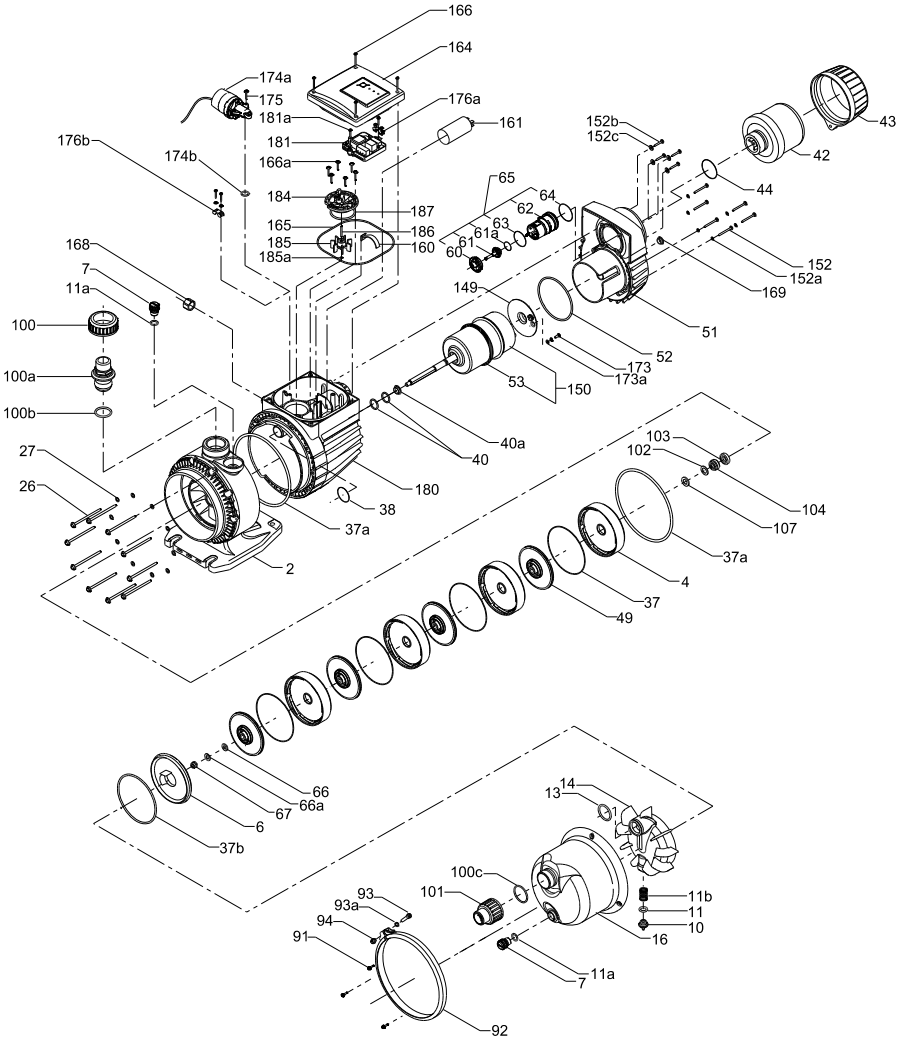
17. Disposal

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.

Exploded view



TM02 8410 4812

Pos.	Description (US)	Descripción (MX)	Description (CA)
2	Motor stool with base plate	Soporte del motor con base	Lanterne moteur avec socle
7	Priming plug	Tapón de cebado	Bouchon d'amorçage
14	Self-priming part	Pieza de autocebado	Pièce d'auto-amorçage
16	Pump sleeve	Camisa de la bomba	Chemise de pompe
42	Pressure tank	Tanque de presión	Réservoir sous pression
43	Cover	Tapa	Couvercle
51	End cover	Tapa final	Extrémité de la carcasse
53	O-ring	Junta tórica	Joint torique
65	Check valve	Válvula de retención	Clapet anti-retour
100a	Discharge connection	Conexión de descarga	Raccord de refoulement
101	Inlet connection	Conexión de aspiración	Raccord d'aspiration
161	Capacitor	Condensador	Condensateur
174a	Pressure switch	Presostato	Contacteur manométrique
181	Circuit board	Carta de circuito impreso	Carte de circuit imprimé
184	Flow switch cover	Tapa del interruptor de caudal	Couvercle de l'interrupteur de débit
185	Flow switch wheel	Rueda del interruptor de caudal	Roue de l'interrupteur de débit

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