MTC

Installation and operating instructions

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GRUNDFOS

English (US) Installation and operating instructions

Original installation and operating instructions

These installation and operating instructions describe Grundfos MTC.

Sections 1-4 give the information necessary to be able to unpack, install and start up the product in a safe way.

Sections 5-9 give important information about the product, as well as information on service, fault finding and disposal of the product.

CONTENTS

Read this document before installing the product. 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 that 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 and accepted codes of good practice. The warranty does not cover normal wear and tear.

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 limitations 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.

Products which are repaired or replaced by Grundfos or authorized service center under the provisions of these limited warranty terms will continue to be covered by Grundfos warranty only through the remainder of the original warranty period set forth by the original purchase date.

2. General information

2.1 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 hazard

Consequence of ignoring the warning.

- Action to avoid the hazard.

2.2 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.

3. Installing the product

3.1 Mechanical installation

3.1.1 Tank mounting

CAUTION

Hot or cold surface

Minor or moderate personal injury

- Make sure that no one can accidentally come into contact with hot or cold surfaces.

The pump is designed for tank mounting in vertical position. The pump is positioned in a hole cut into the cover of the tank (upper side) and is secured to the tank by four hexagon head screws through the holes in the mounting flange. We recommend that you fit a sealing gasket between the pump flange and tank.

MTC pumps must only be mounted vertically.

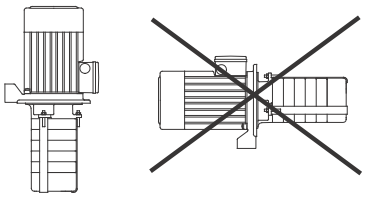

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Fig. 1 Pump mounting position

Filtration requirements

A filtration system must be installed in the tank system to avoid that impurities in the liquid block the pump.

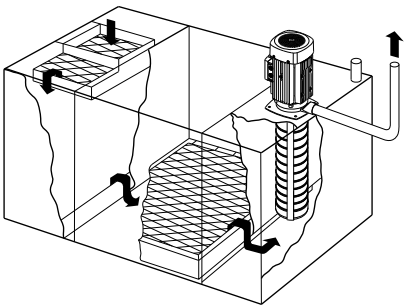

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Fig. 2 Example of a filtration system

Bypass pipe

To reduce the risk of water hammer damaging the pump, we recommend you to install a bypass line.

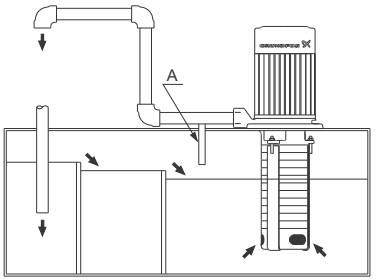

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Fig. 3 Example of a bypass pipe (A)

Installation dimensions

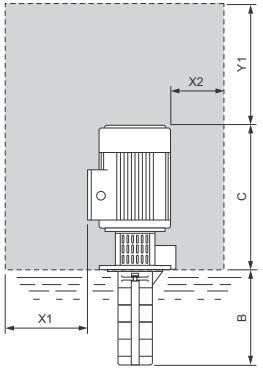

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Fig. 4 Installation dimensions

Measurement	Dimension
B	Depending on pump type.
C	Depending on motor type.
X1	7.87" (200 mm)
X2	5.91" (150 mm)
Y1	This measurement must be at least 1.18" (30 mm) longer than measurement B to allow sufficient space for removing the pump in case of service and maintenance.

Pump mounting flange dimensions

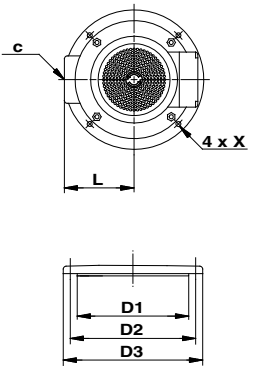

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Fig. 5 Dimensional sketch

	MTC 2, 4 and 8	MTC 10 and 15
D1 [inch (mm)]	5.51 (140)	7.09 (180)
D2 [inch (mm)]	6.3 (160)	8.27 (210)
D3 [inch (mm)]	7.09 (180)	9.84 (250)
L [inch (mm)]	4.76 (121)	5.20 (132)
C	Rp 3/4	Rp/G 1 1/4
X [inch (mm)]	∅0.30 (∅7.5)	∅0.35 (∅9)

3.2 Inlet conditions

The bottom of the pump strainer must be at least 0.98" (25 mm) above the bottom of the tank. See fig. 6 or 7.

MTC pumps must be installed vertically and the drain hole in the motor stool must have access to the tank.

The pumps are designed to provide full performance down to a level of A above the bottom of the strainer.

At a liquid level between A and B above the bottom of the strainer, the built-in priming screw will protect the pump against dry running.

Pump type	A [inch (mm)]	B [inch (mm)]
MTC 2, 4 and 8	1.46 (37)	0.98 (25)
MTC 10 and 15	1.57 (40)	1.10 (28)

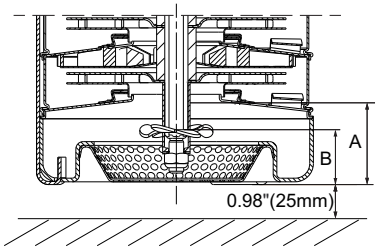

Fig. 6 MTC 2, 4 and 8

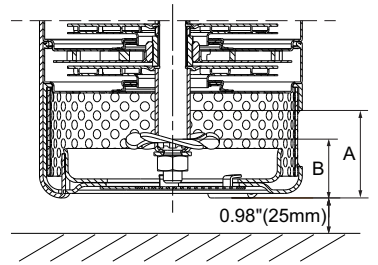

Fig. 7 MTC 10 and 15

3.3 Electrical connection

WARNING

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on. Connect the pump to an external main switch close to the pump and to a motor-protective circuit breaker or a CUE frequency converter.
- Make sure you can lock the main switch in OFF position (isolated). Type and requirements as specified in EN 60204-1, 5.3.2.

Operating voltage and operating frequency are stated on the motor nameplate. Check that the motor is suitable for the power supply available at the installation site.

The voltage quality for ML motors, measured at the motor terminals, must be ± 10 % of the rated voltage during continuous operation, including variation in the supply voltage and losses in cables.

The electrical installation must be carried out by authorised personsin accordance with local regulations.

The wiring diagram is located in the terminal box cover.

ML motors can be connected in star (Y), parallel star (YY), delta (D) or parallel delta (DD). See the wiring diagram in the terminal box cover.

Voltage and connection are stated on the nameplate. Example: 208-230 V YY / 460 Y

- If the voltage supply is 208-230 V, the motor must be connected in parallel star.
- If the voltage supply is 460 V, the motor must be connected in star.

3.3.1 Torque for terminal box cover screws

Torque: 1.18 - 1.48 lbf-ft (1.6 - 2 Nm).

3.3.2 Motor protection

Single-phase motors

Single-phase motors are supplied with built-in thermal protection, according to IEC 60034-11, against thermal overload with both rapid and slow variation.

Three-phase motors

Three-phase motors must be protected by a motor-protective circuit breaker according to local regulations.

ML motors as from 5 hp (3.0 kW) are supplied with thermal switches (PTC) as standard and protected against thermal overload with both rapid and slow variation. The motor protection is stated on the nameplate.

3.3.3 Terminal box positions

The terminal box can be turned to three positions, in 90 ° steps. See fig. 8.

Proceed as follows:

1. Remove the four bolts securing the motor to the motor stool.
2. Turn the motor to the required position.
3. Refit and tighten the four bolts.

The electric motor must be connected to the supply as shown in the diagram inside the terminal box cover.

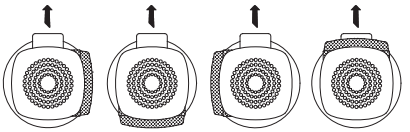

Fig. 8 Terminal box positions, top view

3.3.4 Plug connections

The pumps can be fitted with a 10-pin multiplug connection, type Han® 10 ES.

The purpose of a multiplug connection is to make the electrical installation and the service of the pump easier.

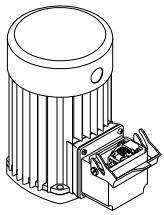

Fig. 9 Multiplug connection on a Grundfos motor

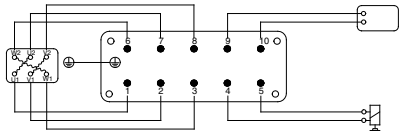

Fig. 10 Connections between motor terminals and plug terminals

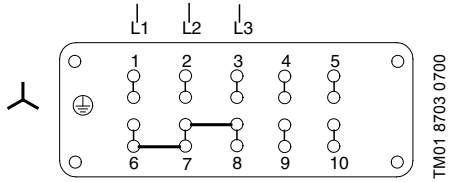

Fig. 11 Plug connections for star connection

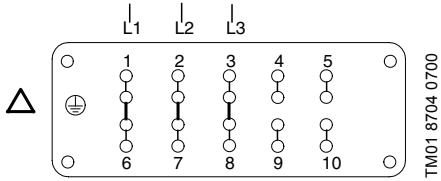

Fig. 12 Plug connections for delta connection, fishplates for connections are located in the plug

3.3.5 Frequency converter operation

Motors supplied by Grundfos

All three-phase motors supplied by Grundfos can be connected to a frequency converter.

Depending on the frequency converter type, this may cause increased acoustic noise from the motor. Furthermore, it may cause the motor to be exposed to detrimental voltage peaks.

Grundfos motors, types ML 71, ML 80 and ML 90 (2 hp (1.5 kW), 2-pole), for supply voltages up to and including 440 V, must be protected against voltage peaks higher than 650 V (peak value) between the supply terminals. See motor nameplate.

We recommend to protect all other motors against voltage peaks higher than 850 V.

The above disturbances, that is both increased acoustic noise and detrimental voltage peaks, can be eliminated by fitting an LC filter between the frequency converter and the motor.

For further information, please contact the frequency converter supplier or Grundfos.

4. Starting up the product

Before starting the pump, ensure the following:

- All pipe connections are tight.
- The pump body is partly filled with liquid (partly submerged).
- The strainer is not blocked by impurities.

Start the pump as follows:

1. Close the isolating valve on the outlet side of the pump.
2. See the correct direction of rotation of the pump on the motor fan cover. When seen from the top, the pump must rotate counterclockwise.
3. Start the pump and check that the direction of rotation is correct.
4. Slowly open the outlet valve until it is completely open.

The pump has now been vented and is ready for operation.

4.1 Operating the product

CAUTION

Fire and explosion

Minor or moderate personal injury

- Do not use the pump for flammable, combustible or explosive liquids.

CAUTION

Hot liquid

Minor or moderate personal injury

- Do not run the pump against a closed valve for more than approximately 5 minutes.

The pump is not allowed to run against a closed outlet valve for more than approximately 5 minutes as this will cause an increase in temperature and formation of steam in the pump which may cause damage to the pump.

5. Product introduction

5.1 Applications

Grundfos pumps, type MTC, are multistage centrifugal pumps designed for pumping liquids for machine tools, condensate transfer, liquid transfer in industrial washing machines and similar applications.

The pumps are designed for pumping liquids with a density and viscosity corresponding to those of water. The pumped liquid must not contain abrasive particles or fibers.

When pumping liquids with a density or viscosity higher than that of water, the motor size must be taken into consideration.

5.2 Identification

5.2.1 Type designation

The standard range consists of pumps with several impeller and chamber combinations. On request, other pump lengths can be supplied by fitting empty intermediate chambers in combination with standard impellers and chambers.

The type key on the pump nameplate indicates the number of chambers and impellers fitted to the pump.

5.2.2 Type key

Example MTC 2 -6 /3 -A -W -A -A QQ V

Pump type

Rated flow rate [m^3/h] (x5 gpm)

Number of chambers

Number of impellers

Pump version

A	Basic version
B	Oversize motor
C	Inlet pipe
X	Special version

Pipe connection

M	Square flange with internal thread
W	Internal thread
WB	NPT internal thread

Materials

A	Basic version
I	Stainless steel pump head

Shaft seal

A	O-ring seal with fixed seal driver
B	Bellows seal, rubber
C	O-ring seal with spring as seal driver
R	O-ring seal, type A, with reduced seal faces

A	Carbon, metal-impregnated
B	Carbon, resin-impregnated
Q	Silicon carbide
U	Tungsten carbide
V	Metal oxides, ceramic

E	EPDM
V	FKM

6. Servicing the product

WARNING

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.
- Connect the pump to an external main switch close to the pump and to a motor-protective circuit breaker or a CUE frequency converter.
- Make sure you can lock the main switch in OFF position (isolated). Type and requirements as specified in EN 60204-1, 5.3.2.

CAUTION

Toxic liquids

Minor or moderate personal injury

- Wear personal protective equipment.

CAUTION

Hot or cold liquid

Minor or moderate personal injury

- Wear personal protective equipment.

CAUTION

Hot or cold surface

Minor or moderate personal injury

- Make sure that no one can accidentally come into contact with hot or cold surfaces.

6.1 Contaminated products

The product will be classified as contaminated if it has been used for a liquid which is injurious to health or toxic.

If you request Grundfos to service the product, contact Grundfos with details about the liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product for service.

Any application for service must include details about the liquid.

Clean the product in the best possible way before you return it.

Costs of returning the product are to be paid by the customer.

6.2 Maintaining the product

Pumps installed in accordance with these instructions require very little maintenance.

Shaft seal

The mechanical shaft seal is self-adjusting and has wear-resistant seal rings which are lubricated and cooled by the pumped liquid.

Pump bearings

The pump bearings are lubricated by the pumped liquid.

Motor bearings

The motor ball bearings are grease packed and sealed for life. No further lubrication is necessary.

Pumps from 5 hp (4 kW) and up have angular contact bearings.

6.3 Filters

Chip trays, filters, etc. must be cleaned at regular intervals to ensure a correct flow of liquid.

6.4 Periodic checks

At regular intervals, depending on the conditions and time of operation, the following checks must be made:

- Check the quantity of liquid and operating pressure.
- Check that there are no leaks.
- Check that the motor is not overheating.
- Check the tripping of the motor-protective circuit breaker.
- Check that all controls are operating satisfactorily.

If the above checks do not reveal any abnormal operating details, no further checks are necessary.

Should any faults be found, check the symptoms in section *7. Fault finding the product*.

7. Fault finding the product

WARNING

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.
- Connect the pump to an external main switch close to the pump and to a motor-protective circuit breaker or a CUE frequency converter.
- Make sure you can lock the main switch in OFF position (isolated). Type and requirements as specified in EN 60204-1, 5.3.2.

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Minor or moderate personal injury

- Wear personal protective equipment.

CAUTION

Hot or cold liquid

Minor or moderate personal injury

- Wear personal protective equipment.

CAUTION

Hot or cold surface

Minor or moderate personal injury

- Make sure that no one can accidentally come into contact with hot or cold surfaces.

Fault	Cause	Remedy
1. The motor does not run when started.	a) Supply failure.	Connect the power supply.
	b) The fuses are blown.	Replace the fuses.
	c) The motor-protective circuit breaker overload has tripped.	Reactivate the motor-protective circuit breaker.
	d) The main contacts in the motor-protective circuit breaker are not making contact or the coil is faulty.	Replace the contacts or magnetic coil.
	e) The control circuit is defective.	Repair the control circuit.
	f) The motor is defective.	Replace the pump.
2. The motor-protective circuit breaker overload trips immediately when the power supply is switched on.	a) One fuse or one automatic circuit breaker is blown.	Cut in the fuse.
	b) The contacts in the motor-protective circuit breaker overload are faulty.	Replace the motor-protective circuit breaker contacts.
	c) The cable connection is loose or faulty.	Fasten or replace the cable connection.
	d) The motor winding is defective.	Replace the pump.
	e) The pump is mechanically blocked.	Remove the mechanical blocking of the pump.
	f) The overload setting is too low.	Set the motor-protective circuit breaker correctly.
3. The motor-protective circuit breaker overload trips occasionally.	a) The overload setting is too low.	Set the motor-protective circuit breaker correctly.
	b) The voltage is low at peak times.	Check the power supply.
4. The motor-protective circuit breaker has not tripped but the pump does not run.	a) Check 1 a), b), d) and e).	
5. The pump runs but does not deliver the rated flow.	a) The pump strainer is partly blocked by impurities.	Clean the strainer.
	b) The liquid level in the tank is too low.	Increase the liquid level.
	c) The pump rotates in the wrong direction.	Change the direction of rotation of the motor.

8. Technical data

8.1 Operating conditions

Pump type	MTC
Minimum liquid temperature [°F (°C)]	+14 (-10)
Maximum liquid temperature [°F (°C)]	+194 (+90)
Maximum ambient temperature [°F (°C)]	+104 (+40)
Maximum operating pressure [psi (bar)]	50 (10)
Enclosure class	IP54

8.1.1 Minimum flow rate

Pump type	Minimum flow rate [l/min]	
	At a liquid temperature of 176 °F (80 °C)	At a liquid temperature between 176 and 194 °F (80 and 90 °C)
MTC 2 and 4	37.4 (3)	46.4 (8)
MTC 8	55.4 (13)	91.4 (33)
MTC 10 and 15	68 (20)	122 (50)

8.1.2 Maximum number of starts

Maximum number of starts per hour: 100.

8.2 Sound pressure level

The sound pressure level of the pumps is lower than 70 dB(A).

9. Disposing of the product

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.

See also end-of-life information at www.grundfos.com/product-recycling.

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