

CRK, MTR

Installation and operating instructions



English (GB) Installation and operating instructions

Original installation and operating instructions

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1. Symbols used in this document



Warning

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



Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.



Warning

The surface of the product may be so hot that it may cause burns or 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.

2. Handling

When the entire pump is to be lifted, observe the following:

- CRK and MTR pumps fitted with a Grundfos MG motor up to 0.75 kW should be lifted in the pump head by means of straps or the like.
- CRK and MTR pumps fitted with a Grundfos MG motor from 1.1 to 22 kW must be lifted by means of the lifting eyes.
- For other motor makes than those mentioned above, we recommend to lift the pump in the pump head by means of straps.



Warning

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

3. Applications

The Grundfos pumps, types CRK and MTR, are tank mounted multistage centrifugal pumps designed for the following applications:

- liquid transfer in machine tools
- condensate transfer
- liquid transfer in industrial washing machines
- pressure boosting of cold or hot clean liquids
- similar applications.



Warning

Do not use the pump for flammable liquids, such as diesel oil and petrol.

3.1 Pumped liquids

Thin, non-explosive liquids, not containing fibres. The liquid must not attack the pump materials chemically.

When pumping liquids with a density and/or viscosity higher than that of water, use motors with correspondingly higher outputs, if required.

MTR version A pumps have a cast iron pump head.

In MTR version I and CRK version I pumps all parts in contact with the pumped liquid are of stainless steel EN/DIN 1.4301 or better.

4. Identification

4.1 Nameplate for CRK and MTR

Type	MTR10-6/3 A-W-A-HUUU				
Model	A 96889995 P1 1019				
f	50	Hz	P2	1.1	kW
n	2853	min ⁻¹	H _{max}	30.3	m
Q	10	m ³ /h	H	22.7	m
D _{max} /t _{max}	25/90	bar/°C	CCW		
Serial No.	0001		Made in Hungary		
MEI ≥	0.70	η _p	---		

Fig. 1 Example of nameplate

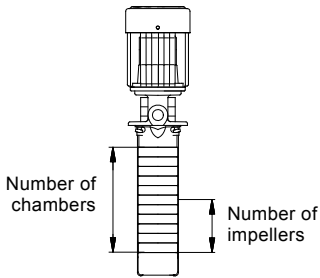
Pos.	Description
1	Type designation
2	Model
3	Product number
4	Place of production
5	Production year and week (YYWW)
6	P2, 50 Hz
7	Head against closed valve
8	Head at rated flow rate
9	Direction of rotation CCW: Counter-clockwise CW: Clockwise
10	Country of production
11	Approval marks
12	Frequency
13	Speed
14	Rated flow rate
15	Maximum pressure and temperature
16	The number of the copy of the technical file kept at KEMA (stated if the pump is ATEX classified)
17	The serial number of the pump (stated if the pump is ATEX classified)
18	ATEX category (stated if the pump is ATEX classified)
19	Minimum efficiency index
20	Hydraulic pump efficiency

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4.2 Type key for CRK

Example	CRK E 4 - 160 / 2 -x -x -x -xxxx
Pump type	E
Pump with integrated frequency control	4
Rated flow rate [m ³ /h]	160
Number of chambers ^{*)} x 10	2
Number of impellers ^{*)}	x
Code for pump version	x
Code for pipework connection	x
Code for materials	x
Code for shaft seal and rubber pump parts	xxxx

^{*)} See fig. 2.



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Fig. 2 Number of chambers / impellers

4.3 Type key for MTR, MTRE

Example	MTR	E	32	(s)	-2	/1	-1	-A	-F	-A	-H	UU	V
Pump type													
Pump with integrated frequency control													
Rated flow rate [m ³ /h]													
All impellers with reduced diameter (applies only to MTR 1s)													
Number of chambers, see fig. 2													
Number of impellers, see fig. 2													
Number of impellers with reduced diameter													
Pump version													
A Basic version													
B Oversize motor													
C Suction pipe													
E Pump with certificate/approval													
F 120 °C version													
H Horizontal version													
J Pump with different max. speed													
P Undersize motor													
T Double oversize													
X Special version													
Pipe connection													
F DIN flange													
G ANSI flange													
J JIS flange													
M Square flange with internal thread													
W Internal thread													
WB NPT internal thread													
X Special version													
Materials													
A Basic version													
I Wetted parts EN/DIN 1.4301 / AISI 304													
X Special version													
Shaft seal													
H Balanced cartridge seal													
Q Silicon carbide													
U Tungsten carbide													
B Carbon													
E EPDM													
F FXM													
K FFKM													
V FKM													

5. Technical data

Pump type	CRK	MTR
Minimum liquid temperature [°C]	-10	-10
Maximum liquid temperature [°C]	+90	+90 (120*)
Maximum operating pressure [bar]	25	25
Enclosure class	IP55	IP55

* Applies to pump version F

5.1 Ambient temperature

Motor power [kW]	Motor make	Motor efficiency class	Max. ambient temperature at full load [°C]	Max. altitude above sea level [m]	Pos. in output curve in fig. 3
0.06 - 0.18	Siemens	-	+40	1000	1
0.25 - 0.55	MG	-	+40	1000	1
0.75	MG	IE2	+60	3500	2
1.1 - 22	MG	IE2	+60	3500	2
30-45	Siemens	IE2	+55	2750	3

If the ambient temperature exceeds the above temperature values or the pump is installed at an altitude exceeding the above altitude values, the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or the low density and consequently low cooling effect of the air.

In such cases, it may be necessary to use a motor with a higher rated output.

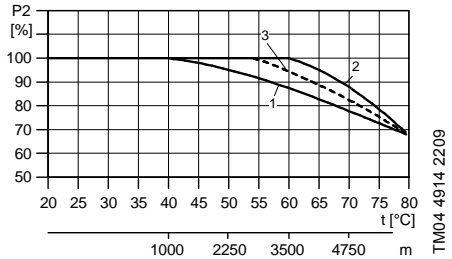


Fig. 3 Relationship between motor output (P2) and ambient temperature/altitude

Example: A pump with a 1.1 kW IE2 MG motor: If this pump is installed 4750 m above sea level, the motor must not be loaded more than 88 % of rated output. At an ambient temperature of 75 °C, the motor must not be loaded more than 78 % of rated output. If the pump is installed 4750 m above sea level at an ambient temperature of 75 °C, the motor must not be loaded more than 88 % x 78 % = 68.6 % of rated output.

5.2 Maximum permissible operating pressure and liquid temperature for the shaft seal

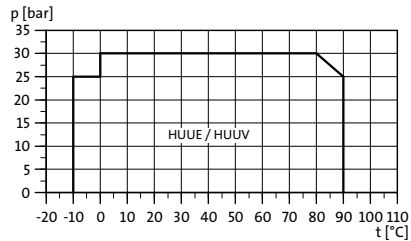


Fig. 4 MTR 1s to 64

5.3 Minimum flow rate

Due to the risk of overheating, the pump should **not** be used at flows below the minimum flow rate.

The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.

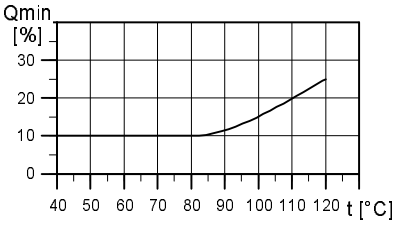


Fig. 5 Minimum flow rate in relation to temperature

Note: The pump must never operate against a closed discharge valve.

5.4 Electrical data

See motor nameplate.

5.5 Maximum number of starts

Motor size [kW]	Recommended maximum number of starts per hour
0.06 - 0.18	100
0.25 - 2.2	250
3-4	100
5.5 - 11	50
15-22	40
30-45	8

6. Installation



Warning

The pump must be installed so that persons cannot accidentally come into contact with the hot surface of the motor.

6.1 Pump location

The pump is designed for tank mounting in vertical and horizontal position. However, only MTR version H and MTRE version H are suitable for horizontal mounting.

The pump is positioned in a hole cut into the tank and is secured to the tank by four hexagon head screws through the holes in the mounting flange.

Vertical

Horizontal

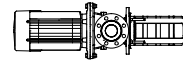
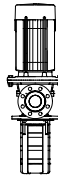


Fig. 6 Vertical and horizontal installation

On horizontally installed MTR, MTRE pumps with motors from 5.5 kW and up the motors have feet and must be supported.

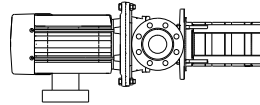


Fig. 7 Horizontally installed MTR with foot

Caution

For horizontally mounted pumps ensure a sufficient sealing between pump flange and tank. A sealing gasket will usually suffice.

Caution

Before changing shaft seals for horizontally mounted pumps, drain the tank.

Caution

MTR 32, 45 and 64 pumps can only be installed in vertical position.

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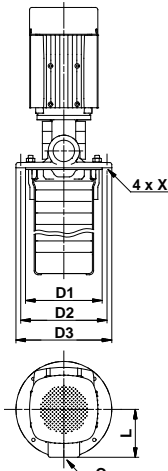


Fig. 8 Vertical installation

Mounting flange dimensions:

Pump type	D1	D2	D3	L	C	X
CRK 2, 4	140	160	180	100	Rp 1 1/4 G 1 1/4	Ø7.5
MTR 1s, 1, 3, 5	140	160	180	100	Rp 1 1/4 G 1 1/4	Ø9.5
MTR 10, 15, 20	200	225	250	125	Rp 2 G 2	Ø9
MTR 32	190	220	250	150	DN 65	Ø12
MTR 45, 64	240	265	290	165	DN 80	Ø12

6.2 Suction conditions

The bottom of the pump strainer must be at least 25 mm above the bottom of the tank.

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

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

Note: MTR 32, 45 and 64 pumps have no priming screw.

Pump type	A [mm]	B [mm]
CRK 2, 4 and MTR 1s, 1, 3, 5	41	28
MTR 10, 15, 20	50	25
MTR 32, 45, 64	70	-

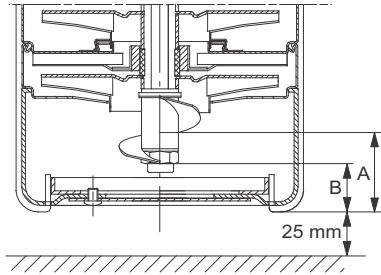


Fig. 9 CRK 2, 4 and MTR 1s, 1, 3, 5

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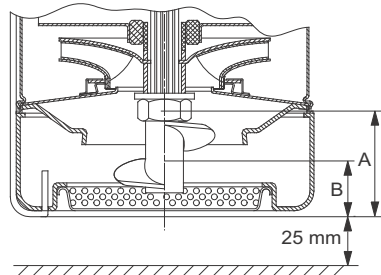


Fig. 10 MTR 10, 15, 20

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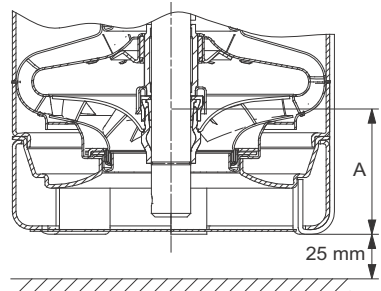


Fig. 11 MTR 32, 45, 64

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7. Electrical connection

The electrical connection should be carried out by an authorized electrician in accordance with local regulations.

The electrical connection should be carried out as shown in the wiring diagram inside the terminal box cover.

Warning



Before removing the terminal box cover and before any removal/dismantling of the pump, make sure that the power supply has been switched off.

The pump must be connected to an external mains switch with a minimum contact gap of 3 mm in all poles.

The operating voltage and frequency are marked on the pump nameplate. Please make sure that the motor is suitable for the power supply on which it will be used.

Single-phase Grundfos motors incorporate a thermal switch and require no additional motor protection.

Three-phase motors must be connected to a motor-protective circuit breaker.

The terminal box can be turned to four positions, in 90° steps. See fig. 12.

1. If necessary, remove the coupling guards. Do *not* remove the coupling.
2. Remove the bolts securing the motor to the pump.
3. Turn the motor to the required position.
4. Replace and tighten the bolts.
5. Replace the coupling guards.

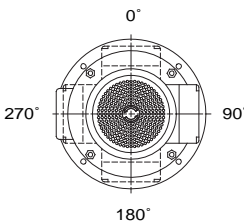


Fig. 12 Terminal box positions

7.1 Frequency converter operation

7.1.1 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 MG 71 and MG 80 as well as MG 90 (1.5 kW, 2-pole), for supply voltages up to and including 440 V (see motor nameplate), must be protected against voltage peaks higher than 650 V (peak value) between the supply terminals.

Caution

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

The above disturbances, i.e. 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 or motor supplier.

7.2 Other motor makes

If other motors makes than those supplied by Grundfos are used, contact Grundfos or the motor manufacturer.

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8. Start-up



Warning

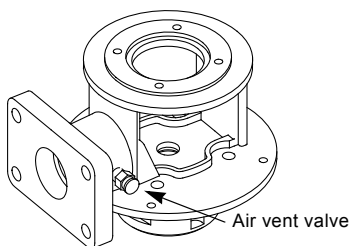
Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.

8.1 Before starting the pump

- Make sure that all pipe connections are tight.
- Make sure that the pump is partly filled with liquid (partly submerged).
- Make sure that the strainer is not blocked by impurities.

8.2 Starting the pump

1. Close the isolating valve on the discharge side of the pump.
2. If the pump is fitted with an air vent valve, this valve must be opened. See fig. 13.



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Fig. 13 Position of the air vent valve

3. See the correct direction of rotation of the pump on the motor fan cover or on the coupling guard. When seen from the top, the pump should rotate **counter-clockwise**.
4. Start the pump and check the direction of rotation.
5. Open the discharge pipe isolating valve a little.
6. If the pump is fitted with an air vent valve, this valve must be closed when a steady flow of liquid runs out of it.
7. Completely open the discharge pipe isolating valve.

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

Caution

Do not run the pump against closed discharge valve for more than approx. 5 minutes as this will cause an increase in temperature/formation of steam in the pump which may cause damage to the pump.

9. Maintenance



Warning

Before starting work on the pump, make sure that all power supplies to the pump have been switched off and that they cannot be accidentally switched on.

Pump bearings and shaft seal are maintenance-free.

Motor bearings

Motors not fitted with grease nipples are maintenance-free.

Motors fitted with grease nipples should be lubricated with a high-temperature, lithium-based grease. See the instructions on the fan cover.

In the case of seasonal operation (motor is idle for more than 6 months of the year), we recommend to grease the motor when the pump is taken out of operation.

Depending on the ambient temperature, the motor bearings must be replaced or lubricated according to the table below. The table applies to 2-pole motors. The number of operating hours stated for bearing replacement are guidelines only.

Motor size [kW]	Bearing replacement interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
0.37 - 0.75	18000	-	-	-	-
1.1 - 7.5	20000	15500	12500	10000	7500

Motor size [kW]	Lubrication interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
11 - 18.5	4500	3400	2500	1700	1100
22	4000	3100	2300	1500	1000
30-55	4000	3000	2000	1500	-
75	2000	1500	1000	500	-

Intervals for 4-pole motors are twice as long as those for 2-pole motors.

If the ambient temperature is lower than 40 °C, bearings must be replaced/lubricated at the intervals mentioned under 40 °C.

9.1 Filters

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

9.2 Periodic checks

At regular intervals, depending on the conditions and time of operation, the following checks should 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 function 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 according to section [12. Fault finding](#).

10. Service



Warning

If a pump has been used for a liquid which 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.

10.1 Service kits

Service kits for CRK and MTR, see <https://product-selection.grundfos.com/> or Service Kit Catalogue.

10.2 Coupling adjustment

For adjustment of coupling in CRK and MTR 1s to 20, see page [14](#).

For adjustment of coupling in MTR 32, 45, 64, see page [15](#).

11. Sound pressure level

The table below shows airborne noise emitted by CRK and MTR pumps with motors fitted by Grundfos.

Motor [kW]	\bar{L}_{pA} [dB(A)]	
	50 Hz	60 Hz
0.37	50	55
0.55	50	53
0.75	50	54
1.1	52	57
1.5	54	59
2.2	54	59
3.0	55	60
4.0	62	66
5.5	60	65
7.5	60	65
11	60	65
15	60	65
18.5	60	65
22	66	70
30	71	75
37	71	75
45	71	75

12. Fault finding



Warning

Before starting work on the pump, make sure that all power supplies to the pump have been switched off and that they cannot be accidentally switched on.

Fault	Cause	Remedy
1. Motor does not run when started.	a) Power supply failure.	Connect the power supply.
	b) Fuses are blown.	Replace fuses.
	c) Motor-protective circuit breaker has tripped out.	Reactivate the motor-protective circuit breaker.
	d) Thermal protection has tripped out.	Reactivate the thermal protection.
	e) Main contacts in motor-protective circuit breaker are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	f) Control circuit is defective.	Repair the control circuit.
	g) Motor is defective.	Replace the motor.
2. Motor-protective circuit breaker trips out immediately when power supply is switched on.	a) One fuse blown/automatic circuit breaker has tripped out.	Replace fuse/cut in the circuit breaker.
	b) Contacts in motor-protective circuit breaker are faulty.	Replace motor-protective circuit breaker contacts.
	c) Cable connection is loose or faulty.	Fasten or replace the cable connection.
	d) Motor winding is defective.	Replace the motor.
	e) Pump mechanically blocked.	Remove the mechanical blocking of the pump.
	f) Motor-protective circuit breaker overload setting is too low.	Set the motor-protective circuit breaker correctly.
3. Motor-protective-circuit breaker trips out occasionally.	a) Motor-protective circuit breaker overload setting is too low.	Set the motor-protective circuit breaker correctly.
	b) Low voltage at peak times.	Reestablish constant power supply.
4. Motor-protective-circuit breaker has not tripped out but the pump does not run.	a) Check 1 a), b), d), e) and f).	
5. Pump runs but gives no liquid or pump performance is not constant.	a) Pump strainer partly blocked by impurities.	Clean the strainer.
	b) Liquid level in tank too low.	Increase the liquid level.
	c) Pump draws in air.	Check the suction conditions.
6. Leakage in shaft seal.	a) Shaft seal is defective.	Replace the shaft seal.
7. Noise.	a) Cavitation.	Check the suction conditions.
	b) Pump does not rotate freely (frictional resistance) because of incorrect pump shaft position.	Adjust the pump shaft.
	c) Frequency converter operation.	See section 7.1 Frequency converter operation .

13. Disposal

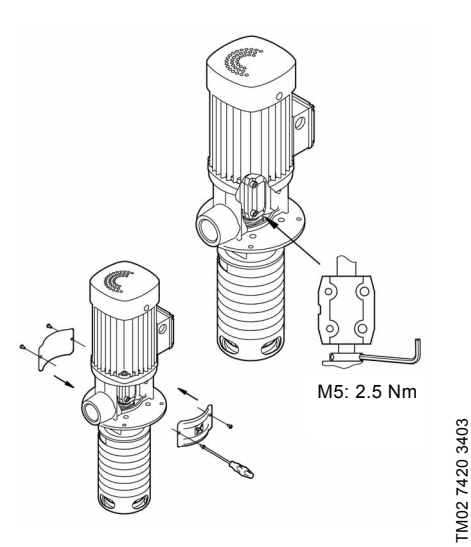
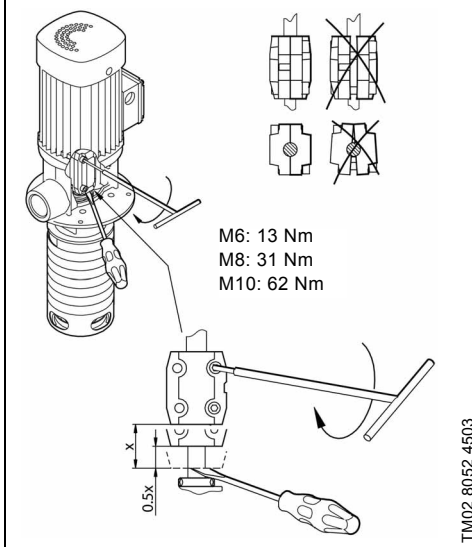
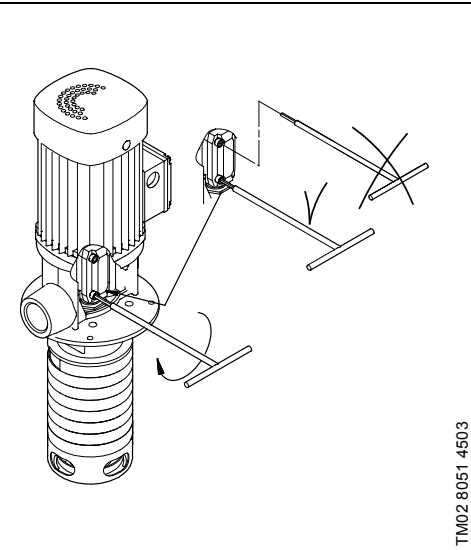
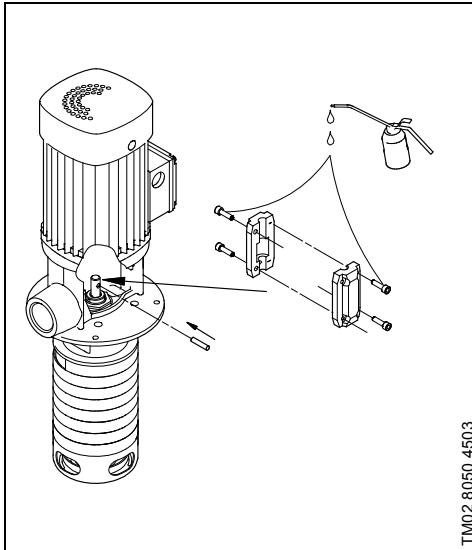
This product or parts of it must be disposed of in an environmentally sound way:

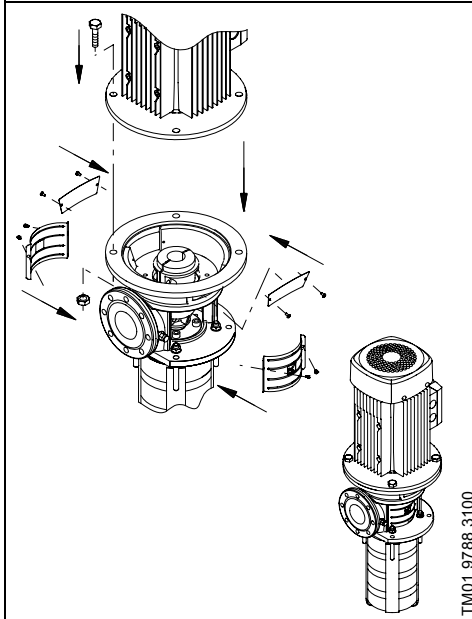
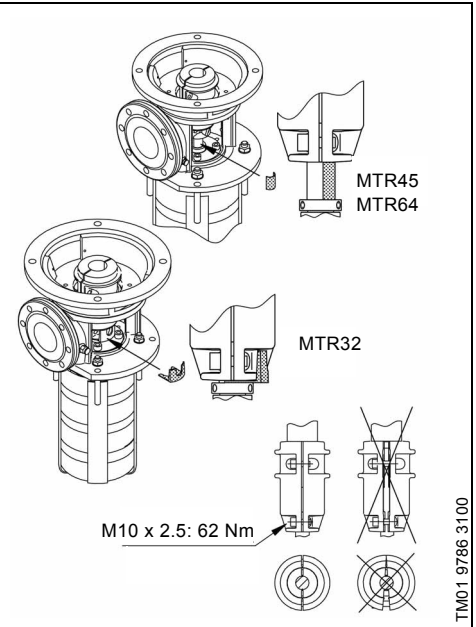
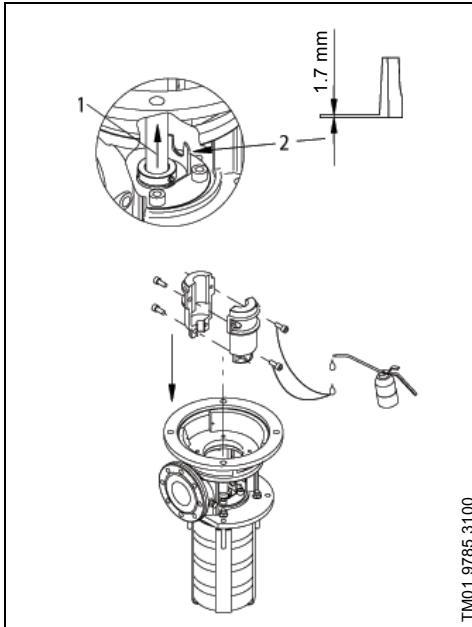
1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

Appendix

CRK and MTR 1s to 20





Declaration of conformity

GB: EC/EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the products CRK, MTR, to which the declaration below relates, are in conformity with the Council Directives listed below on the approximation of the laws of the EC/EU member states.

Note: There are two sets of Council Directives and standards listed below. One set applies until and including 19th April 2016. The other set applies from 20th April 2016 and onwards.

DE: EG-/EU-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte CRK, MTR, auf die sich diese Erklärung beziehen, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-/EU-Mitgliedsstaaten übereinstimmen.

Hinweis: Nachfolgend sind zwei Gruppen aus Richtlinien des Rates und Standards aufgeführt. Eine Gruppe gilt bis einschließlich 19. April 2016. Die andere Gruppe gilt ab dem 20. April 2016.

FR: Déclaration de conformité CE/UE

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits CRK, MTR, auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des États membres CE/UE relatives aux normes énoncées ci-dessous.

Remarque : Deux groupes de Directives du Conseil et normes sont énoncés ci-dessous. Un groupe s'applique jusqu'au 19 avril 2016 inclus. L'autre groupe entrera en vigueur le 20 avril 2016.

PL: Deklaracja zgodności WE/UE

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze produkty CRK, MTR, których deklaracja niniejsza dotyczy, są zgodne z następującymi dyrektywami Rady w sprawie zbliżenia przepisów prawnych państw członkowskich.

Uwaga: Poniżej podano dwa zestawy dyrektyw i norm. Pierwszy zestaw obowiązuje do 19 kwietnia 2016 r. włącznie. Drugi zacznie obowiązywać 20 kwietnia 2016 r.

CZ: Prohlášení o shodě EU

My firma Grundfos prohlašujeme na svou plnou odpovědnost, že výrobky CRK, MTR, na které se toto prohlášení vztahuje, jsou v souladu s níže uvedenými ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství.

Poznámka: Níže jsou uvedeny dvě sady směrnic Rady a standardů. První sada je platná do 19. dubna 2016 (včetně). Druhá sada platí od 20. dubna 2016.

ES: Declaración de conformidad de la CE/UE

Grundfos declara, bajo su exclusiva responsabilidad, que los productos CRK, MTR a los que hace referencia la siguiente declaración cumplen lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la CE/UE.

Nota: A continuación se recogen dos conjuntos de normas y Directivas del Consejo. Uno de ellos es válido hasta el 19 de abril de 2016. El otro es válido a partir del 20 de abril de 2016.

IT: Dichiarazione di conformità CE/UE

Grundfos dichiara sotto la sua esclusiva responsabilità che i prodotti CRK, MTR, ai quale si riferisce questa dichiarazione, sono conformi alle seguenti direttive del Consiglio riguardanti il riavvicinamento delle legislazioni degli Stati membri CE/UE.

Nota: Di seguito sono elencate due serie di direttive del Consiglio e norme. Una serie si applica fino al 19 aprile 2016 (incluso). La seconda serie si applica a partire dal 20 aprile 2016.

RU: Декларация о соответствии нормам ЕЭС/ЕС

Мы, компания Grundfos, со всей ответственностью заявляем, что изделия CRK, MTR, к которым относится нижеприведённая декларация, соответствуют нижеприведённым Директивам Совета Евросоюза о тождественности законов стран-членов ЕЭС/ЕС.

Примечание: Существует два комплекта Директив Совета Евросоюза и стандартов, перечисленных ниже. Один комплект применяется до 19 апреля 2016 г. включительно. Второй комплект применяется начиная с 20 апреля 2016 г.

These Directives and standards apply until and including 19th April 2016:

- Machinery Directive (2006/42/EC).
Standard used:
EN 809:1998 + A1:2009.
- EMC Directive (2004/108/EC).
- Ecodesign Directive (2009/125/EC).
Electric motors:
Commission Regulation No 640/2009.
Applies only to three-phase Grundfos motors marked IE2 or IE3.
See motor nameplate.
Standard used EN 60034-30:2009.
- Ecodesign Directive (2009/125/EC).
Water pumps:
Commission Regulation No 547/2012.
Applies only to water pumps marked with the minimum efficiency index MEI. See pump nameplate.

These Directives and standards apply from 20th April 2016 and onwards:

- Machinery Directive (2006/42/EC).
Standard used:
EN 809:1998 + A1:2009
- EMC Directive (2014/30/EU).
- Ecodesign Directive (2009/125/EC).
Electric motors:
Commission Regulation No 640/2009.
Applies only to three-phase Grundfos motors marked IE2 or IE3.
See motor nameplate.
Standard used EN 60034-30:2009.
- Ecodesign Directive (2009/125/EC).
Water pumps:
Commission Regulation No 547/2012.
Applies only to water pumps marked with the minimum efficiency index MEI. See pump nameplate.

This EC/EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 96496966 0316).

Székesfehérvár, 3 February 2016



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