

# TP, TPD

Installation and operating instructions





## TP, TPD

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### English (GB)

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# English (GB) Installation and operating instructions

## Original installation and operating instructions

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## 1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

## 1.1 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 the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

## 1.2 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.

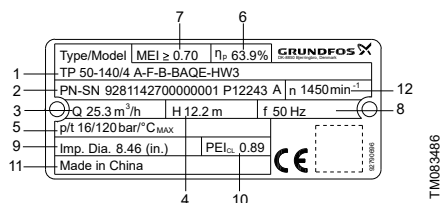
## 2. Product introduction

### 2.1 Product description

These instructions apply to the pump types TP and TPD fitted with Grundfos motors or Siemens/ Innomatics motors. If the pump is fitted with another motor make, please note that the motor data may differ from the data stated in these instructions.

### 2.2 Identification

#### 2.2.1 Nameplate



Example of TP Nameplate

Pos.	Description
1	Type designation
2	Identification code
	92811427 Product number
	00000001 Serial number
	P1 Production site code
	2243 Production year and week (YYWW)
	A Service model
3	Nominal flow rate
4	Nominal pump head
5	Pressure rating and maximum temperature
6	Hydraulic efficiency at best efficiency point
7	Minimum efficiency index
8	Frequency
9	Actual impeller diameter
	WRAS approval or Pump Energy Index (PEI)
10	PEI <sub>CL</sub> : constant load
	PEI <sub>VL</sub> : variable load
11	Country of origin
12	Rated pump speed

## 2.2.2 Type key

**Example of type key: TPED 65-120/2 S-A-F-A-BQQE-GDB**

Pos.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Code	TP	E	D	65	-120	/2	S	-A	-F	-A	-BQQE	-G	D	B

Pos.	Description
1	Pump range
2	Electronically speed-controlled pump, Series 1000, 2000
3	Twin-head pump
4	Nominal diameter of inlet and outlet ports, DN
5	Maximum head [dm]
6	Pole number
7	Code for pump version. The codes may be combined: [Blank]: TPE Series 1000 with MGE motor and without sensor S: TPE Series 2000 with factory-fitted differential-pressure sensor NC: TPE Series 1000 with Siemens/Innomotics motor with integrated CUE SC: TPE Series 2000 with built-in differential-pressure sensor and Siemens/Innomotics motor with integrated CUE
8	Code for pump version. The codes may be combined: A: Basic version A3: PN 25 flange B: Oversize motor (+E): With ATEX approval, certificate or test report, the second character of the code for pump version is an E I: PN 6 flange X: Special version
9	Code for pipe connection: F: DIN flange O: Union
10	Code for materials: A: Basic version (Cast-iron pump housing with Cast-iron/ stainless steel 1.1301/Composite PES/PP 30% GF impeller) B: Cast-iron pump housing with brass/bronze impeller I: Stainless steel 1.4308 housing and motor stool (with Composite PES/PP 30% GF impeller) R: Cast-iron pump housing with stainless steel 1.4308 impeller S: Cast-iron pump housing with stainless steel 1.4408 impeller O: Ductile cast-iron pump housing with cast-iron impeller Y: Ductile cast-iron pump housing with brass/bronze impeller Q: Ductile cast-iron pump housing with stainless steel 1.440 impeller Z: Bronze pump housing and motor stool (with stainless steel 1.4301 impeller)
11	Code for shaft seal including other plastic and rubber pump parts, except the neck ring.

Pos.	Description
12	Code for rated motor power [kW].
13	Code for phase and voltage or other information [V].
14	Code for speed variant [rpm].

### 2.2.2.1 Codes for shaft seal

Code example	Description	Code explanation
B	Shaft seal type	A: O-ring seal with fixed seal driver
		B: Rubber bellows seal
		D: O-ring seal, balanced
		G: Bellows seal with reduced seal faces
		R: O-ring seal with reduced seal faces
Q	Material of rotating face	A: Carbon, antimony-impregnated
		B: Carbon, resin-impregnated
		Q: Silicon carbide
Q	Material of stationary seal	B: Carbon, resin-impregnated Q: Silicon carbide U: Tungsten carbide
E	Material of secondary seal	E: EPDM P: NBR rubber V: FKM F: FXM

### 2.2.2.2 Codes for rated motor power

Pos. 12 in TP, TPD type key example.

Code	Description	
	[hp]	[kW]
A	0.16	0.12
B	0.25	0.18
C	0.33	0.25
D	0.5	0.37
E	0.75	0.55
F	1	0.75
G	1.5	1.1
H	2	1.5
I	3	2.2

Code	Description	
	[hp]	[kW]
J	4	3
K	5 (5.5 <sup>1)</sup> )	3.7 (4 <sup>1)</sup> )
L	7.5	5.5
M	10	7.5
N	15	11
O	20	15
P	25	18.5
Q	30	22
R	40	30
S	50	37
T	60	45
U	75	55
V	100	75
W	125	90
X	Bare shaft pump	
Y	> 200 <sup>2)</sup>	> 150 <sup>2)</sup>
1	150	110
2	175	132
3	200	150
4	215 <sup>3)</sup>	160 <sup>3)</sup>
5	250 <sup>3)</sup>	185 <sup>3)</sup>
6		26

1) Value in bracket is for the standard IEC motor size. Value outside bracket is for the motor size according to NEMA standards.

2) Used for pumps where the pump shaft input power exceeds 200 hp (150 kW) and is not regulated under the DOE pump rule.

3) Special cases with power sizes above 200 hp (150 kW) which are still regulated under the DOE pump rule. For example: Pump has a P2 value of 198 hp (147.6 kW) in its duty point (in DOE scope) but customer wants the 215 hp (160 kW) motor instead of the 200 hp (150 kW). The pump is in scope of the DOE regulation and requires a PEI value and a motor code.

### 2.2.2.3 Codes for phase and voltage or other information

Pos. 13 in TP, TPD type key example.

Code	Description
A	E-motor (ECM <sup>4</sup> ), 1 x 200-240 V
B	E-motor (ECM <sup>4</sup> ), 3 x 200-240 V
C	E-motor (ECM <sup>4</sup> ), 3 x 440-480 V
D	E-motor (ECM <sup>4</sup> ), 3 x 380-500 V
W	Not for sale in North America
X	No motor or US DOE regulated motor (CC marked motor)
Y	Out of DOE scope
Z	E-motor, asynchronous motor

4) ECM: Electronically Commutated Motor.

### 2.2.2.4 Codes for speed variant

Pos. 14 in TP, TPD type key example.

Code	Description
A	1450-2200 RPM, E-motor (ECM <sup>5</sup> )
B	2900-4000 RPM, E-motor (ECM <sup>5</sup> )
C	4000-5900 RPM, E-motor (ECM <sup>5</sup> )
1	2-pole, 50 Hz (Asynchronous motor)
2	2-pole, 60 Hz (Asynchronous motor)
3	4-pole, 50 Hz (Asynchronous motor)
4	4-pole, 60 Hz (Asynchronous motor)
5	6-pole, 50 Hz (Asynchronous motor)
6	6-pole, 60 Hz (Asynchronous motor)
7	8-pole, 50 Hz (Asynchronous motor)
8	8-pole, 60 Hz (Asynchronous motor)

5) ECM: Electronically Commutated Motor.

## 2.3 Applications

The pumps are designed to circulate hot or cold water in residential, institutional and industrial applications in systems, such as:

- heating systems
- district heating plants
- central heating systems for blocks of flats
- air-conditioning systems
- cooling systems.

In addition, the pump range is used for liquid transfer and water supply in systems such as:

- washing systems
- hot water recirculation systems
- industrial systems in general.

To ensure optimum operation, the dimensioning range of the system must fall within the performance range of the pump.

### 2.3.1 Pumped liquids

TP, TPD pumps are suitable for thin, clean, non-aggressive and non-explosive liquids without solid particles or fibres that may attack the pump mechanically or chemically.

Examples:

- Central heating system water (the water must meet the requirements of accepted standards on water quality in heating systems)
- cooling liquids
- hot tap water
- industrial liquids
- softened water.

The pumping of liquids with a density and/or kinematic viscosity higher than that of water will have the following effects:

- a considerable pressure drop
- a drop in hydraulic performance
- a rise in power consumption.

In such cases, the pump must be fitted with a bigger motor. If in doubt, contact Grundfos.

The EPDM O-rings fitted as standard are primarily suitable for water.

If the water contains mineral/synthetic oils or chemicals or if other liquids than water are pumped, the O-rings must be chosen accordingly.



## 3. Receiving the product

### 3.1 Delivery

The pump is delivered from the factory in a carton with a wooden bottom, which is specially designed for transport by fork-lift truck or a similar vehicle.

## 4. Installing the product



### CAUTION

#### Hot or cold surface

Minor or moderate personal injury



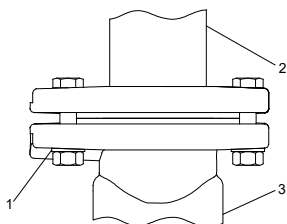
- When pumping hot or cold liquids, make sure that persons cannot accidentally come into contact with hot or cold surfaces.

### 4.1 Location

The pump must be sited in a dry, well-ventilated, but frost-free position.

When installing pumps with oval bolt holes in the pump flange (PN 6/10), use washers as shown in the figure below.

- 1: Washer
- 2: Installation side
- 3: Pump side



TM010683

Use of washers for oval bolt holes

Arrows on the pump housing show the direction of flow of liquid through the pump.

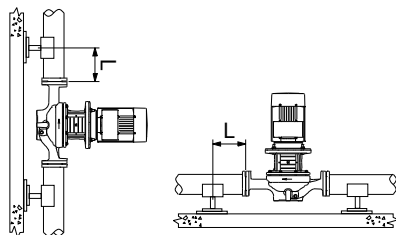
Pumps with motors smaller than 11 kW can be installed in horizontal or vertical pipes.

Pumps with motors of 11 kW and up may only be installed in horizontal pipes with the motor in vertical position.

However, some TP, TPE pumps of 11 kW and up may be suspended directly in the pipes (horizontally or vertically). See the section TP, TPE pumps from 11 kW and up suspended in the pipes.

In installations where the pump is suspended directly in the pipes, the pump can support the pipe length L on both sides of the pump (L less than  $3 \times DN$ ), see the figure below. In installations where the pump is suspended directly in the pipes, the pump must be

lifted and held in correct position by means of ropes or similar until both pump flanges are completely fastened to the pipe flanges.



TM085150

Pump suspended directly in the pipes

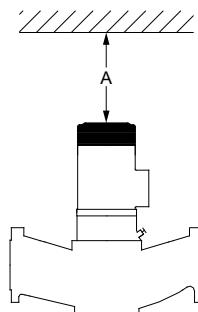


The motor must never be installed below the horizontal plane.

For inspection and motor or pump head removal, the following clearance is required above the motor:

- 300 mm for motors up to and including 4.0 kW.
- 1 m for motors of 5.5 kW and up.

See the figure below.

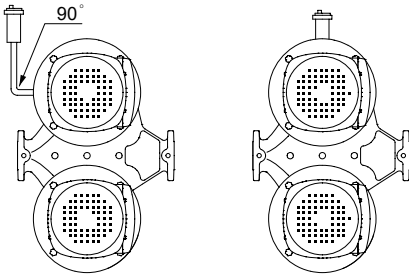


TM003733

Required clearance above the motor

Motor size	A
0.25 - 4.0 kW	$\geq 300$ mm
5.5 kW and up	$\geq 1$ m

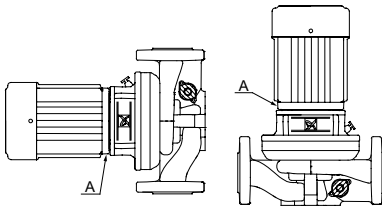
Twin-head pumps installed in horizontal pipes must be fitted with an automatic vent in the upper part of the pump housing. See the figure below. The automatic vent is not supplied with the pump.



TM038127

### Automatic vent

If the liquid temperature falls below the ambient temperature or if the pump is installed outside, condensation may form in the motor during inactivity. In this case, make sure that the drain hole in the motor flange is open and points downwards. See the figure below.



TM009831

### A: Drain hole Drain hole in motor flange

If twin-head pumps are used for pumping liquids with a temperature below 0 °C (32 °F), condensed water may freeze and cause the coupling to get stuck. The problem can be remedied by installing heating elements. For pumps with motors smaller than 11 kW, the pump must be installed with the motor shaft in horizontal position.

## 4.2 Mechanical installation



The pump must be installed according to national water regulations and standards.

### 4.2.1 Lifting the product

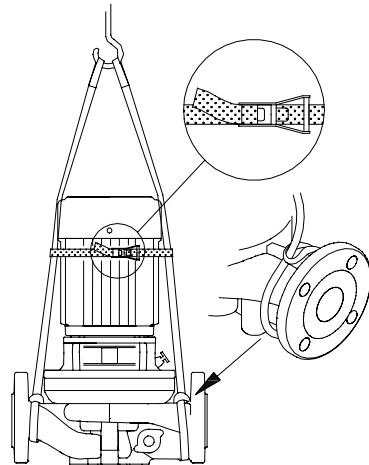
#### **DANGER** Overhead load

Death or serious personal injury

- The lifting eyes fitted to large pump motors can be used for lifting the pump head (motor, motor stool and impeller). Do not use the lifting eyes for lifting the entire pump and motor assembly.
- TPD: Do not use the centrally positioned thread of the pump housing for lifting purposes as the thread is placed below the centre of gravity of the pump.

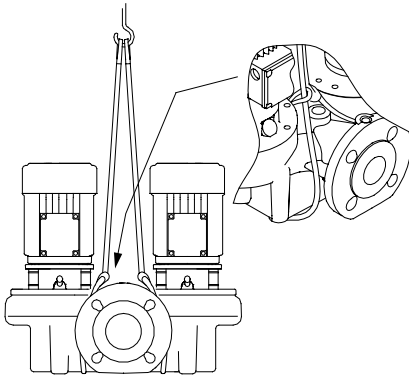


Pumps without lifting eyes must be lifted by means of nylon straps.



TM027007

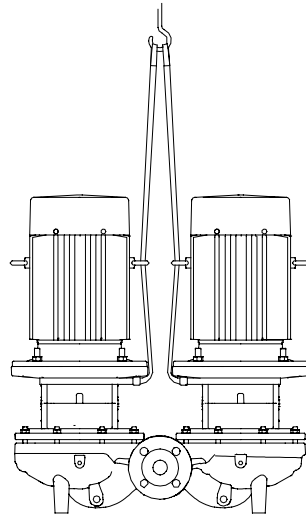
### TP pump without lifting eyes



*TPD pumps without lifting eyes*

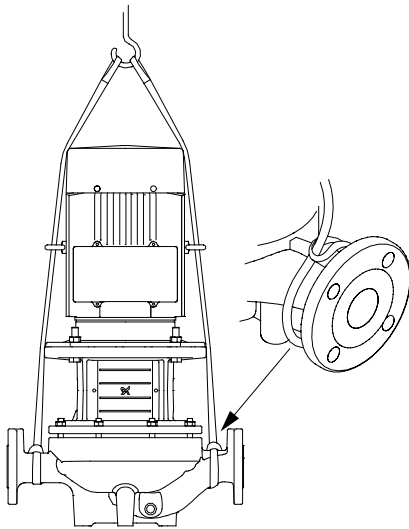
Pumps with lifting eyes must be lifted by means of nylon straps and shackles.

TM027008



*TPD pump with lifting eyes*

TM027010



*TP pump with lifting eyes*

TM027009

#### 4.2.2 Pipes

Fit isolating valves on either side of the pump to avoid draining the system if the pump needs to be cleaned or repaired.

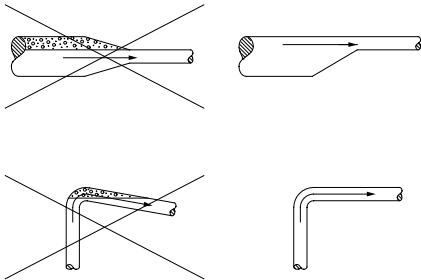
The pump is suitable for pipeline mounting, provided that the pipes are adequately supported either side of the pump. TP 25-50, 25-80, 25-90, 32-50, 32-80, 32-90, 40-50, 40-80 and 40-90 are designed for pipeline mounting only.

When installing the pipes, make sure that the pump housing is not stressed by the pipes.

The inlet and outlet pipes must be of an adequate size, taking the pump inlet pressure into account.

To avoid sediment buildup, do not fit the pump at the lowest point of the system.

Install the pipes so that air pockets are avoided, especially on the inlet side of the pump. See the figure below.



Correct pipes on the inlet side of the pump

### DANGER

#### Pump can explode

Death or serious personal injury



- The pump is not allowed to run against a closed valve except during startup. Operating against a closed valve at an extended period of time will cause an increase in temperature and the formation of steam and may result in damages to or explosion of the pump housing. The valve must be kept open during operation.

If there is any danger of the pump running against a closed outlet valve, ensure a minimum liquid flow through the pump by connecting a bypass or a drain to the outlet pipe. The drain can for instance be connected to a tank. The minimum flow rate must be at least 10 % of the maximum flow rate. The flow rate and head are stated on the pump nameplate.

#### 4.2.3 Elimination of noise and vibrations

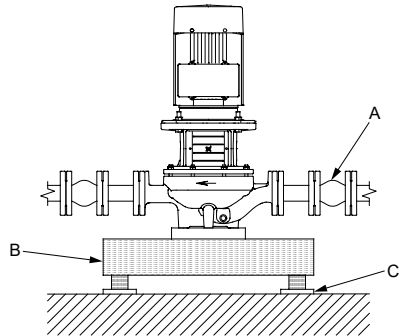
In order to achieve optimum operation and minimum noise and vibration, consider vibration damping of the pump. Generally, always consider this for pumps with motors of 11 kW and up. Vibration damping is mandatory for motors of 90 kW and up as well as the pumps stated in the table below:

Pump type	P2 [kW]	Frequency [Hz]
TP 200-280/4	37	60
TP 200-290/4	37	50
TP 200-320/4	45	60
TP 200-360/4	55	60
TP 200-390/4	75	60

Smaller motor sizes, however, may also cause undesirable noise and vibration.

Noise and vibration are generated by the revolutions of the motor and pump and by the flow in pipes and fittings. The effect on the environment is subjective and depends on correct installation and the state of the rest of the system.

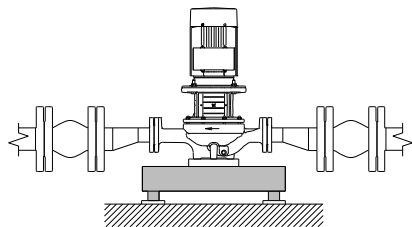
Elimination of noise and vibrations is best achieved by means of a concrete foundation, vibration dampers and expansion joints. See the figure below.



Foundation for TP pump

Pos.	Description
A	Expansion joint
B	Concrete pedestal
C	Vibration damper

At high liquid velocities (greater than 5 m/s), we recommend that you fit larger expansion joints matching the pipes.



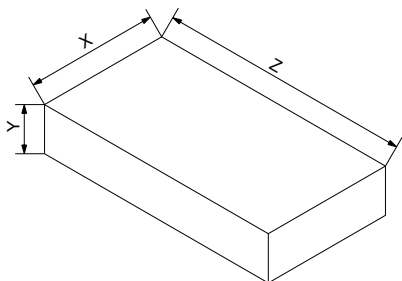
TP pump installed with larger expansion joints

#### 4.2.4 Foundation

We recommend that you install the pump on a concrete foundation which is heavy enough to provide permanent and rigid support for the entire pump. The foundation must be capable of absorbing any vibration, normal strain or shock. As a rule of thumb, the weight of the concrete foundation must be 1.5 times the weight of the pump. Place the pump on the foundation and fasten it.

##### 4.2.4.1 Recommended concrete foundations for TP, TPD Series 300 pumps

For TP Series 300 pumps with weights of 150 kg or more, we recommend that you mount the pump on a concrete foundation with the dimensions stated in the table below. The same recommendation applies for TPD Series 300 pumps with weights of 300 kg or more.



TM039190

Foundation for TP, TPD Series 300 pumps

Concrete foundation dimensions			
Pump weight [kg]	Y (height) [mm]	Z (length) [mm]	X (width) [mm]
150	280	565	565
200	310	620	620
250	330	670	670
300	360	710	710
350	375	750	750
400	390	780	780
450 ≤ DN 200	410	810	810
500	420	840	840
550	440	870	870
600	450	900	900
650	460	920	920
700	470	940	940
750	480	970	970

Concrete foundation dimensions			
Pump weight [kg]	Y (height) [mm]	Z (length) [mm]	X (width) [mm]
800	490	990	990
850	500	1010	1010
900	510	1030	1030
950	520	1050	1050
1000	530	1060	1060
1050	540	1080	1080
1100	550	1100	1100
1150	560	1100	1100
1200	560	1130	1130
1250	570	1150	1150
1300	580	1160	1160
1350	590	1180	1180
1400	600	1190	1190
1450	600	1200	1200
1500	610	1220	1220
1550	620	1230	1230
1600	620	1250	1250
1650	630	1250	1250
1700	635	1270	1270
800	450	1400	800
1000	450	1400	1000
1200	450	1400	1200
1400	500	1600	1200
1600	500	1600	1350
1800	500	1600	1500
2000	550	1600	1600
2200 DN 300	550	1700	1700
2400 DN 350	550	1800	1800
2600 DN 400	600	1800	1800
3000	600	2000	2000
3400	680	2000	2000
3800	760	2000	2000
4200	840	2000	2000
4600	920	2000	2000
5000	1000	2000	2000
5400	1080	2000	2000

#### 4.2.5 Changing terminal box positions



##### **DANGER** **Electric shock**

Death or serious personal injury

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

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

Change the terminal box position as follows:

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

#### 4.2.6 Base plate

Single-head pumps (except TP 25-50, 25-80, 25-90, 32-50, 32-80, 32-90, 40-50, 40-80 and 40-90) have two tapped holes in the bottom of the pump housing which can be used for fitting a Grundfos base plate to the pump. The base plate is available as an optional extra.

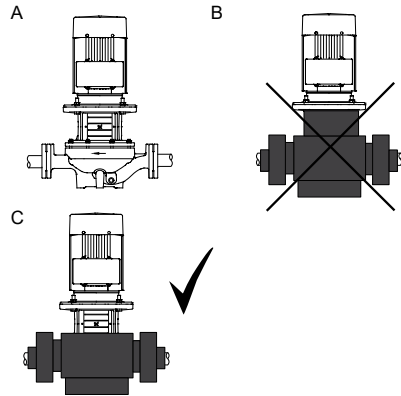
Twin-head pumps have four tapped holes in the bottom of the pump housing. For some twin-head pumps, a base plate consisting of two halves is available.

#### 4.2.7 Insulation



Do not insulate the motor stool as this will trap any vapour escaping from the shaft seal, thus causing corrosion. Covering the motor stool with insulation will also make inspection and service difficult.

Follow the guidelines in the figure below when insulating the pump.



#### Insulation of TP pumps

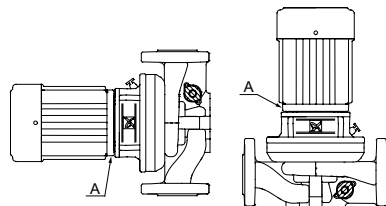
Pos.	Description
A	Without insulation
B	Incorrect insulation
C	Correct insulation

#### 4.3 Frost protection

Pumps which are not being used during periods of frost must be drained to avoid damage.

##### 4.3.1 Condensation cover

When installing the pumps outdoors, provide the motor with a suitable cover to avoid condensation, and make sure that the drain hole in the motor flange is open and points downwards. See the figure below.

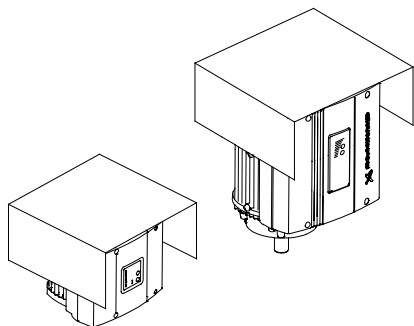


A: Drain hole  
*Drain hole in motor flange*

When mounting the condensation cover on top of the motor, make sure to leave enough space for the air to cool the motor.

TM052328

TM009631



TM028514

Motors with condensation cover

## 4.4 Electrical connection

Make the electrical connection in accordance with local regulations.

### **DANGER** Electric shock

Death or serious personal injury

- Before removing the terminal box cover and before removing or dismantling the pump, make sure that the power supply has been switched off. Connect the pump to an external main switch with a minimum contact gap of 3 mm in all poles.
- The pump must be connected to an external main switch close to the pump and to a motor-protective circuit breaker. Make sure you can lock the main switch in OFF position (isolated). Type and requirements are specified in EN 60204-1, 5.3.2.



### **DANGER** Electric shock

Death or serious personal injury

- The motor must be protected against overload by an external motor-protective circuit breaker with IEC trip class 10 or 20.
- We recommend that you use trip class 20.
- The current setting of the motor-protective circuit breaker must be adjusted to the nominal current stated on the motor nameplate.



The operating voltage and frequency are stated on the pump nameplate. Make sure that the motor is suitable for the power supply on which it will be used. Single-phase standard motors incorporate a thermal switch and require no additional motor protection.

Three-phase motors must be connected to a motor protection device.

Motors of 3 kW and up incorporate thermistors (PTC). The thermistors are designed according to DIN 44082.

Make the electrical connection as shown in the diagram inside the terminal box cover.

The motors of twin-head pumps are to be connected separately.

### 4.4.1 Cable entry/screwed connection, MG motor

All motors are supplied without screwed cable entries. The table below shows the numbers and sizes of cable entry holes of the terminal box of Grundfos MG motors according to the standard EN 50262.

Frame size	Model	Number x dimensions	Description
MG 71 and 80	B, C	2 x M20 x 1.5	The holes have precast threads and are closed with knock-out cable entries.
MG 90 and 100	B, C, D	4 x M20	The holes are closed with knock-out cable entries.
MG 112 and 132	C, D, F, H	4 x M25	
MG 160 and 180	F, H	4 x M40 2 x M20	

### 4.4.2 Frequency converter operation

Motor types Siemens/Innomotics, MG 71 and MG 80 for supply voltages up to and including 440 V (seeing the motor nameplate) must be protected against voltage peaks higher than 650 V between the supply terminals.



#### 4.4.2.1 Grundfos motors

All three-phase Grundfos motors from frame size 90 and up can be connected to a frequency converter.

The connection of a frequency converter will often have the effect that the motor insulation system is loaded more and that the motor will be more noisy than during normal operation. In addition, large motors are more at risk of being loaded with bearing currents caused by the frequency converter.

Check these operating conditions if the pump is driven via a frequency converter:

Operating conditions	Action
2-pole motors from 45 kW, 4-pole motors from 37 kW and 6-pole motors from 30 kW	Check that one of the motor bearings is electrically isolated. Contact Grundfos.
Noise critical applications	Fit an output filter between the motor and the frequency converter; this reduces the voltage peaks and thus the noise.
Particularly noise critical applications	Fit a sinusoidal filter.
Cable length	Fit a cable that meets the specifications laid down by the frequency converter supplier. The length of the cable between motor and frequency converter affects the motor load.
Supply voltage up to 500 V	Check that the motor is suitable for frequency converter operation.
Supply voltage between 500 V and 690 V	Fit a sinusoidal filter between the motor and the frequency converter which reduces the voltage peaks and thus the noise, or check that the motor has reinforced insulation.
Supply voltage of 690 V and higher	Fit a sinusoidal filter and check that the motor has reinforced insulation.



Grundfos MG motors do not have reinforced insulation. When it comes to reinforced insulation, other motors supplies are able to supply such motors as FPV variants.

#### 4.4.2.2 Other motor makes than Grundfos

Contact Grundfos or the motor manufacturer.

#### 4.4.3 Synchronous motors

Pumps fitted with synchronous motors must be connected to a Grundfos CUE frequency converter.



TM044289

Example of installation without filter

Symbol	Designation
1	CUE
4	Standard motor
One line	Unscreened cable
Double line	Screened cable



Synchronous motors must not be connected directly to mains supply.

The CUE must be of T/C CUE203 followed by additional numbers and characters. See the CUE Installation and operating instruction to setup frequency driver together with synchronous motor. If another frequency driver brand other than CUE is required or specified, contact Grundfos.



TM077181

Example of CUE nameplate

Text Description

T/C	CUE: product name 203... :internal code
-----	--



## 5. Starting up the product

### 5.1 Flushing the pipe system

#### CAUTION

##### Biological hazard

Minor or moderate personal injury



- When pumping drinking water, the pump must be flushed thoroughly with clean water before startup in order to remove any foreign matters, such as preservatives, test liquid, or grease.

- Before starting up the pump, thoroughly clean, flush and fill the pipe system with clean water.



The warranty does not cover any damage caused by flushing the pipe system by means of the pump.



The pump is not designed to pump liquids containing solid particles such as pipe debris and welding slag.

### 5.2 Priming



Always fill and vent the pump before starting the pump. To ensure correct venting, the vent screw must point upwards.

#### 5.2.1 Priming the product in closed systems or open systems where the liquid level is above the pump inlet

#### WARNING

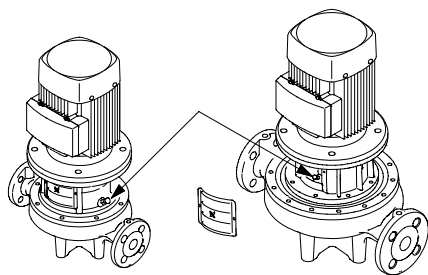
##### Escaping liquid

Death or serious personal injury



- Pay attention to the orientation of the vent hole to ensure that the escaping liquid does not cause personal injury or damage to the motor or other components.
- In hot-liquid installations, pay special attention to the risk of personal injury caused by scalding hot liquid.
- In cold-liquid installations, pay special attention to the risk of personal injury caused by cold liquid.

1. Close the isolating valve on the outlet side and loosen the vent screw in the motor stool.



TMO38126

Position of vent screw

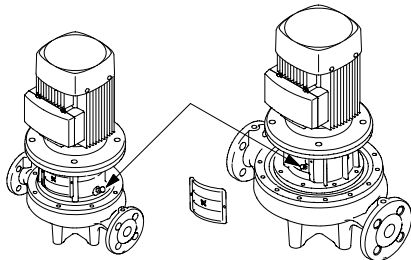
2. Slowly open the isolating valve on the inlet side until a steady stream of liquid runs out of the vent hole.
3. Tighten the vent screw and completely open the isolating valve(s).

#### 5.2.2 Priming the product in open systems where the liquid level is below the pump inlet

The inlet pipe and the pump must be filled with liquid and vented before the pump is started.

1. Close the isolating valve on the outlet side and open the isolating valve on the inlet side.
2. Loosen the vent screw.
3. Remove the plug from one of the pump flanges, depending on the pump location.
4. Pour liquid through the priming hole until the inlet pipe and the pump are filled with liquid.
5. Replace the plug and tighten securely.
6. Tighten the vent screw.

The inlet pipe can to some extent be filled with liquid and vented before it is connected to the pump. A priming device can also be installed before the pump.



TMO38126

Position of vent screw

### 5.3 Checking the direction of rotation

Do not start the pump to check the direction of rotation until it has been filled with liquid.



Do not check the direction of rotation with the motor alone, as an adjustment of the shaft position is required when the coupling has been removed.

The correct direction of rotation is shown by arrows on the motor fan cover or on the pump housing.

### 5.4 Starting up the pump

#### WARNING

#### Escaping liquid

Death or serious personal injury

- Pay attention to the orientation of the vent hole to ensure that the escaping liquid does not cause personal injury or damage to the motor or other components.
- In hot-liquid installations, pay special attention to the risk of personal injury caused by scalding hot liquid.
- In cold-liquid installations, pay special attention to the risk of personal injury caused by cold liquid.



1. Open the isolating valve on the inlet side of the pump completely and leave the isolating valve on the outlet side almost closed.
2. Start the pump.
3. Vent the pump during startup by loosening the air vent screw in the pump head or pump head cover until a steady stream of liquid runs out of the vent hole
4. When the pipe system has been filled with liquid, slowly open the isolating valve on the outlet side until it is completely open.

### 5.5 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 for the first time, or when a new shaft seal has been 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, that is every time the operating conditions change, a new run-in period will be started.

Under normal conditions, the leaking liquid will evaporate. As a result, no leakage will be detected. Liquids such as kerosene will not evaporate, and drops will be visible, but this is not a shaft seal failure.

### 5.6 Frequency of starts and stops

Frame size	Maximum number of starts per hour		
	2-pole	4-pole	6-pole
56-71	100	250	350
80-100	60	140	160
112-132	30	60	80
160-180	15	30	50
200-225	8	15	30
250-315	4	8	12

- On twin-head pumps, the duty and standby pumps must be alternated on a regular basis, that is once a week, to ensure an even distribution of the operating hours on both pumps. Pump change can be effected either manually or automatically by installing a suitable pump controller.
- If twin-head pumps are used for hot water recirculation, the duty and standby pumps must be alternated on a regular basis, that is once a day, to avoid blocking of the standby pump due to deposits (calcareous deposits, etc.). We recommend automatic pump change.

## 6. Handling and storing the product

### 6.1 Storing the product

The contractor must inspect the equipment on delivery and make sure that it is stored in such a way that corrosion and damage are avoided.

If you do not operate the pump soon after arrival, store it in a clean, dry place with slow, moderate changes in ambient temperature. Protect the pump from moisture, dust, dirt and foreign bodies. Before and during storage we recommend these precautions:

1. Make sure that the bearings are filled with the recommended grease to prevent moisture from entering around the shaft.
2. Make sure that the inlet and outlet ports and all other openings are covered with cardboard, wood or masking tape to prevent foreign objects from entering the pump.
3. Cover the unit with a tarpaulin or waterproof material or other suitable covering if it is to be stored where there is no protective covering.
4. Rotate the shaft two turns every two weeks to prevent corrosion of the bearing surfaces and the shaft seal faces due to moisture.

If more than six months will pass before the equipment is put into operation, consider applying a suitable corrosion inhibitor to the internal pump parts.

Make sure that the corrosion inhibitor used does not affect the rubber parts with which it comes into contact.

Commercially available preservatives can be used for this purpose. Please observe the manufacturer's instructions for application or removal.

To prevent water, dust, etc. from entering the pump, keep all openings covered until the pipes are to be fitted. The cost of having to dismantle the pump during startup to remove foreign objects can be very high.

## 7. Servicing the product

### 7.1 Contaminated products



#### CAUTION

##### Biological hazard

Minor or moderate personal injury

- Flush the pump thoroughly with clean water and rinse the pump parts in water after dismantling.

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 pumped liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product for service. The product must be cleaned thoroughly before you return it.

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

### 7.2 Adjusting the shaft

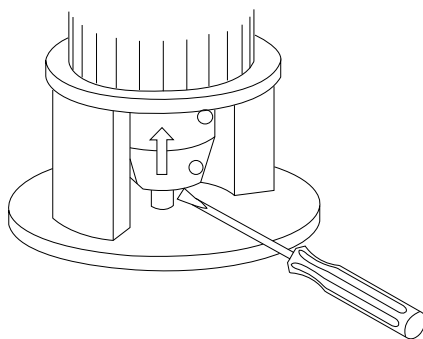
If the motor has been removed during installation or for repair of the pump, the pump shaft must be adjusted after the motor has been replaced.

#### 7.2.1 Adjusting the shaft for pumps with two-part coupling, TP Series 100 and 200

Make sure that the shaft pin is fitted in the pump shaft.

Adjust the pump shaft as follows:

1. Remove the coupling guards using a screwdriver.
2. Fit the hexagon socket head screws in the coupling and leave loose.
3. Raise the coupling and the pump shaft as far as possible (towards the motor) with a screwdriver or a similar tool so that the pump and motor shafts touch each other.



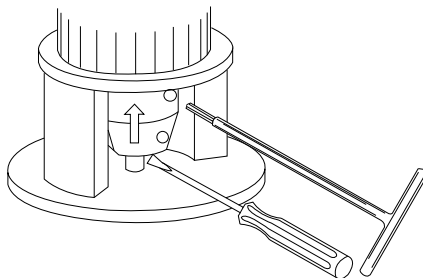
TM006415

#### Raising the coupling and the pump shaft

4. Tighten the hexagon socket head screws in the coupling to 5 Nm (0.5 kpm).
5. Check that the gaps either side of the coupling halves are equal.
6. Tighten the screws two and two (one side at a time) to the torque stated below.

Hexagon socket head screw	Torque
M6 x 20	13 Nm (1.3 kpm)
M8 x 25	31 Nm (3.1 kpm)

7. Fit the coupling guards.



TM006416

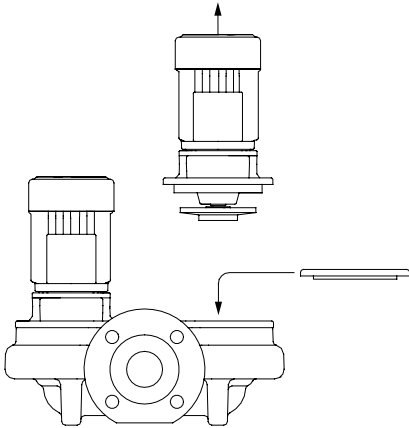
#### Tightening the screws

#### 7.2.2 Pumps with integral shaft and coupling

For pumps with integral shaft and coupling, we recommend that you do not remove the motor. If the motor has been removed, it is necessary to remove the motor stool in order to refit the motor correctly. Otherwise, the shaft seal may be damaged.

### 7.3 Blanking flanges

For twin-head pumps, a blanking flange with a pump housing gasket is available. See the figure below.



Fitting the blanking flange

If one pump requires service, the blanking flange is fitted to allow the other pump to continue operating.

### 7.4 Maintaining the product

#### **DANGER** 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.

#### **WARNING** Escaping liquid



Death or serious personal injury

- Make sure that the escaping liquid does not cause injury to persons or damage to the motor or other components. In hot-liquid installations, pay special attention to the risk of injury caused by scalding hot liquid. In cold-liquid installations, pay special attention to the risk of injury caused by the cold liquid.

### 7.4.1 Pump

The pump is maintenance-free.

If the pump is to be drained for a long period of inactivity, inject a few drops of silicone oil on the shaft between the motor stool and the coupling. This will prevent the shaft seal faces from sticking.

TP 25-50/2, 25-80/2, 25-90/2, 32-50/2, 32-80/2, 32-90/2, 40-50/2, 40-80/2 and 40-90/2 must be operated minimum once every month in minimum 5 minutes to prevent the shaft seal faces from sticking.

### 7.4.2 Motor

The motor must be checked at regular intervals. It is important to keep the motor clean in order to ensure adequate ventilation. If the pump is installed in a dusty environment, both pump and motor must be cleaned and checked regularly.

### 7.4.3 Lubrication

#### MG motors

The bearings of motors up to 11 kW are greased for life and require no lubrication.

The bearings of motors of 11 kW and up must be greased in accordance with the indications on the motor nameplate.

#### Other motors

For other motor makes with grease nipples, lubricate the motor according to the indications on the motor nameplate.

### 7.4.4 Bearing grease

The motor must be lubricated with a lithium-based, high-temperature grease.

- The technical specification of the grease must correspond to DIN 51825, K3N, or better.
- The viscosity of the basic oil must be higher than 50 cSt (mm<sup>2</sup>/s) at 40 °C (104 °F) and 8 cSt (mm<sup>2</sup>/s) at 100 °C (212 °F).
- The grease filling rate must be 30-40 %.

### 7.4.5 Frost protection

Pumps which are not being used during periods of frost must be drained to avoid damage.

TMM06360

## 8. Fault finding the product

### DANGER

#### Electric shock

Death or serious personal injury



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



### WARNING

#### Escaping liquid

Death or serious personal injury

- Make sure that the escaping liquid does not cause injury to persons or damage to the motor or other components.
- In hot-liquid installations, pay special attention to the risk of injury caused by scalding hot liquid.
- In cold-liquid installations, pay special attention to the risk of injury caused by the cold liquid.

Fault	Cause and remedy
The motor does not run when started.	Power supply failure. The fuses are blown. The motor protection device has tripped. The main contacts in the motor protection device are not making contact or the coil is faulty. The control circuit fuses are defective. The motor is defective.
The motor protection device trips immediately when the power supply is switched on.	Power supply failure. The contacts in the motor protection device are faulty. The cable connection is loose or faulty. The motor winding is defective. The pump is mechanically blocked. The overload setting is too low.
The motor protection device trips occasionally.	The overload setting is too low. The supply voltage is periodically too low or too high. The differential pressure across the pump is too low.
The motor protection device has not tripped, but the pump does not run.	Power supply failure. The fuses are blown. The main contacts in the motor protection device are not making contact or the coil is faulty. The control circuit fuses are defective.
The pump capacity is not constant.	The pump inlet pressure is too low. The inlet pipe or pump is partly blocked by impurities. The pump draws in air.
The pump runs but gives no water.	The inlet pipe or pump is blocked by impurities. The foot or non-return valve is blocked in closed position. There is a leakage in the inlet pipe. There is air in the inlet pipe or pump. The motor rotates in the wrong direction.
The pump runs backwards when switched off. <sup>6)</sup>	There is a leakage in the inlet pipe. The foot or non-return valve is defective. The foot or non-return valve is blocked in open or partly open position.

Fault	Cause and remedy
There is a leakage in the shaft seal.	<p>The pump shaft position is incorrect.</p> <p>The shaft seal is defective.</p>
Noise.	<p>The pump is cavitating.</p> <p>The pump does not rotate freely (frictional resistance) because of incorrect pump shaft position.</p> <p>Frequency converter operation: See section Frequency converter operation.</p> <p>There is resonance in the installation.</p> <p>There are foreign bodies in the pump.</p>
The pump runs constantly (applies only to pumps with automatic start/stop).	<p>The stop pressure is too high in relation to the required quantity of water.</p> <p>The water consumption is larger than anticipated.</p> <p>There is a leakage in the outlet pipe.</p> <p>The direction of rotation of the pump is incorrect.</p> <p>The pipes, valves or strainer are blocked by impurities.</p> <p>The pump controller, if used, is defective.</p>
The period of operation is too long (applies only to pumps with automatic start/stop).	<p>The stop pressure is too high in relation to the required quantity of water.</p> <p>The pipes, valves or strainer are blocked by impurities.</p> <p>The pump is partly blocked or seized up.</p> <p>The water consumption is larger than anticipated.</p> <p>There is a leakage in the outlet pipe.</p>

<sup>6)</sup> In twin-head pump installations, the standby pump will often rotate slowly.

## 9. Technical data

### 9.1 Operating conditions

#### 9.1.1 Ambient temperature



Do not exceed the allowable maximum ambient temperature stated on the motor nameplate. If nothing is stated, the allowable maximum ambient temperature is 40 °C.

Maximum ambient temperature: 55 °C (131 °F).

#### 9.1.2 Liquid temperature

Liquid temperature: -40 to +150 °C (-40 to +302 °F).

The maximum liquid temperature depends on the mechanical shaft seal type and the pump type.

Depending on the cast-iron version and the pump application, the maximum liquid temperature may be limited by local regulations and laws.

The maximum liquid temperature is marked on the pump nameplate.



If the pump is operating with liquids at high temperatures, the life of the shaft seal may be reduced. It may be necessary to replace the shaft seal more often.

#### 9.1.3 Maximum Operating pressure and test pressure



Do not exceed the maximum operating pressure stated on the pump nameplate.

The pressure test has been made with water containing anticorrosive additives at a temperature of 20 °C (68 °F).

Pressure stage	Operating pressure		Test pressure	
	[bar]	[MPa]	[bar]	[MPa]
PN 6	6	0.6	10	1.0
PN 6 / PN 10	10	1.0	15	1.5
PN 16	16	1.6	24	2.4
PN 25	25	2.5	38	3.8

The pumps comply with IEC 60335-2-51 if they are used in closed heating or cooling systems.

The pumps comply with IEC 60335-2-51 if they are used in service water applications and the maximum allowable operating pressure stated on the pump nameplate is equal to or higher than 1.0 MPa.

#### 9.1.4 Inlet pressure

To ensure optimum and quiet pump operation, the inlet pressure (system pressure) must be adjusted correctly.

For the calculation of specific inlet pressures, contact the local Grundfos company or see the data booklet for TP, TPD, TPE, TPED, TPE2, TPE2 D, TPE3, TPE3 D, if at hand.

The total pressure of the inlet pressure and the pump pressure must be lower than the maximum operating pressure stated on the pump nameplate.

The pumps comply with IEC 60335-2-51 if the maximum inlet pressure is equal to or less than half of the maximum operating pressure stated on the pump nameplate.

#### 9.1.5 Max. flow rate



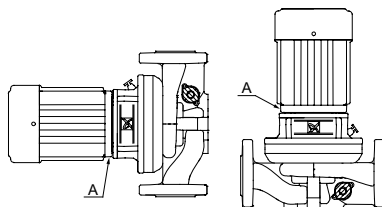
Do not exceed the maximum flow rate as otherwise there is a risk of, for instance, cavitation and overload.

The minimum and maximum flow rates and total heads can be read either from the performance curve pages in the relevant data booklets or from a curve for a specific pump when selecting it in Grundfos Product Center. See [www.grundfos.com](http://www.grundfos.com).

#### 9.2 Enclosure class

Closed drain hole in motor: IP55

Open drain hole in motor: IP44. See the figure below.



Drain hole (A) in motor flange

#### 9.3 Electrical data

See the motor nameplate.

#### 9.4 Sound pressure level

The sound pressure level of the pump with single-phase motors is lower than 70 dB(A).

The sound pressure level of the pump with three-phase motors is shown in the table below.

**Maximum sound pressure level**

Three-phase motors [kW]	50 Hz [dB(A)]			60 Hz [dB(A)]	
	2-pole	4-pole	6-pole	2-pole	4-pole
0.12	< 70	< 70	-	< 70	< 70
0.18	< 70	< 70	-	< 70	< 70
0.25	56	41	-	< 70	45
0.37	56	45	-	57	45
0.55	57	42	-	56	45
0.75	53	59.5	-	57	49
1.1	53	49.5	-	58	53
1.5	58	50	47	64	53
2.2	60	51	52	65	55
3.0	59.5	53	63	53.5	55
4.0	63	54	63	67.5	57
5.5	62	50	63	68	62
7.5	60	51	66	65	62
11.0	60	53	-	64.5	66
15.0	60	66	-	65	66
18.5	60.5	63	-	65.5	63
22.0	65.5	63	-	70.5	63
30.0	70	65	-	75	65
37.0	71	66	-	75	65
45.0	67	66	-	75	65
55.0	72	67	-	75	68
75.0	74	70	-	77	71
90.0	73	70	-	77	71
110	76	70	-	81	75
132	76	70	-	81	75
160	76	70	-	81	75
200	-	70	-	81	75
250	-	73	-	86	77
315	-	73	-	-	77
355	-	75	-	-	-
400	-	75	-	-	-
500	-	75	-	-	-
560	-	78	-	-	-
630	-	78	-	-	-

**9.5 Environment**

The pump is designed for installation in a non-aggressive and non-explosive atmosphere.

Maximum relative humidity: 95 %.

**10. 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.



The crossed-out wheeled bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

See also end-of-life information at [www.grundfos.com/product-recycling](http://www.grundfos.com/product-recycling).



## 中文(CN) 安装和使用说明书

## 中文版本

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## 1. 概述



安装产品前应阅读本文档。安装和运行必须遵守当地规章制度并符合公认的良好操作习惯。

## 1.1 危险性声明

以下符号和危险性声明可能出现在格兰富的安装和操作说明、安全说明和维修说明中。

**危险**

指示危险情况，如果不避免，可能导致死亡或重度人身伤害。

**警告**

指示危险情况，如果不避免，可能导致死亡或重度人身伤害。

**注意**

指示危险情况，如果不避免，可能导致轻度或中度的人身伤害。

危险性声明的结构如下：

**警示语****危险说明**

无视警告的后果

- 避免危险的措施。

## 1.2 注释

以下符号和注释可能出现在格兰富的安装和操作说明、安全说明和维修说明中。



使用防爆产品时应遵循本说明。



带白色图形符号的蓝色或灰色圆圈表示必须采取行动。



红色或灰色圆圈加一斜线，也可能带黑色图形符号，表示不得采取或必须停止的行为。



不遵守这些指导可能会造成设备故障或设备损坏。



使工作更轻松的窍门和建议。

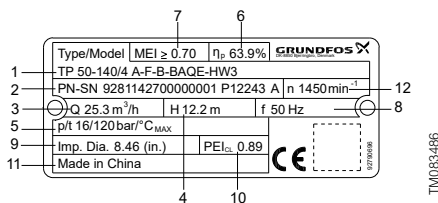
## 2. 产品介绍

### 2.1 产品描述

本手册适用于配备有格兰富电机或者 Siemens/ Innomotics 电机的 TP 和 TPD 型水泵。如果水泵安装了其它类型的电机，务必要注意其电机数据可能会与本说明手册不同。

### 2.2 标识

#### 2.2.1 铭牌



TP 铭牌示例

#### 位置 说明

1	型号名称
2	识别码
	92811427 产品编号
	0000001 服务模式序列号
	P1 生产现场代码
	2015 生产年份与星期数 (年份/星期)
	A 服务模式
3	额定流量
4	额定水泵扬程
5	额定压力和最高温度
6	水泵的最佳效率工作点
7	最低能效指数
8	频率
9	实际叶轮直径
	WRAS 饮用水认证或泵能指数 (PEI)
10	PEI <sub>CL</sub> : 恒定负载
	PEI <sub>VL</sub> : 可变负载
11	原产国
12	额定泵速

## 2.2.2 型号说明

**型号说明示例: TPEd 65-120/2 S-A-F-A-BQQE-GDB**

位置号	1	2	3	4	5	6	7	8	9	10	11	12	13	14
代码	TP	E	D	65	-120	/2	S	-A	-F	-A	-BQQE	-G	D	B

**位置号 描述**

1	泵机型
2	1000、2000 系列电子调速泵
3	双头泵
4	入口和出口端的公称直径, DN
5	最大扬程 [dm]
6	极数
7	<p>泵的版本代码。代码可为组合代码: [空白]: 配备 MGE 电机和无传感器的 TPE 1000 系列 S: 出厂时装有压差传感器的 TPE 2000 系列 NC: 带配有集成 CUE 的 Siemens/Innomotics 电机的 TPE 1000 系列 SC: 带有内置差压传感器以及集成 CUE 的 Siemens/Innomotics 电机的 TPE 2000 系列</p>
8	<p>泵的版本代码。代码可为组合代码: A: 基本版 A3: PN 25 法兰 B: 大规模电机 (+E): 带 ATEX 防爆批准、证书或测试报告, 则此泵版本代码的第二个字符为 E。 I: PN 6 法兰 X: 特殊材料</p>
9	<p>管路连接代码: F: DIN 法兰 O: 连接器</p>
10	<p>材料代码: A: 基本版 (铸铁泵壳带铸铁叶轮/1.1301 不锈钢叶轮/复合材料 PES/PP 30%GF 叶轮) B: 铸铁泵壳带黄铜叶轮或者青铜叶轮 I: 不锈钢 1.4308 和电机底座 (带复合材料 PES/PP 30%GF 叶轮) R: 铸铁泵壳带不锈钢 1.4308 叶轮 S: 铸铁泵壳带不锈钢 1.4408 叶轮 O: 球墨铸铁泵壳带铸铁叶轮 Y: 球墨铸铁泵壳带黄铜或者青铜叶轮 Q: 球墨铸铁泵壳带 1.4408 不锈钢叶轮 Z: 青铜泵壳带电机底座</p>
11	轴封代码, 包括其它塑料和橡胶泵部件, 颈环除外。
12	额定电机功率代码[kW]。
13	相位和电压代码或其它信息[V]。
14	速度变量代码[rpm]。

## 相关信息

### 2.2.2.1 轴封代码

#### 2.2.2.2 额定电机功率代码

#### 2.2.2.3 相位和电压代码或其他信息

#### 2.2.2.4 转速代码

### 2.2.2.1 轴封代码

代码示例	描述	代码说明
B	轴封类型	A: 带固定弹簧驱动的 O 形圈密封 B: 橡胶波纹管密封 D: 平衡型 O 形圈密封 G: 带缩小密封面的波纹管式密封 R: 带缩小密封面的 O 型圈密封
Q	旋转面材料	A: 梯浸渍碳石墨 B: 树脂浸渍碳石墨 Q: 碳化硅
Q	固定密封圈材料	B: 树脂浸渍碳石墨 Q: 碳化硅 U: 碳化钨
E	二级密封材料	E: EPDM P: 丁腈橡胶 V: FKM F: FXM

### 2.2.2.2 额定电机功率代码

TP, TPD 型号示例中的位置 12。

代码	描述	
	[hp]	[kW]
A	0.16	0.12
B	0.25	0.18
C	0.33	0.25
D	0.5	0.37
E	0.75	0.55
F	1	0.75
G	1.5	1.1
H	2	1.5
I	3	2.2
J	4	3
K	5 (5.5 <sup>1)</sup> )	3.7 (4 <sup>1)</sup> )
L	7.5	5.5
M	10	7.5

代码	描述	
	[hp]	[kW]
N	15	11
O	20	15
P	25	18.5
Q	30	22
R	40	30
S	50	37
T	60	45
U	75	55
V	100	75
W	125	90
X	裸轴泵	
Y	> 200 <sup>2)</sup>	> 150 <sup>2)</sup>
1	150	110
2	175	132
3	200	150
4	215 <sup>3)</sup>	160 <sup>3)</sup>
5	250 <sup>3)</sup>	185 <sup>3)</sup>
6		26

1) 括号中的值对应标准 IEC 电机尺寸。括号外的值对应 NEMA 标准的电机尺寸。

2) 用于泵输入功率超过 200hp (150kW)，且不在 DOE 泵规则监管范围内的泵

3) 功率在 200hp (150kW) 以上，但仍在 DOE 监管范围的特殊情况。例如：例如：泵在额定工作点 (DOE 范围内) 的 P2 值是 198hp (147.6kW)，而客户希望配置 215hp (160kW) 的电机，而不是 200hp (150kW) 的电机。该泵则在 DOE 监管范围，需要 PEI 值和电机代码。

### 2.2.2.3 相位和电压代码或其他信息

TP, TPD 型号示例中的位置 13。

代码	描述
A	E-电机 (ECM <sup>4)</sup> ，1 x 200-240 V
B	E-电机 (ECM <sup>4)</sup> ，3 x 200-240 V
C	E-电机 (ECM <sup>4)</sup> ，3 x 440-480 V
D	E-电机 (ECM <sup>4)</sup> ，3 x 380-500 V
W	不在北美地区出售
X	无电机或美国 DOE 电机 (带 CC 标记的电机)
Y	不在 DOE 范围内
Z	E-电机，异步电机

4) ECM: 电子换向电机。

### 2.2.2.4 转速代码

TP, TPD 型号示例中的位置 14。

代码	描述
A	1450-2200 RPM, E 电机 (ECM <sup>5)</sup> )
B	2900-4000 RPM, E-电机 (ECM <sup>5)</sup> )
C	4000-5900 RPM, E 电机 (ECM <sup>5)</sup> )
1	2 极, 50 Hz (异步电机)
2	2 极, 60 Hz (异步电机)
3	4 极, 50 Hz (异步电机)
4	4 极, 60 Hz (异步电机)
5	6 极, 50 Hz (异步电机)
6	6 极, 60 Hz (异步电机)
7	8 极, 50 Hz (异步电机)
8	8 极, 60 Hz (异步电机)

5) ECM: 电子换向电机。

## 2.3 应用

该泵用于在住宅、机构和工业应用中循环热水或冷水，用于以下系统：

- 加热系统
- 区域供暖站
- 公寓楼的集中供暖系统
- 空调系统
- 冷却系统。

此外，本系列水泵还适用于液体输送和给水系统，例如：

- 冲洗系统
- 热水再循环系统
- 一般的工业系统

为了达到最佳工作状态，系统的工作范围必须处于水泵的性能范围之内。

### 2.3.1 泵送液体

TP, TPD 泵适用于泵送稀薄、洁净，无腐蚀性，无爆炸性的液体，且液体中不得含有对水泵造成机械或化学损伤的固体颗粒或纤维。

举例：

- 集中供热系统（泵送水质应符合公认的供热系统水质标准要求）
- 冷却液
- 热的自来水
- 工业用液体
- 软化水

如果泵送液体的密度和/或运动粘度高于水的密度和运动粘度，将会导致：

- 压力大幅度下降
- 水力性能降低
- 能源消耗增加

在此情况下，泵应配备更大的电机。如有疑问，请联系格兰富公司。

作为标准安装的 EPDM O 型圈主要适用于水。

如果水中含有矿物质、合成油或者化学物质，或者泵送的液体是水以外的其它液体，应相应地选择 O 型圈。

### 3. 接收产品

#### 3.1 运输

该泵出厂时装在木底的纸箱中，木底是专为使用叉车或类似车辆进行运输而设计的。

### 4. 安装产品



**小心**  
高温或低温表面  
轻度或中度的人身伤害



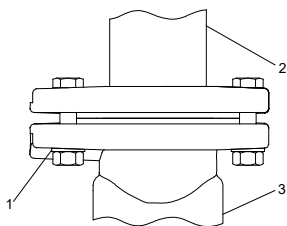
- 当泵的工作液体为高温或低温时，应避免人员意外接触到高温或低温表面。

#### 4.1 使用位置

水泵必须安装在干燥，通风但无霜冻的位置。

用水泵法兰（PN 6/10）中的椭圆螺栓孔安装水泵时，请使用下图所示的垫圈。

- 1: 垫圈
- 2: 安装侧
- 3: 水泵侧



TMD10883

在椭圆螺栓孔上使用垫圈

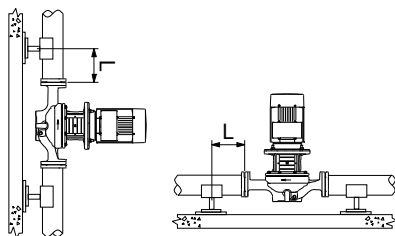
泵壳体上的箭头表示液体通过泵的流通方向。

电机功率低于 11kW 的泵可以安装在水平或垂直的管道中。

电机功率不小于 11kW 的泵只能安装在水平管道中，且电机处于垂直位置。

然而，一些 11 kW 及以上的 TP、TPE 泵可直接悬挂在管道（水平或垂直）中。见悬浮在管道中的 11 kW 及以上的 TP、TPE 泵。

在泵直接悬挂在管道中的情况下，泵可以支持泵两端长度为 L 的管道 ( $L < 3 \times DN$ )。见下图。在水泵直接悬挂在管道中的情况下，水泵必须用绳索或类似的装置吊起并保持在正确的位置上，直到两个泵法兰被完全紧固到管道上。



TM085150

直接悬挂在管道中的泵

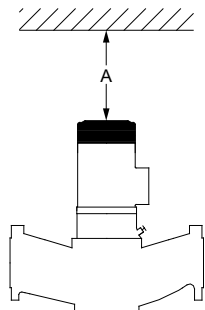


电机不得低于水平面。

为了检查和拆卸电机或泵头，电机上方需要以下间隙：

- 功率为 4.0 千瓦及以下的电机为 300 mm。
- 对于 5.5 kW 及以上的电机为 1 米。

见下图。

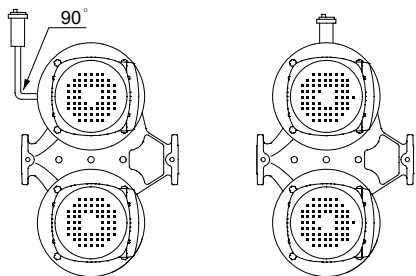


TMD03733

电机上方的空隙

电机规格	A
0.25 - 4.0 kW	≥ 300 mm
5.5 kW 和以上	≥ 1 m

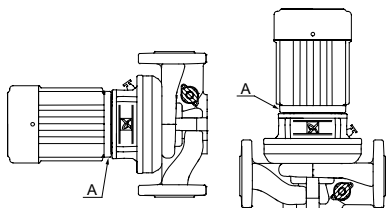
安装在水平管里的双头水泵必须在水泵外壳的上部分安装一个自动排气阀。见下图。自动排气阀不随泵一起供应。



自动排气阀

TM038127

如果液体的温度降低到环境温度以下，或者泵安装在户外，电机在不工作期间可能出现冷凝。在这种情况下须确保打开电机法兰的排水孔，使其朝下。见下图。



A: 排水孔  
电机法兰的排水孔

TM009631

若使用双头水泵泵送温度低于  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ) 的液体，冷凝水可能会结冰并导致联轴器无法运转。安装加热元件可防止冻结问题。对于电机功率低于 11 kW 的泵，安装时电机轴必须处于水平位置。

## 4.2 机械安装



请务必根据国家用水法规和标准安装泵。

### 4.2.1 吊装产品

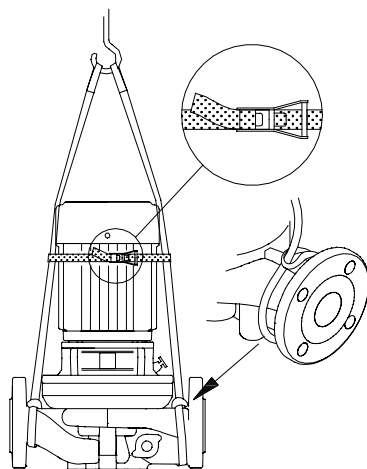
#### 危险 高空起吊

死亡或严重的人身伤害



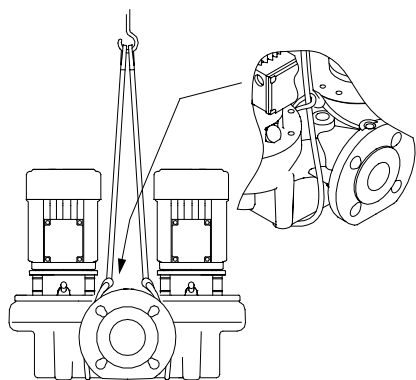
- 大型水泵电机配备的吊眼可用于起吊泵头（电机、电机托架和叶轮）。吊眼不得用于起吊整个泵和电机组件。
- TPD: 水泵外壳中央的线索不能用来起吊。这是因为线索位于水泵的重心之下。

没有吊环的泵必须使用尼龙带进行吊装。



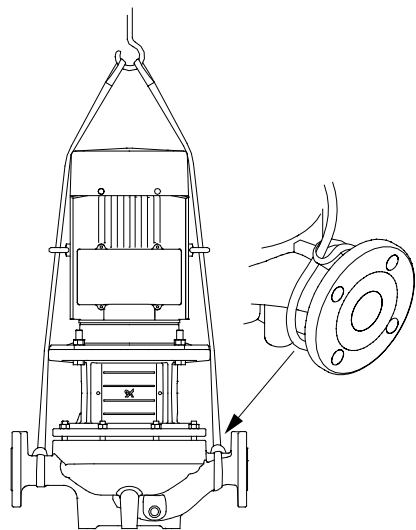
无吊环的 TP 泵

TM027007



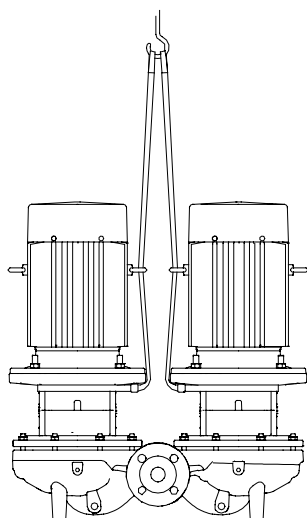
无吊环的 TPD 泵

有吊环的泵必须使用尼龙带和锁紧卡环进行吊装。



带吊环的 TP 泵

TM027008



带吊环的 TPD 泵

TM027010

#### 4.2.2 管道

在水泵两侧安装隔离阀，如果水泵需要清理或维修，则可以避免进行系统排水。

如果水泵两侧的管道系统能被充分支撑起来，水泵可以进行管线安装。TP 25-50, 25-80, 25-90, 32-50, 32-80, 32-90, 40-50, 40-80 和 40-90 专门用于管线安装。

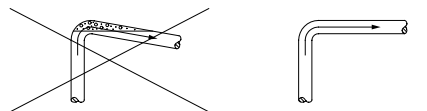
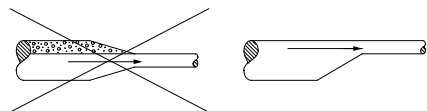
安装管道时，必须确保泵壳不被管道应力施压。

进水管和出水管的尺寸必须恰当，同时需要考虑到水泵的入口压力。

不得将水泵安装在系统的最低点，以避免产生污物沉积。

安装管道，避免产生气穴，特别是在水泵的进水口侧。见下图。

TM027009



泵入口侧上的正确管道

TM002263



**危险****泵可能爆炸**

死亡或严重的人身伤害



- 除启动期间外，严禁在阀门关闭时运行水泵。在较长时间内在阀门关闭是运行水泵将导致温度升高和蒸汽形成，并且可能导致泵壳体损坏或爆炸。运行过程中阀门必须处于开放状态！

如果水泵存在任何在出口阀关闭情况下运行的可能，应该在出口阀前的排出管路上连接一个旁通或排水管以确保最小流量得以流经水泵。比如，排水管可以与一个水箱连接。最小运行流量必须至少达到最大流量的 10%。泵的铭牌上标有泵的流量和扬程。

**4.2.3 降噪和减振**

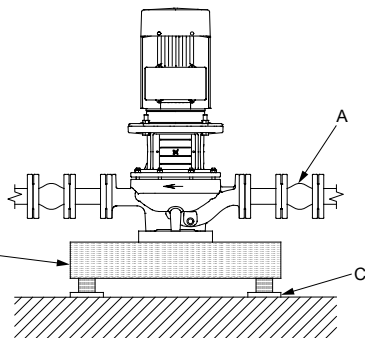
为了达到最佳工作状态，将噪音和振动降至最低，可考虑为水泵安装减振器。一般而言，输出功率在 11kW 及以上的水泵都要考虑安装。对于 90kW 及以上的电机以及下表中列出的水泵，必须安装减振器。

水泵型号	P2 [kW]	频率 [Hz]
TP 200-280/4	37	60
TP 200-290/4	37	50
TP 200-320/4	45	60
TP 200-360/4	55	60
TP 200-390/4	75	60

较小功率的电机也会发生较大的噪音和振动。

噪音和振动是由于电机和水泵运转，以及水管和管道配件中的水流造成的。其对环境的影响程度根据情况而定，并取决于正确的安装和系统中其它部件的状况。

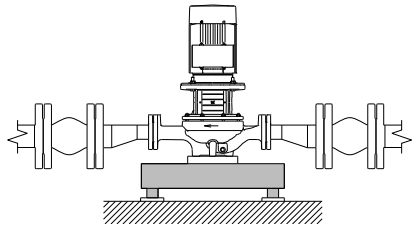
降噪减振最好的方法是使用混凝土基础、减振器和伸缩接头。见下图。



TP 水泵底座

位置号	描述
A	膨胀接头
B	混凝土基座
C	减振器

在高液体速度(大于 5 米/秒)的情况下，建议使用适合管道的较大伸缩接头。



安装较大的伸缩接头的 TP 水泵

TM085205

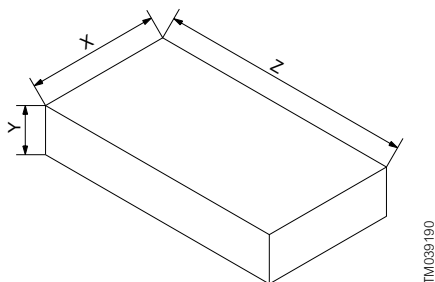
TM024993

#### 4.2.4 基础

建议您将水泵安装在一个平整坚固的混凝土基础上，基础的重量应该足以整个泵提供永久支撑。基础必须能够吸收振动、正常的应力或冲击。根据经验，混凝土底座的重量必须为泵总重的 1.5 倍。将泵放置在基础上，将其固定。

##### 4.2.4.1 建议对 TP、TPD 300 系列的水泵使用混凝土基座

对于重 150 千克或以上的 TP 300 系列泵，我们建议您将泵安装在下表所列尺寸的混凝土基座上。对于 TPD 300 系列的水泵中重量等于或大于 300 千克的水泵，该建议同样适用。



TM039 190

TP、TPD 300 系列泵的基座

#### 混凝土基座尺寸规格

水泵重量 [kg]	Y (高度) [mm]	Z (长度) [mm]	X (宽度) [mm]
150	280	565	565
200	310	620	620
250	330	670	670
300	360	710	710
350	375	750	750
400	390	780	780
450	410	810	810
500	420	840	840
550	440	870	870
600	450	900	900
650	460	920	920
700	470	940	940
750	480	970	970
800	490	990	990
850	500	1010	1010
900	510	1030	1030

#### 混凝土基座尺寸规格

水泵重量 [kg]	Y (高度) [mm]	Z (长度) [mm]	X (宽度) [mm]
950	520	1050	1050
1000	530	1060	1060
1050	540	1080	1080
1100	550	1100	1100
1150	560	1100	1100
1200	560	1130	1130
1250	570	1150	1150
1300	580	1160	1160
1350	590	1180	1180
1400	600	1190	1190
1450	600	1200	1200
1500	610	1220	1220
1550	620	1230	1230
1600	620	1250	1250
1650	630	1250	1250
1700	635	1270	1270
800	450	1400	800
1000	450	1400	1000
1200	450	1400	1200
1400	500	1600	1200
1600	500	1600	1350
1800	500	1600	1500
2000	550	1600	1600
2200	550	1700	1700
2400	550	1800	1800
2600	600	1800	1800
3000	600	2000	2000
3400	680	2000	2000
3800	760	2000	2000
4200	840	2000	2000
4600	920	2000	2000
5000	1000	2000	2000
5400	1080	2000	2000

DN 300

DN 350

DN 400

## 4.2.5 更改接线盒位置



### 危险 电击

死亡或严重的人身伤害

- 在泵启动工作前，应确保电源断开，且不会被意外接通。

接线盒可以被调整到四个不同位置，以 90° 步进。

按照下列操作步骤改变接线盒的位置：

1. 必要时，用螺丝起子拆除联轴器护板。不得拆除联轴器。
2. 拆下用来将电机固定在水泵上的螺丝。
3. 将电机转到需要的位置。
4. 重新安装并旋紧螺丝。
5. 重新安装联轴器护板。

## 4.2.6 底板

单头水泵（除 TP 25-50, 25-80, 25-90, 32-50, 32-80, 32-90, 40-50, 40-80, 40-90 外）在水泵外壳的底部有两个螺丝孔，可以用来将格兰富底座安装到水泵上。底座为选用附件。

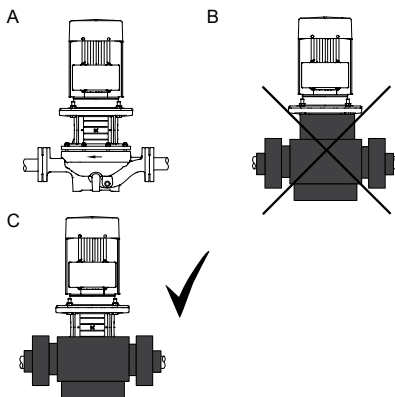
双头水泵在水泵外壳的底部有四个螺丝孔。对一些双头水泵，可以用两个半底座。

## 4.2.7 绝缘



勿对电机托架进行密封，这样会阻碍蒸汽从轴密封排出，从而导致腐蚀。在电机托架上密封之后也会使检查和维修变得困难。

在对泵进行隔离时，请按照下图中的指导进行操作。



TP 泵隔离

位置号	描述
A	无绝缘

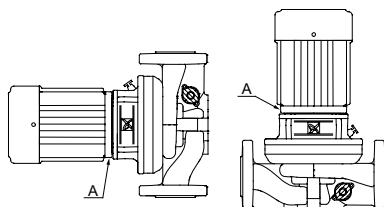
位置号	描述
B	错误的隔离密封
C	正确隔离密封

## 4.3 霜冻防护

如果在严寒季节不需要使用水泵时，应该排空水泵以防损坏。

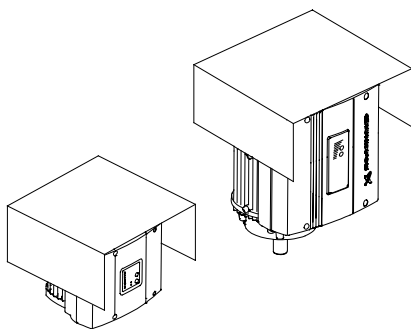
### 4.3.1 冷凝罩

在户外安装水泵时，必须在电机上安装一个合适的罩子，以避免冷凝，同时确保电机法兰上的排水孔打开，并朝下。见下图。



A: 排水孔  
电机法兰的排水孔

在将冷凝罩安装在电机顶部时，确保流出足够的空间以便让空气对电机进行冷却。



带有冷凝盖的电机

## 4.4 电气连接

遵照当地法规进行电气连接。

TM009831

TM028514

TM052328

**危险  
电击**

死亡或严重的人身伤害



- 在拆去接线盒盖之前，以及在拆卸水泵之前，确保电源已经切断。将水泵连接到外部电源开关，其电极间的接触间隙最小为 3 mm。
- 水泵必须连接到靠近水泵的一个外部电源开关和一个电机保护断路器。确保您可以将主开关锁定在 OFF 位置（隔离）。型号及要求见 EN 60204-1, 5.3.2 标准中有详细说明。

**危险  
电击**

死亡或严重的人身伤害



- 必须使用 IEC 跳闸等级 10 或 20 的外部电机保护断路器来保护电机防止过载。
- 我们建议跳闸等级 20。
- 电动机保护断路器的电流设置必须调整为电动机铭牌上标明的额定电流。

运行电压和运行频率在水泵的铭牌上标出。确保电动机与其使用的电源匹配。

单相标准电机配有一只热保护器，因此不需要另外的电机保护。

三相电机必须连接到电机-保护断路器上。

功率为 3 千瓦及以上的电机配有热敏电阻（PTC）。热敏电阻设计符合 DIN 44082 标准。

按照接线盒盖内的接线图所示进行电气连接。

双头水泵的电机应单独连接。

**4.4.1 电缆引入/螺纹接口，MG 电机**

所有电机未配有螺纹电缆入口。下表显示了根据 EN50262 标准的格兰富 MG 电机接线盒中电缆引入孔的数量和尺寸。

框架尺寸	型号	数量 x 尺寸	描述
MG 71 和 80 型	B, C	2 x M20 x 1.5	引入孔配有预制的螺纹线，以分离式电缆引入封闭。
MG 90 和 100	B, C, D	4 x M20	
MG 112 和 132	C, D, F, H	4 x M25	引入孔以分离式电缆引入封闭。
MG 160 和 180	F, H	4 x M40 2 x M20	

**4.4.2 变频器操作**

电源供应电压为 440 伏及 440 伏以下的 Siemens/Innomotics, MG 71 和 MG 80 型号的电机(见电机铭牌)必须加以保护以避免出现两电源端子之间的电压的峰值高于 650 伏的情况。

**相关信息**

8. 故障查寻

#### 4.4.2.1 格兰富电机

所有机架尺寸大于 90 的三相电机都可以与一个变频器相连。

水泵连接变频器工作时会增加电动机绝缘的负载以及电动机运行噪音。此外，大功率电机还会因为轴电流而增加负载。

如果使用变频器驱动泵，请检查以下运行条件：

运行条件	操作
大于等于 45 kW 的 2 极电机功率， 大于等于 37 kW 的 4 极电机功率和大于等于 30 kW 的 6 极电机	检查电机的一个轴承是否是绝缘轴承。 联系格兰富。
需要保持低噪音的应用	在电机与变频器之间安装输出滤波器：这样可以降低电压峰值，从而降低噪音。
尤其是需要保持低噪音的应用	安装正弦滤波器。
电缆长度	安装一根满足变频器供应厂家规格要求的电缆。电机与变频器之间的电缆长度会影响电机负载。
供电电压不高于 500 V	检查电机是否适合于变频器运行。
供电电压 500 V 到 690 V 之间	在电机与变频器之间安装一个正弦滤波器，以降低电压峰值，从而降低噪音，或者检查电机是否已加强绝缘。
供电电压 690 V 或更高	安装一个正弦滤波器，并检查电机是否强化了绝缘。



格兰富 MG 电机不具有加强绝缘层。对于加强绝缘层，其他电机供应商能够提供类似于 FPV 型号的电机。

#### 相关信息

8. 故障查寻

#### 4.4.2.2 非格兰富制造的电机

联系格兰富公司或电机制造商。

#### 相关信息

8. 故障查寻

#### 4.4.3 同步电机

配备同步电机的泵必须连接一个格兰富 CUE 变频器。



未配滤波器的安装示范

符号	名称
1	CUE
4	标准电机
单线	非屏蔽电缆
双线	屏蔽电缆



同步电机不得直接连接到主电源。

CUE 必须是 T/C CUE203 型号，后跟附加编号和字符。请参阅 CUE 安装与操作指导手册，以设置变频器和同步电机。

如果需要或指定除 CUE 之外的另一个品牌的变频器，请联系格兰富。



CUE 铭牌示例

文字说明

T/C	CUE: 产品名称 203...: 内部代码
-----	---------------------------

TM044289

TM077181

## 5. 启动产品

### 5.1 冲洗管道系统



#### 小心 生物危险

轻度或中度人身伤害

- 当泵送饮用水时，在启动泵之前必须用洁净水冲洗以去除任何异物，例如防腐剂、测试液体或油脂。
- 启动水泵之前，管道系统必须彻底清洁和冲洗，并注满干净的水。



如因用水泵冲洗管道系统导致水泵受损，质保对此无效。



水泵不适合用于泵送含有固体颗粒的液体。

### 5.2 启动注水



在启动泵之前用液体加注泵并对泵进行排气。排气螺丝应向上，以保证正确的排气。

#### 5.2.1 在液位高于泵入口的封闭系统或开放系统中用液体加注产品

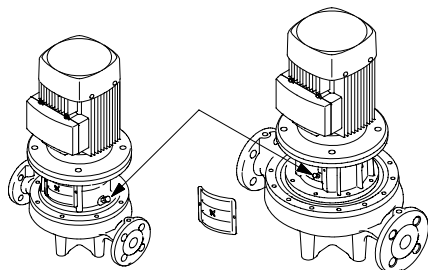
#### 警告 液体溢出

死亡或严重的人身伤害



- 注意排放孔的方向，保证溢出的液体不会造成人身伤害或损坏电机或其它元件。
- 在高温液体安装中，要特别注意防止灼热的液体造成人身伤害等风险。
- 在低温液体安装中，要特别注意防止低温液体造成人身伤害等风险。

1. 关闭出口隔离阀，松开电机座上的排气螺丝。



排气螺丝位置

TM038126

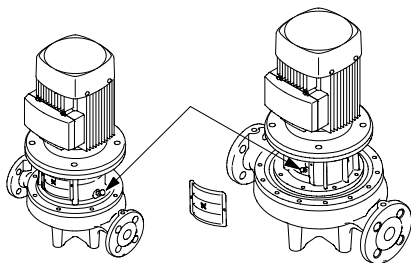
2. 慢慢打开进水管上的隔离阀，直到稳定的液流从排气孔流出。
3. 拧紧排气螺丝，完全打开隔离阀。

#### 5.2.2 在液位低于水泵进口的开放式系统中用液体加注产品

水泵启动前，进水管和水泵必须充满液体并充分排气。

1. 关闭排出侧的隔离阀，然后打开入口侧的隔离阀。
2. 拧松排气螺丝。
3. 拔出水泵任一法兰的塞子，根据水泵的位置来确定。
4. 通过注水孔加注液体，直到进水管和水泵完全充满液体。
5. 重新插上塞子并旋紧。
6. 拧紧排气螺丝。

进水管在连接到水泵之前可以一定程度地充满液体并排气。在水泵前可以安装一个注水器。



排气螺丝位置

TM038126

### 5.3 检查旋转的方向

在泵充满液体之前，不得启动泵检查旋转的方向。



不应只通过电机检查旋转方向，因为取出联轴器之后，轴的位置需要进行调整。

正确的旋转方向必须与电机风扇盖或者水泵外壳上的箭头方向一致。

## 5.4 启动水泵

### 警告 液体溢出

死亡或严重的人身伤害



- 注意排放孔的方向，保证溢出的液体不会造成人身伤害或损坏电机或其它元件。
- 在高温液体安装中，要特别注意防止灼热的液体造成人身伤害等风险。
- 在低温液体安装中，要特别注意防止低温液体造成人身伤害等风险。

1. 完全打开泵进水侧的隔离阀，同时将出水侧的隔离阀几乎完全关闭。
2. 启动水泵。
3. 启动期间，通过松开泵头部或泵头盖上的排气螺钉给泵排气，直到排放孔流出稳定的液流。
4. 当管道中充满液体时，慢慢打开出水侧的隔离阀，直到它完全打开。

## 5.5 轴封磨合

泵送液体对轴封的密封面进行润滑，也就意味着轴封会有一些量的渗漏。首次启动水泵，或者安装新的轴封时，需经过一定的磨合周期后，渗漏才会降至合理水平。所需时间取决于运行状况，即每当运行状况改变时，就需要开始新的磨合期。

在正常条件下，渗漏液体会蒸发。因此，不会检查到渗漏。

煤油等液体不会蒸发，且其液滴为可见状态，但这不是轴封故障。

## 5.6 启动和停机频率

框架尺寸	每小时最大启动次数		
	二极	四极	六极
56-71	100	250	350
80-100	60	140	160
112-132	30	60	80
160-180	15	30	50
200-225	8	15	30
250-315	4	8	12

- 在双头水泵上，正在运行的水泵和处于待机状态的水泵应该定期轮流运行，即一周轮换一次，以保证两个水泵的运行时间均等。交换使用水泵可以采用手工控制来完成，也可以通过安装一个适当的水泵控制器自动完成。
- 如果双头水泵用于热水循环，正在运行的水泵和处于待机状态的水泵必须定期轮流运行，即每天轮换一次，以避免备用泵由于沉积物（钙质沉积物等）堵塞。我们建议进行自动泵更换。

## 6. 产品的搬运与储存

### 6.1 产品储存

承包商在收到设备时应该及时进行检查，并确保设备的存放方式不会对设备造成腐蚀或损坏。

如果您在泵送达后不立即使用，请将其存放在干净、干燥的地方，环境温度的变化应该缓慢、适度。保护泵免受潮湿、灰尘、污垢和异物的影响。在存放前和存放期间必须遵循以下预防措施：

1. 确保轴承上加注了推荐的润滑脂，以防止水分进入轴周围。
2. 确保进水口和排水口以及所有其他开口都覆盖有纸板、木材或遮蔽胶带，以防止异物进入泵。
3. 如果要储存在没有防护罩的地方，用防水油布或防水材料或其他合适的覆盖物覆盖装置。
4. 每两周旋转轴两圈，以防止轴承表面和轴封表面由于潮湿而腐蚀。

如果设备在投入运行之前需要存放的时间超过 6 个月，应该考虑是否给泵的内部零件涂上合适的防锈剂。

应该确保使用的防锈剂不会对接触的橡胶部件造成影响。

可购买的防腐剂可用于该目的。防腐剂的应用和移除，请遵守生产厂家的说明。

为了防止水和灰尘等物进入泵里，在管路安装之前，所有的开口必须盖上帽盖。在启动水泵时如需为清除内部杂物的目的而拆开水泵，其代价会是很高的。

## 7. 维修产品

### 7.1 受污染的产品



小心

生物危险

轻度或中度人身伤害

- 拆卸后，用清水将泵彻底冲洗干净，并用水冲洗泵部件。

若水泵应用于会对人体产生危害的有毒液体，则必须将其归类为受污染水泵。

如需格兰富对水泵进行维修，必须在将水泵退回维修之前，向格兰富提供关于液体的详细信息。否则格兰富有权拒绝对该产品进行维修。

退回产品之前，必须将产品彻底清洁。

退回产品可能发生的费用由客户承担。

### 7.2 调整轴

如果在安装过程中或者水泵维修时电机被拆卸，重新安装电机后必须调节水泵轴。

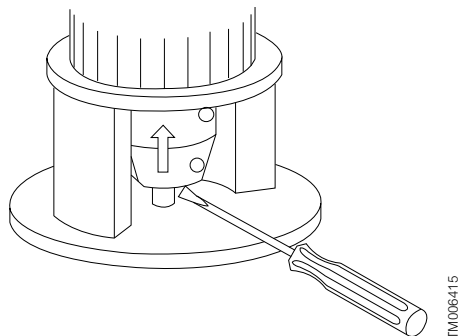
#### 7.2.1 调整两部分联轴器的泵的轴，TP 系列 100 和 200

确保轴销与水泵的轴相吻合。

按下列步骤调节水泵轴：

1. 用螺丝起子拆下联轴器护板。

- 将内六角头螺丝放入联轴器中，先不要拧紧。
- 用螺丝起子或者类似工具尽可能地抬起联轴器和水泵轴（朝电机方向），使水泵轴和电机轴互相接触。



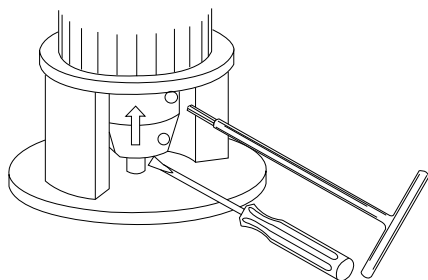
TM006415

抬起联轴器和水泵轴

- 以 5 Nm (0.5 kpm) 的转矩将内六角头螺丝安装在联轴器里。
- 检查半联轴器每侧的间隙相等。
- 两个两个地旋紧螺丝（每次一边），转矩如下表：

内六角头螺丝	扭矩
M6 x 20	13 Nm (1.3 kpm)
M8 x 25	31 Nm (3.1 kpm)

- 安装联轴器护板。



TM006416

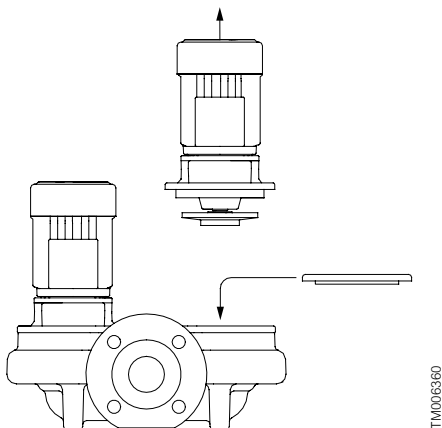
旋紧螺丝

### 7.2.2 带一体式轴和联轴器的泵

对于配备整体轴和联轴器的泵，我们建议不要移除电机。如果电机已经被移出，也必须同时移出电机支架，以便重新正确安装电机。否则轴封将被损坏。

### 7.3 盲法兰

对于双头水泵，我们可以提供一个带水泵外壳垫圈的盲板法兰。见下图。



TM006360

安装盲板法兰

如果一个水泵需要进行维修，那么可以安装盲板法兰使另一台水泵继续工作。

### 7.4 产品维护



#### 危险 电击

死亡或严重的人身伤害

- 在对产品进行任何操作前，必须确保电源已断开，并且不会被意外接通。



#### 警告 液体溢出

死亡或严重的人身伤害

- 确保溢出的水不会对人员造成伤害或损坏电机或其它部件。在高温液体安装中，要特别注意防止灼热的液体造成人身伤害等风险。在低温液体安装中，要特别注意由低温液体引起的人身伤害风险。

#### 7.4.1 泵

水泵是免维护的。

如果水泵因为长时间未用而排空，在电机支架和联轴器之间的轴上注入几滴硅油。这将有效地防止了轴密封的粘结。

TP 25-50/2、25-80/2、25-90/2、32-50/2、32-80/2、32-90/2、40-50/2、40-80/2 和 40-90/2 必须至少每月运行一次，一次最少 5 分钟，以防止轴封表面粘连。



## 7.4.2 电机

每隔一定时间，应对电机进行检查。为保证通风充足，请务必保持电机清洁。如果泵安装在灰尘较多的环境中，必须定期清洗和检查水泵和电机。

## 7.4.3 润滑

MG 电机

功率为 11 千瓦以下的电机轴承上添加的润滑脂可以满足电机整个使用寿命内的需求，因此不需要再润滑。

功率为 11 千瓦及以上的电机的轴承必须根据电机铭牌上的说明加注润滑脂。

其它电机

对于使用油脂嘴的其他电机，请根据电机铭牌上的指示对电机进行润滑。

## 7.4.4 轴承润滑油脂

必须使用锂基高温润滑脂润滑电机。

- 润滑油脂的技术规格必须符合 DIN 51825 的规定，必须为 K3N 或更佳。
- 基础油的粘度必须在 40°C (104°F) 时高于 50 cSt ( $\text{mm}^2/\text{s}$ ) 和在 100°C (212°F) 时高于 8 cSt ( $\text{mm}^2/\text{s}$ )。
- 润滑脂的充填速率必须为 30%至 40%。

## 7.4.5 霜冻防护

如果在严寒季节不需要使用水泵时，应该排空水泵以防损坏。

## 8. 故障查寻



### 危险 电击

死亡或严重的人身伤害

- 在拆去接线盒盖之前或者是在拆卸或拆装水泵之前，务必保证电源已经切断并且不会意外接通。



### 警告 液体溢出

死亡或严重的人身伤害

- 确保溢出的水不会对人员造成伤害或损坏电机或其它部件。
- 在高温液体安装中，要特别注意防止灼热的液体造成人身伤害等风险。
- 在低温液体安装中，要特别注意由低温液体引起的人身伤害风险。

故障	原因和解决方法
电机启动时不能运行。	电源故障。 保险丝熔断。 电机保护装置跳闸。 电机保护装置的主触点接触不良或线圈故障。 控制电路保险丝损坏。 电机损坏。
电源接通时电机保护装置跳闸。	电源故障。 电机保护装置触点故障。 电缆连接松开或者出现故障。 电机绕组损坏。 水泵被机械性卡死。 过载设置太低。
电机保护装置偶尔跳闸。	过载设置太低。 电源电压周期性过低或者过高。 通过水泵的压差太低。
电机保护装置未跳闸，但水泵不转。	电源故障。 保险丝熔断。 电机保护装置的主触点接触不良或线圈故障。 控制电路保险丝损坏。
水泵流量不恒定。	泵进水口压力过低。 进水管或水泵部分被杂质堵塞。 泵内进气。
泵运行，但不出水。	进水管或水泵被杂质堵塞。 底阀或者止回阀卡在关闭位置。 进水管存在泄漏。 进水管或水泵中进气。 电机的转动方向错误。
泵在关机时反向运转。 <sup>6)</sup>	进水管存在泄漏。 底阀或止回阀损坏。 底阀或止回阀在完全或部分打开位置被堵塞。
轴封泄漏。	水泵轴的位置不正确。 轴封损坏。

故障	原因和解决方法
噪音。	泵正汽蚀。 水泵不能自由转动（摩擦阻力）因为水泵轴的位置错误。 变频器操作：见变频器操作章节。 装置出现共振。 泵中有异物。
水泵持续运行（仅适用于具有自动启动和停机功能的水泵）。	相对于所需水量，停机压力太高。 水消耗比预期的要大。 进水管存在泄漏。 水泵的转动方向错误。 管道、阀门或者过滤器被杂物堵塞。 如果使用水泵控制器，则该控制器有问题。
运行周期过长（仅适用于具有自动启动和停机功能的水泵）。	相对于所需水量，停机压力太高。 管道、阀门或者过滤器被杂物堵塞。 水泵部分堵塞或卡死。 水消耗比预期的要大。 进水管存在泄漏。

6) 在双头水泵装置中，处于待机状态的水泵经常慢速转动。

## 相关信息

### 4.4.2 变频器操作

#### 4.4.2.1 格兰富电机

#### 4.4.2.2 非格兰富制造的电机

## 9. 技术数据

### 9.1 运行条件

#### 9.1.1 环境温度



严禁超出铭牌上规定的最高工作温度。如果没有说明，则最高允许环境温度为 40°C。

最高环境温度: 55°C (131°F)。

#### 9.1.2 液体温度

液体温度: -40 至+150°C (-40 至+302°F)。

最高液体温度取决机械密封的类型和水泵类型。

根据铸铁的类型和水泵用途，液体最大温度还可能受地方法律法规的限制。

最高液体温度在水泵铭牌上已标明。



如果水泵用来泵送高温液体，轴封的寿命可能缩短。因此有必要经常更换轴封。

#### 9.1.3 最大运行压力和测试压力



严禁超出泵铭牌上规定的最高工作温度。

压力测试通过含防腐蚀添加剂的水在 20°C (68°F) 的温度下完成。

压力等级	运行压力		测试压力	
	[bar]	[MPa]	[bar]	[MPa]
PN 6	6	0.6	10	1.0
PN 6 / PN 10	10	1.0	15	1.5
PN 16	16	1.6	24	2.4
PN 25	25	2.5	38	3.8

如果泵用于闭式加热或冷却系统，泵符合 IEC 60335-2-51 标准。

泵符合 IEC 60335-2-51 标准，如果泵用于非饮用水应用，且泵的铭牌上规定的最大允许工作压力等于或高于 1.0 MPa。

#### 9.1.4 入口压力

为了保证水泵以最佳状态安静地工作，入口压力（系统压力）必须正确调节。

为了计算具体的进口压力，请与当地的格兰富公司联系或者参见 TP、TPD、TPE、TPED、TPE2、TPE2 D、TPE3、TPE3 D 数据手册。

入口压力和水泵压力的总和必须低于水泵铭牌上规定的最大运行压力。

如果最大入口压力等于或小于泵铭牌上规定的最大运行压力的一半，则这些泵符合 IEC 60335-2-51 标准。

#### 9.1.5 最大流量范围。



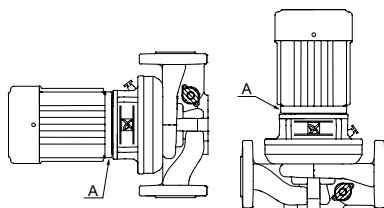
不得使流量超过泵的最大流量，否则可能会导致气蚀、过载等危险。

最小和最大流量和总扬程可以在相关数据手册中的性能曲线页面中读取，也可以在格兰富产品中心中选择特定泵时从曲线中读取。请访问 [www.grundfos.com](http://www.grundfos.com)。

### 9.2 防护等级

封闭电机的排水孔: IP55

打开电机的排水孔: IP44. 见下图。



电机法兰的排水孔 (A)

TM009831

### 9.3 电气数据

见电机铭牌。

### 9.4 声压级

单相电机的水泵的噪声级低于 70 dB (A)。

三相电机水泵的噪声级在下表中列出。

#### 最大声压级

三相电机 [kW]	50 Hz [dB(A)]			60 Hz [dB(A)]	
	二极	四极	六极	二极	四极
0.12	< 70	< 70	-	< 70	< 70
0.18	< 70	< 70	-	< 70	< 70
0.25	56	41	-	< 70	45
0.37	56	45	-	57	45
0.55	57	42	-	56	45
0.75	53	59.5	-	57	49
1.1	53	49.5	-	58	53
1.5	58	50	47	64	53
2.2	60	51	52	65	55
3.0	59.5	53	63	53.5	55
4.0	63	54	63	67.5	57
5.5	62	50	63	68	62

三相电机 [kW]	50 Hz [dB(A)]			60 Hz [dB(A)]	
	二极	四极	六极	二极	四极
7.5	60	51	66	65	62
11.0	60	53	-	64.5	66
15.0	60	66	-	65	66
18.5	60.5	63	-	65.5	63
22.0	65.5	63	-	70.5	63
30.0	70	65	-	75	65
37.0	71	66	-	75	65
45.0	67	66	-	75	65
55.0	72	67	-	75	68
75.0	74	70	-	77	71
90.0	73	70	-	77	71
110	76	70	-	81	75
132	76	70	-	81	75
160	76	70	-	81	75
200	-	70	-	81	75
250	-	73	-	86	77
315	-	73	-	-	77
355	-	75	-	-	-
400	-	75	-	-	-
500	-	75	-	-	-
560	-	78	-	-	-
630	-	78	-	-	-



产品上打叉的垃圾桶符号的意思是它必须与家庭垃圾分开处理。当带有此符号的产品达到使用寿命时，请将其送至当地废物处理机构指定的收集点。单独收集和回收这些产品有助于保护环境和人类健康。

另请参阅 [www.grundfos.com/product-recycling](http://www.grundfos.com/product-recycling)

## 9.5 环境

泵专门设计安装在非腐蚀性和非爆炸性环境。

最大相对湿度：95 %。

## 10. 产品处置

本产品或其部件必须按环保方法进行处理。

1. 使用当地的公共和个人废物处理设施。
2. 如果不能采用当地的公共和个人废物处理设施，请联系最近的格兰富公司或者维修站。

## Appendix A

## A.1. 中国 RoHS

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴联苯醚 (PBDE)
泵壳	X	0	0	0	0	0
紧固件	X	0	0	0	0	0
管件	X	0	0	0	0	0
定子	X	0	0	0	0	0
转子	X	0	0	0	0	0

本表格依据 SJ/T 11364 的规定编制

O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。  
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 该规定的限量要求。

 该产品环保使用期限为 10 年，标识如左图所示。  
此环保期限只适用于产品在安装与使用说明书中所规定的条件下工作

## Appendix B

**B.1. Minimum inlet pressure, 50 Hz, 2-pole**

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 25-50/2	0.1	0.1	0.2	0.5	-	-	-
TP 25-80/2	0.1	0.1	0.1	0.3	-	-	-
TP 25-90/2	0.1	0.1	0.2	0.5	-	-	-
TP 32-50/2	0.1	0.1	0.1	0.2	-	-	-
TP 32-80/2	0.1	0.1	0.2	0.5	-	-	-
TP 32-90/2	0.1	0.1	0.2	0.5	-	-	-
TP, TPD 32-60/2	0.1	0.1	0.2	1.0	1.5	3.2	-
TP, TPD 32-120/2	0.1	0.2	0.7	1.5	2.0	3.7	-
TP, TPD 32-150/2	0.1	0.3	0.8	1.6	2.1	3.8	-
TP, TPD 32-180/2	0.5	0.7	1.2	2.0	2.5	4.2	-
TP, TPD 32-230/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 32-200/2	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 32-250/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 32-320/2	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 32-380/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 32-460/2	0.1	0.2	0.7	1.4	1.9	3.6	-
TP, TPD 32-580/2	0.2	0.4	0.9	1.6	2.2	3.8	-
TP 40-50/2	0.1	0.1	0.1	0.3	-	-	-
TP 40-80/2	0.1	0.1	0.2	0.5	-	-	-
TP 40-90/2	0.1	0.1	0.2	0.5	-	-	-
TP, TPD 40-60/2	0.1	0.1	0.5	1.2	1.8	3.5	-
TP, TPD 40-120/2	0.1	0.1	0.4	1.2	1.7	3.4	-
TP 40-180/2	0.1	0.2	0.7	1.5	2.0	3.7	-
TP, TPD 40-190/2	0.1	0.3	0.8	1.6	2.1	3.8	-
TP, TPD 40-230/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 40-270/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 40-240/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 40-300/2	0.1	0.1	0.4	1.1	1.6	3.3	-
TP, TPD 40-360/2	0.2	0.4	0.9	1.6	2.1	3.8	-
TP, TPD 40-430/2	0.1	0.1	0.5	1.2	1.8	3.4	-
TP, TPD 40-530/2	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 40-630/2	0.1	0.3	0.8	1.5	2.1	3.7	-
TP, TPD 50-60/2	0.1	0.1	0.4	1.1	1.7	3.4	-
TP, TPD 50-120/2	0.1	0.2	0.7	1.5	2.0	3.7	-

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 50-180/2	0.1	0.2	0.7	1.4	2.0	3.7	-
TP, TPD 50-160/2	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 50-190/2	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 50-240/2	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 50-290/2	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 50-360/2	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 50-430/2	0.1	0.1	0.4	1.1	1.6	3.3	-
TP, TPD 50-420/2	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 50-540/2	0.1	0.1	0.5	1.3	1.8	3.4	-
TP, TPD 50-630/2	0.1	0.1	0.6	1.4	1.9	3.6	-
TP, TPD 50-710/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 50-830/2	0.5	0.7	1.2	2.0	2.5	4.1	-
TP, TPD 50-900/2	1.0	1.2	1.7	2.4	3.0	4.6	-
TP, TPD 65-60/2	0.1	0.3	0.8	1.5	2.1	3.8	-
TP, TPD 65-120/2	0.5	0.7	1.2	2.0	2.5	4.2	-
TP, TPD 65-180/2	0.3	0.5	1.0	1.8	2.3	4.0	-
TP, TPD 65-170/2	0.1	0.1	0.1	0.9	1.4	3.1	-
TP, TPD 65-210/2	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 65-250/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 65-340/2	0.1	0.1	0.2	0.9	1.4	3.1	-
TP, TPD 65-410/2	0.1	0.1	0.2	0.9	1.4	3.1	-
TP, TPD 65-460/2	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 65-550/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 65-660/2	0.1	0.1	0.4	1.1	1.6	3.3	-
TP, TPD 65-720/2	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 65-930/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 80-120/2	1.2	1.4	1.9	2.7	3.2	4.9	-
TP, TPD 80-140/2	0.1	0.2	0.7	1.4	1.9	3.6	-
TP, TPD 80-180/2	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 80-210/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 80-240/2	0.1	0.1	0.5	1.3	1.8	3.4	-
TP, TPD 80-250/2	0.1	0.3	0.8	1.6	2.1	3.7	-
TP 80-315/2	0.1	0.1	0.1	0.81	1.37	2.98	4.13
TP, TPD 80-330/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 80-395/2	0.1	0.1	0.16	0.88	1.44	3.05	4.2
TP, TPD 80-400/2	0.2	0.4	0.9	1.6	2.2	3.8	-
TP 80-405/2	0.1	0.1	0.13	0.85	1.41	3.02	4.17
TP 80-425/2	0.1	0.1	0.1	0.77	1.33	2.94	4.09



Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 80-520/2	0.1	0.1	0.6	1.4	1.9	3.5	-
TP, TPD 80-570/2	0.1	0.3	0.8	1.6	2.1	3.7	-
TP, TPD 80-700/2	0.6	0.8	1.3	2.1	2.6	4.2	-
TP, TPD 100-120/2	1.9	2.1	2.6	3.4	3.9	5.6	-
TP, TPD 100-160/2	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 100-200/2	0.1	0.1	0.4	1.2	1.7	3.3	-
TP, TPD 100-240/2	0.1	0.1	0.5	1.3	1.8	3.4	-
TP, TPD 100-250/2	0.6	0.8	1.3	2.0	2.5	4.2	-
TP, TPD 100-310/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 100-360/2	0.6	0.8	1.3	2.0	2.5	4.2	-
TP, TPD 100-390/2	1.0	1.2	1.7	2.4	3.0	4.6	-
TP, TPD 100-480/2	1.5	1.7	2.2	2.9	3.5	5.1	-
TP 100-530/2	1.6	1.8	2.2	3.2	3.7	5.3	6.6
TP 100-650/2	1.4	1.6	2.0	3.0	3.5	5.1	6.4
TP 100-800/2	1.3	1.5	1.9	2.9	3.4	5.0	6.3
TP 100-950/2	1.3	1.5	1.9	2.9	3.4	5.0	6.3
TP 100-1040/2	1.2	1.4	1.8	2.8	3.3	4.9	6.2
TP 100-1200/2	1.2	1.4	1.8	2.8	3.3	4.9	6.2
TP 100-1410/2	1.2	1.4	1.8	2.8	3.3	4.9	6.2
TP 125-310/2	0.4	0.5	1.0	1.7	2.3	3.9	-
TP 125-360/2	0.5	0.6	1.1	1.8	2.4	4.0	-

## B.2. Minimum inlet pressure, 50 Hz, 4-pole

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 32-30/4	0.1	0.1	0.1	0.8	1.4	3.1	-
TP, TPD 32-40/4	0.1	0.1	0.1	0.9	1.4	3.1	-
TP, TPD 32-60/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP, TPD 32-80/4	0.1	0.1	0.1	0.5	1.0	2.7	-
TP, TPD 32-100/4	0.1	0.1	0.1	0.5	1.1	2.7	-
TP, TPD 32-120/4	0.1	0.1	0.1	0.6	1.1	2.7	-
TP, TPD 40-30/4	0.1	0.1	0.2	0.9	1.5	3.2	-
TP 40-60/4	0.1	0.1	0.1	0.8	1.4	3.1	-
TP, TPD 40-90/4	0.1	0.1	0.3	1.0	1.6	3.3	-
TP, TPD 40-100/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 40-110/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 40-140/4	0.1	0.1	0.1	0.7	1.3	2.9	-

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 50-30/4	0.1	0.1	0.1	0.9	1.4	3.1	-
TP, TPD 50-60/4	0.1	0.1	0.2	0.9	1.5	3.2	-
TP, TPD 50-90/4	0.1	0.1	0.1	0.6	1.1	2.8	-
TP, TPD 50-80/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP, TPD 50-120/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 50-140/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 50-190/4	0.1	0.1	0.1	0.9	1.4	3.0	-
TP, TPD 50-230/4	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 65-30/4	0.1	0.2	0.7	1.5	2.0	3.7	-
TP, TPD 65-60/4	0.2	0.4	0.9	1.6	2.2	3.9	-
TP, TPD 65-90/4	0.1	0.1	0.1	0.6	1.1	2.7	-
TP, TPD 65-110/4	0.1	0.1	0.1	0.6	1.1	2.7	-
TP, TPD 65-130/4	0.1	0.1	0.1	0.6	1.1	2.8	-
TP, TPD 65-150/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-170/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-240/4	0.1	0.1	0.1	0.8	1.3	2.9	-
TP, TPD 80-30/4	0.8	1.0	1.5	2.2	2.8	4.5	-
TP, TPD 80-60/4	0.8	1.0	1.5	2.3	2.8	4.5	-
TP, TPD 80-70/4	0.1	0.1	0.1	0.8	1.3	2.9	-
TP, TPD 80-90/4	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 80-110/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 80-150/4	0.1	0.1	0.1	0.8	1.3	2.9	-
TP, TPD 80-170/4	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 80-240/4	0.1	0.1	0.3	1.0	1.5	3.2	-
TP 80-245/4	0.1	0.1	0.1	0.56	1.12	2.74	3.89
TP 80-265/4	0.1	0.1	0.1	0.64	1.2	2.82	3.96
TP, TPD 80-270/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP 80-275/4	0.1	0.1	0.1	0.69	1.25	2.87	4.02
TP 80-285/4	0.1	0.1	0.1	0.62	1.18	2.79	3.94
TP, TPD 80-340/4	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 100-30/4	0.8	1.0	1.5	2.2	2.8	4.5	-
TP, TPD 100-65/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP, TPD 100-70/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP, TPD 100-90/4	0.1	0.1	0.1	0.9	1.4	3.0	-
TP, TPD 100-110/4	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 100-130/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 100-170/4	0.3	0.5	1.0	1.7	2.3	3.9	-
TP 100-140/4	0.2	0.4	0.8	1.8	2.3	3.9	5.2

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 100-200/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP, TPD 100-250/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP, TPD 100-330/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
TP 100-335/4	0.1	0.1	0.51	1.23	1.78	3.39	4.54
TP, TPD 100-370/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
TP 100-395/4	0.54	0.69	1.17	1.87	2.42	4.02	5.16
TP, TPD 100-410/4	0.5	0.7	1.2	1.9	2.5	4.1	5.4
TP 125-60/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP 125-80/4	0.1	0.1	0.1	0.9	1.4	3.1	-
TP 125-95/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 125-110/4	0.1	0.1	0.1	0.9	1.4	3.0	-
TP, TPD 125-130/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 125-160/4	0.1	0.1	0.2	1.0	1.5	3.1	-
TP 125-150/4	0.2	0.4	0.8	1.8	2.3	3.9	5.2
TP, TPD 125-190/4	0.1	0.1	0.2	0.9	1.5	3.1	4.4
TP, TPD 125-230/4	0.1	0.1	0.3	1.0	1.6	3.2	4.5
TP, TPD 125-300/4	0.1	0.1	0.2	0.9	1.5	3.1	4.4
TP, TPD 125-340/4	0.1	0.1	0.3	1.0	1.5	3.2	4.5
TP 125-355/4	0.1	0.1	0.1	0.76	1.32	2.93	4.08
TP 125-375/4	0.1	0.1	0.25	0.97	1.52	3.13	4.28
TP, TPD 125-400/4	0.1	0.1	0.3	1.0	1.6	3.2	4.5
TP 150-70/4	0.1	0.1	0.3	1.1	1.6	3.2	-
TP 150-110/4	0.1	0.1	0.4	1.1	1.7	3.3	-
TP 150-155/4	0.1	0.1	0.5	1.2	1.8	3.4	-
TP 150-170/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 150-130/4	0.1	0.1	0.4	1.1	1.6	3.3	4.6
TP, TPD 150-160/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP, TPD 150-200/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP, TPD 150-220/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP, TPD 150-250/4	0.1	0.1	0.6	1.3	1.9	3.5	4.8
TP 150-260/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP 150-275/4	0.1	0.22	0.7	1.42	1.97	3.57	4.72
TP 150-280/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP 150-285/4	0.1	0.13	0.62	1.33	1.89	3.49	4.64
TP 150-340/4	0.1	0.2	0.7	1.5	2.0	3.6	4.9
TP 150-390/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP 150-450/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP 150-520/4	0.1	0.1	1.0	1.5	1.9	3.5	4.8

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 150-660/4	0.1	0.2	0.7	1.4	1.9	3.6	4.9
TP 150-680/4	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 200-50/4	0.3	0.4	0.9	1.7	2.2	3.8	-
TP 200-70/4	0.1	0.3	0.8	1.5	2.1	3.7	-
TP 200-90/4	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 200-130/4	0.1	0.1	0.5	1.2	1.8	3.4	-
TP 200-150/4	0.1	0.1	0.4	1.2	1.7	3.3	-
TP 200-160/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
TP 200-190/4	0.2	0.4	0.9	1.6	2.2	3.8	5.1
TP 200-200/4	0.2	0.4	0.9	1.6	2.1	3.8	5.1
TP 200-215/4	0.1	0.19	0.68	1.39	1.95	3.55	4.69
TP 200-240/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP 200-245/4	0.1	0.16	0.65	1.36	1.92	3.52	4.67
TP 200-270/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP 200-290/4	0.1	0.1	0.6	1.3	1.9	3.5	4.8
TP 200-320/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP 200-330/4	0.1	0.1	0.3	1.1	1.6	3.2	4.5
TP 200-360/4	0.1	0.1	0.3	1.1	1.6	3.2	4.5
TP 200-400/4	0.1	0.1	0.3	1.0	1.6	3.2	4.5
TP 200-410/4	0.1	0.2	0.7	1.4	1.9	3.6	4.9
TP 200-470/4	0.1	0.1	0.4	1.1	1.6	3.3	4.6
TP 200-530/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP 200-590/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP 200-595/4	0.1	0.14	0.63	1.34	1.9	3.5	4.65
TP 200-660/4	0.2	0.4	0.9	1.7	2.2	3.8	5.1
TP 200-665/4	0.1	0.18	0.66	1.38	1.93	3.53	4.68
TP 300-190/4	0.5	0.7	1.1	2.1	2.6	4.2	5.5
TP 300-220/4	0.3	0.5	0.9	1.9	2.4	4.0	5.3
TP 300-250/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 300-290/4	0.5	0.7	1.1	2.1	2.6	4.2	5.5
TP 300-390/4	0.5	0.7	1.1	2.1	2.6	4.2	5.5
TP 300-420/4	0.5	0.7	1.1	2.1	2.6	4.2	5.5
TP 300-430/4	0.5	0.7	1.1	2.1	2.6	4.2	5.5
TP 300-500/4	0.4	0.6	1.0	2.0	2.5	4.1	5.4
TP 300-550/4	0.3	0.5	0.9	1.9	2.4	4.0	5.3
TP 350-280/4	1.7	1.9	2.3	3.3	3.8	5.4	6.7
TP 350-320/4	1.6	1.8	2.2	3.2	3.7	5.3	6.6
TP 350-360/4	1.5	1.7	2.1	3.1	3.6	5.2	6.5

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 350-420/4	1.4	1.6	2.0	3.0	3.5	5.1	6.4
TP 350-480/4	1.3	1.5	1.9	2.9	3.4	5.0	6.3
TP 350-530/4	0.5	0.7	1.1	2.1	2.6	4.2	5.5
TP 350-650/4	0.4	0.6	1.0	2.0	2.5	4.1	5.4
TP 350-780/4	0.3	0.5	0.9	1.9	2.4	4.0	5.3
TP 400-470/4	0.7	0.7	1.4	2.1	2.6	4.3	5.6
TP 400-510/4	1.6	1.7	2.3	3.1	3.6	5.2	6.5
TP 400-540/4	0.8	0.9	1.5	2.2	2.8	4.4	5.7
TP 400-670/4	0.8	0.8	1.5	2.2	2.8	4.4	5.7
TP 400-720/4	0.9	0.9	1.5	2.3	2.8	4.5	5.8
TP 400-760/4	1.4	1.5	2.1	2.8	3.4	5.0	6.3
TP 400-670/4	0.8	0.8	1.5	2.2	2.8	4.4	5.7
TP 400-720/4	0.9	0.9	1.5	2.3	2.8	4.5	5.8
TP 400-760/4	1.4	1.5	2.1	2.8	3.4	5.0	6.3

### B.3. Minimum inlet pressure, 50 Hz, 6-pole

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 125-60/6	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 125-70/6	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 125-80/6	0.1	0.1	0.1	0.7	1.2	2.9	-
TP, TPD 125-100/6	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 125-130/6	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 125-160/6	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 150-60/6	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 150-70/6	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 150-90/6	0.1	0.1	0.1	0.8	1.3	2.9	-
TP, TPD 150-110/6	0.1	0.1	0.1	0.8	1.3	3.0	-

### B.4. Minimum inlet pressure, 60 Hz, 2-pole

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 32-80/2	0.4	0.4	0.4	1.2	1.7	3.4	-
TP 32-160/2	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 32-220/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 32-260/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 32-330/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 32-300/2	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 32-360/2	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 32-450/2	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 32-550/2	0.1	0.1	0.1	0.7	1.2	2.9	-
TP, TPD 32-680/2	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 32-820/2	0.5	0.7	1.2	1.9	2.5	4.1	-
TP 40-80/2	0.1	0.3	0.8	1.6	2.1	3.8	-
TP 40-160/2	0.1	0.2	0.7	1.5	2.0	3.7	-
TP 40-240/2	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 40-270/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 40-330/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 40-390/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 40-400/2	0.1	0.1	0.1	0.9	1.4	3.1	-
TP, TPD 40-460/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 40-530/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 40-690/2	0.1	0.2	0.7	1.4	2.0	3.6	-

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 40-820/2	0.1	0.3	0.8	1.6	2.1	3.7	-
TP, TPD 40-920/2	0.4	0.6	1.1	1.8	2.4	4.0	-
TP 50-80/2	0.1	0.1	0.6	1.4	1.9	3.6	-
TP 50-160/2	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 50-240/2	0.3	0.5	1.0	1.8	2.3	4.0	-
TP, TPD 50-250/2	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 50-300/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 50-350/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 50-410/2	0.1	0.1	0.4	1.1	1.6	3.3	-
TP, TPD 50-430/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 50-530/2	0.1	0.1	0.5	1.3	1.8	3.5	-
TP, TPD 50-640/2	0.1	0.1	0.6	1.4	1.9	3.5	-
TP, TPD 50-720/2	0.1	0.3	0.8	1.6	2.1	3.7	-
TP, TPD 50-790/2	0.5	0.7	1.2	1.9	2.5	4.1	-
TP, TPD 50-880/2	0.8	1.0	1.5	2.2	2.8	4.4	-
TP 50-1050/2	1.1	1.3	1.8	2.5	3.1	4.7	-
TP 65-80/2	0.6	0.8	1.3	2.1	2.6	4.3	-
TP 65-160/2	1.1	1.3	1.8	2.6	3.1	4.8	-
TP 65-240/2	0.9	1.1	1.6	2.4	2.9	4.6	-
TP, TPD 65-200/2	0.1	0.1	0.3	1.0	1.5	3.2	-
TP, TPD 65-250/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 65-340/2	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 65-390/2	0.1	0.1	0.3	1.0	1.5	3.2	-
TP, TPD 65-480/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 65-540/2	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 65-630/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 65-740/2	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 65-910/2	0.1	0.2	0.7	1.5	2.0	3.6	-
TP, TPD 65-920/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 65-1050/2	0.1	0.2	0.7	1.5	2.0	3.6	-
TP 80-160/2	2.1	2.3	2.8	3.6	4.1	5.8	-
TP, TPD 80-200/2	0.5	0.7	1.2	1.9	2.5	4.1	-
TP, TPD 80-240/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 80-290/2	0.1	0.3	0.8	1.5	2.1	3.7	-
TP, TPD 80-330/2	0.2	0.4	0.9	1.7	2.2	3.8	-
TP, TPD 80-400/2	0.6	0.8	1.3	2.1	2.6	4.2	-
TP, TPD 80-480/2	0.1	0.3	0.8	1.5	2.1	3.7	-
TP, TPD 80-530/2	0.2	0.4	0.9	1.6	2.1	3.8	-

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 80-640/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 80-750/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 100-230/2	0.4	0.6	1.1	1.9	2.4	4.0	-
TP, TPD 100-300/2	0.2	0.4	0.9	1.6	2.2	3.8	-
TP, TPD 100-370/2	0.3	0.5	1.0	1.7	2.3	3.9	-
TP, TPD 100-350/2	0.9	1.1	1.6	2.3	2.9	4.5	-
TP, TPD 100-380/2	1.2	1.4	1.9	2.6	3.2	4.8	-
TP, TPD 100-530/2	1.7	1.9	2.4	3.2	3.7	5.3	-
TP, TPD 100-630/2	1.4	1.6	2.1	2.8	3.3	5.0	-
TP, TPD 100-700/2	3.0	3.2	3.7	4.4	5.0	6.6	-
TP 100-760/2	1.7	1.9	2.3	3.3	3.8	5.4	6.7
TP 100-940/2	1.6	1.8	2.2	3.2	3.7	5.3	6.6
TP 100-1040/2	1.6	1.8	2.2	3.2	3.7	5.3	6.6
TP 100-1200/2	1.9	2.1	2.5	3.5	4.0	5.6	6.9
TP 100-1360/2	1.8	2.0	2.4	3.4	3.9	5.5	6.8
TP 100-1510/2	1.8	2.0	2.4	3.4	3.9	5.5	6.8

### B.5. Minimum inlet pressure, 60 Hz, 4-pole

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 32-40/4	0.1	0.1	0.1	0.9	1.4	3.1	-
TP 32-80/4	0.1	0.1	0.5	1.3	1.8	3.5	-
TP, TPD 32-120/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 32-140/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 32-190/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP 40-40/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP 40-80/4	0.1	0.1	0.2	1.0	1.5	3.2	-
TP, TPD 40-110/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 40-150/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 40-180/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 40-230/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP 50-40/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP 50-80/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP, TPD 50-100/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 50-115/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 50-130/4	0.1	0.1	0.1	0.9	1.4	3.0	-
TP, TPD 50-180/4	0.1	0.1	0.1	0.8	1.3	3.0	-



















Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 50-240/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 50-270/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 50-340/4	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 65-40/4	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 65-80/4	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 65-130/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-150/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-190/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-230/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 65-310/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 65-330/4	0.1	0.1	0.1	0.3	0.8	2.5	-
TP 80-40/4	1.5	1.7	2.2	3.0	3.5	5.2	-
TP 80-80/4	1.6	1.8	2.3	3.1	3.6	5.3	-
TP, TPD 80-110/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 80-150/4	0.1	0.1	0.1	0.8	1.3	2.9	-
TP, TPD 80-170/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP, TPD 80-230/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 80-280/4	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 80-340/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 80-410/4	0.1	0.1	0.5	1.2	1.8	3.4	-
TP, TPD 80-460/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 80-510/4	0.1	0.2	0.7	1.5	2.0	3.6	-
TP 100-40/4	1.4	1.6	2.1	2.9	3.4	5.1	-
TP 100-90/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 100-100/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 100-130/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 100-150/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 100-170/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 100-200/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP, TPD 100-240/4	0.1	0.1	0.6	1.3	1.9	3.5	4.8
TP, TPD 100-260/4	0.6	0.8	1.3	2.1	2.7	4.3	5.6
TP, TPD 100-290/4	0.5	0.7	1.2	2.0	2.5	4.1	5.4
TP, TPD 100-340/4	0.6	0.8	1.3	2.0	2.6	4.2	5.5
TP, TPD 100-350/4	0.2	0.4	0.9	1.7	2.3	3.9	5.2
TP, TPD 100-390/4	0.7	0.9	1.4	2.1	2.7	4.3	5.6
TP, TPD 100-470/4	0.9	1.1	1.6	2.3	2.9	4.5	5.8
TP 100-560/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 125-80/4	0.1	0.1	0.1	0.8	1.4	3.0	-









Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 125-110/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP 125-135/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP, TPD 125-130/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 125-160/4	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 125-200/4	0.1	0.1	0.2	0.9	1.4	3.1	-
TP, TPD 125-230/4	0.1	0.1	0.4	1.1	1.7	3.3	-
TP 125-220/4	0.1	0.1	0.4	1.1	1.7	3.3	4.5
TP, TPD 125-280/4	0.1	0.1	0.4	1.1	1.7	3.3	4.5
TP, TPD 125-340/4	0.1	0.1	0.5	1.2	1.8	3.4	4.6
TP, TPD 125-365/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
TP, TPD 125-420/4	0.1	0.1	0.3	1.0	1.6	3.2	4.5
TP, TPD 125-480/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP 125-550/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 125-580/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 150-130/4	0.1	0.1	0.5	1.2	1.8	3.4	-
TP 150-160/4	0.1	0.2	0.7	1.5	2.0	3.6	-
TP 150-200/4	0.2	0.4	0.9	1.6	2.1	3.8	-
TP 150-220/4	0.3	0.5	1.0	1.7	2.3	3.9	-
TP, TPD 150-180/4	0.1	0.2	0.7	1.4	1.9	3.6	4.9
TP, TPD 150-210/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP, TPD 150-240/4	0.1	0.2	0.7	1.5	2.0	3.6	4.9
TP, TPD 150-300/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP, TPD 150-340/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP 150-360/4	0.3	0.5	1.0	1.8	2.3	4.0	5.3
TP 150-400/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 150-440/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP 150-480/4	0.1	0.1	0.5	1.3	1.8	3.4	4.7
TP 150-610/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP 150-700/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP 150-810/4	0.3	0.4	0.9	1.7	2.2	3.8	5.1
TP 150-960/4	0.4	0.6	1.1	1.8	2.3	3.8	5.1
TP 200-80/4	0.9	1.1	1.6	2.3	2.9	4.5	-
TP 200-110/4	0.5	0.6	1.1	1.9	2.4	4.0	-
TP 200-140/4	0.3	0.5	1.0	1.7	2.3	3.9	-
TP 200-190/4	0.2	0.4	0.9	1.6	2.2	3.8	-
TP 200-210/4	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 200-250/4	0.9	1.0	1.5	2.3	2.8	4.4	5.7
TP 200-280/4	0.7	0.9	1.4	2.1	2.7	4.3	5.6









Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 200-320/4	0.6	0.8	1.3	2.0	2.6	4.2	5.5
TP 200-360/4	0.4	0.6	1.1	1.8	2.4	4.0	5.3
TP 200-390/4	0.3	0.5	1.0	1.7	2.2	3.9	5.2
TP 200-400/4	0.1	0.1	0.6	1.3	1.9	3.6	4.9
TP 200-430/4	0.1	0.1	0.6	1.4	1.9	3.6	4.9
TP 200-440/4	0.1	0.2	0.7	1.5	2.0	3.7	5.0
TP 200-490/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-500/4	0.2	0.4	0.9	1.6	2.2	3.9	5.2
TP 200-540/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-600/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-680/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-770/4	0.1	0.2	0.7	1.4	2.0	3.7	5.0
TP 300-230/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-270/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 300-360/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 300-370/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-440/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-550/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-630/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-640/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 300-750/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 350-400/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-450/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-540/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-680/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-450/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-540/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-680/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0

## B.6. TP, TPE pumps from 11 kW and up suspended in the pipes

Pump type	PN 16	PN 25	P2 [kW]									
50 Hz												
TP, TPE 65-460/2	•	-	11	-	-	-	-	-	-	•	-	
TP, TPE 65-550/2	•	-	15	-	-	-	-	-	-	•	-	
TP, TPE 65-660/2	•	-	18.5	-	-	-	-	-	-	•	-	
TP, TPE 65-720/2	•	-	22	-	-	-	-	-	-	•	-	
TP 80-315/2	•	-	11	-	-	-	-	-	-	•	-	
TP, TPE 80-330/2	•	-	11	-	-	-	-	-	-	•	-	
TP 80-395/2	•	-	11	-	-	-	-	-	-	•	-	
TP 80-405/2	•	-	15	-	-	-	-	-	-	•	-	
TP 80-425/2	•	-	15	-	-	-	-	-	-	•	-	
TP, TPE 80-400/2	•	-	15	-	-	-	-	-	-	•	-	
TP, TPE 80-520/2	•	-	18.5	-	-	-	-	-	-	•	-	
TP, TPE 80-570/2	•	-	22	-	-	-	-	-	-	•	-	
TP, TPE 100-250/2	•	-	11	-	-	-	-	-	-	•	-	
TP, TPE 100-310/2	•	-	15	-	-	-	-	-	-	•	-	
TP, TPE 100-360/2	•	-	18.5	-	-	-	-	-	-	•	-	
TP, TPE 100-390/2	•	-	22	-	-	-	-	-	-	•	-	
TP 80-265/4	•	-	5.5	-	-	-	-	-	-	•	-	
TP 80-245/4	•	-	7.5	-	-	-	-	-	-	•	-	
TP 80-285/4	•	-	7.5	-	-	-	-	-	-	•	-	
TP 80-275/4	•	-	11	-	-	-	-	-	-	•	-	
TP, TPE 80-340/4	•	-	11	-	-	-	-	-	-	•	-	
TP, TPE 100-250/4	•	•	11	-	-	-	-	-	-	•	-	
TP, TPE 100-330/4	•	•	15	-	-	-	-	-	-	•	-	
TP 100-335/4	•	-	15	-	-	-	-	-	-	•	-	
TP, TPE 100-370/4	•	•	18.5	-	-	-	-	-	-	•	-	
TP 100-395/4	•	-	18.5	-	-	-	-	-	-	•	-	
TP 100-410/4	•	•	22	-	-	-	-	-	-	•	-	
TP, TPE 125-190/4	•	•	11	-	-	-	-	-	-	•	-	
TP, TPE 125-230/4	•	•	15	-	-	-	-	-	-	•	-	
TP, TPE 125-300/4	•	•	18.5	-	-	-	-	-	-	•	-	
TP 125-340/4	•	•	22	-	-	-	-	-	-	•	-	
TP 125-355/4	•	-	30	•	-	-	-	-	-	-	-	
TP 125-375/4	•	-	37	•	-	-	-	-	-	-	-	
TP, TPE 150-200/4	•	•	15	-	-	-	-	-	-	•	-	
TP, TPE 150-220/4	•	•	18.5	-	-	-	-	-	-	•	-	

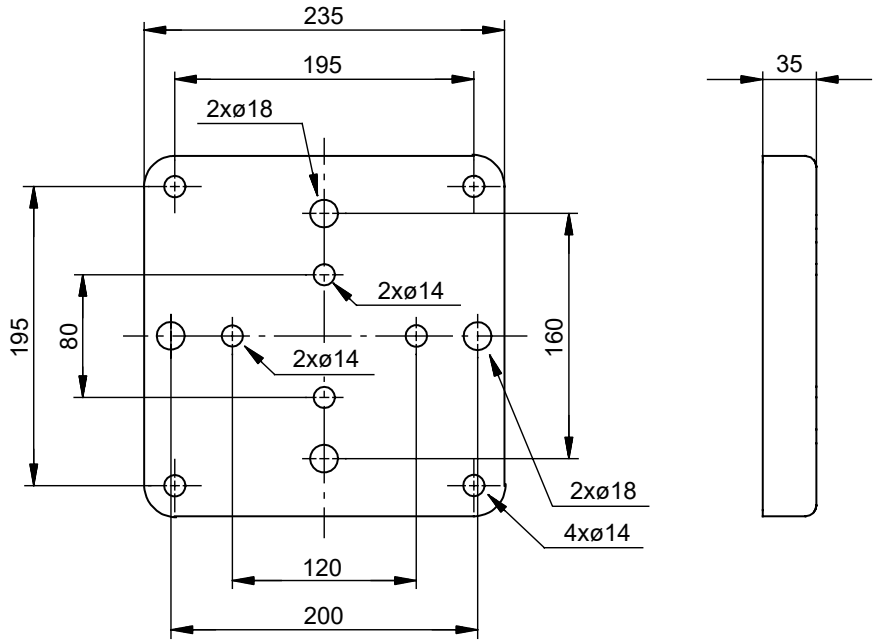
Pump type	PN 16	PN 25	P2 [kW]								
TP 150-275/4	●	-	18.5		●					-	
TP 150-250/4	●	●	22		-					●	
TP, TPE 150-260/4	-	●	18.5		●					-	
TP 150-280/4	-	●	22		●					-	
TP 150-285/4	●	-	22		●					-	
TP 150-340/4	-	●	30		●					-	
TP 150-390/4	-	●	37		●					-	
TP 150-450/4	-	●	45		●					-	
TP 150-520/4	-	●	55		●					-	
TP 150-660/4	-	●	75		●					-	
TP, TPE 200-160/4	-	●	15		●					-	
TP, TPE 200-190/4	-	●	18.5		●					-	
TP 200-200/4	-	●	22		●					-	
TP 200-215/4	●	-	22		●					-	
TP 200-240/4	-	●	30		●					-	
TP 200-245/4	●	-	30		●					-	
TP 200-270/4	-	●	45		●					-	
TP 200-320/4	-	●	55		●					-	
TP 200-330/4	-	●	37		●					-	
TP 200-360/4	-	●	45		●					-	
TP 200-400/4	-	●	55		●					-	
TP 200-410/4	-	●	75		●					-	
TP 200-470/4	-	●	75		●					-	
TP 200-595/4	●	-	110		●					-	
TP 200-665/4	●	-	132		●					-	
TP 300-190/4	-	●	30		●					-	
TP 300-220/4	-	●	37		●					-	
TP 300-250/4	-	●	45		●					-	
TP 300-290/4	-	●	55		●					-	
TP 300-390/4	-	●	75		●					-	
TP 300-420/4	-	●	90		●					-	
TP 300-430/4	-	●	110		●					-	
TP 300-500/4	-	●	132		●					-	
TP 300-550/4	-	●	160		●					-	
TP 350-230/4	-	●	55		●					-	
TP 350-280/4	-	●	75		●					-	
TP 350-310/4	-	●	90		●					-	
TP 350-360/4	-	●	110		●					-	

Pump type	PN 16	PN 25	P2 [kW]								
TP 350-420/4	-	●	132			●				-	
TP 350-480/4	-	●	160			●				-	
TP 350-530/4	-	●	200			●				-	
TP 350-650/4	-	●	250			●				-	
TP 350-780/4	-	●	315			●				-	
60 Hz											
TP, TPE 65-480/2	●	-	11			-				●	
TP, TPE 65-540/2	●	-	15			-				●	
TP, TPE 65-630/2	●	-	18.5			-				●	
TP, TPE 65-740/2	●	-	22			-				●	
TP, TPE 80-330/2	●	-	11			-				●	
TP, TPE 80-400/2	●	-	15			-				●	
TP, TPE 80-480/2	●	-	18.5			-				●	
TP, TPE 80-530/2	●	-	22			-				●	
TP, TPE 100-300/2	●	-	11			-				●	
TP, TPE 100-370/2	●	-	15			-				●	
TP, TPE 100-350/2	●	-	18.5			-				●	
TP, TPE 100-380/2	●	-	22			-				●	
TP, TPE 80-340/4	●	-	11			-				●	
TP, TPE 80-410/4	●	-	15			-				●	
TP, TPE 80-460/4	●	-	18.5			-				●	
TP 80-510/4	●	-	22			-				●	
TP, TPE 100-240/4	●	●	11			●				●	
TP, TPE 100-260/4	●	-	11			-				●	
TP, TPE 100-290/4	●	●	15			●				●	
TP, TPE 100-340/4	●	●	18.5			●				●	
TP 100-350/4	●	-	22			-				●	
TP 100-390/4	●	●	22			●				●	
TP 100-470/4	-	●	30			●				-	
TP 100-560/4	-	●	37			●				-	
TP, TPE 125-200/4	●	-	11			-				●	
TP, TPE 125-230/4	●	-	15			-				●	
TP, TPE 125-220/4	-	●	15			-				●	
TP, TPE 125-280/4	●	●	18.5			-				●	
TP 125-340/4	●	●	22			-				●	
TP 125-365/4	-	●	30			●				-	
TP 125-420/4	-	●	30			●				-	
TP 125-480/4	-	●	37			●				-	

Pump type	PN 16	PN 25	P2 [kW]								
TP 125-550/4	-	•	45			•					-
TP 125-580/4	-	•	55			•					-
TP, TPE 150-180/4	•	•	15			-					•
TP, TPE 150-210/4	•	•	18.5			-					•
TP 150-240/4	•	•	22			-					•
TP 150-300/4	-	•	30			•					-
TP 150-340/4	-	•	37			•					-
TP 150-360/4	-	•	30			•					-
TP 150-400/4	-	•	37			•					-
TP 150-440/4	-	•	45			•					-
TP 150-480/4	-	•	55			•					-
TP 150-610/4	-	•	75			•					-
TP 150-810/4	-	•	110			•					-
TP 150-960/4	-	•	132			•					-
TP 200-250/4	-	•	30			•					-
TP 200-400/4	-	•	75			•					-
TP 200-430/4	-	•	55			•					-
TP 300-230/4	-	•	45			•					-
TP 300-270/4	-	•	55			•					-
TP 300-360/4	-	•	75			•					-
TP 300-370/4	-	•	90			•					-
TP 300-440/4	-	•	110			•					-
TP 300-550/4	-	•	132			•					-
TP 300-630/4	-	•	160			•					-
TP 300-640/4	-	•	200			•					-
TP 300-750/4	-	•	250			•					-
TP 350-280/4	-	•	90			•					-
TP 350-330/4	-	•	110			•					-
TP 350-390/4	-	•	132			•					-
TP 350-440/4	-	•	160			•					-
TP 350-450/4	-	•	160			•					-
TP 350-540/4	-	•	200			•					-
TP 350-680/4	-	•	250			•					-

### B.7. Dimensions of base plates, TP, TPE Series 200

Pump type	Hexagon head screws
50 Hz: TP, TPE 32 TP, TPE 40 TP, TPE 50 TP 65-60/2 TP, TPE 65-120/2 TP 65-180/2	60 Hz: TP 32 TP 40 TP 50 TP 65-80/2, 65-160/2, 65-240/2  2 x M12 x 20 mm
50 Hz: TP 65-30/4 TP, TPE 65-60/4 TP, TPE 80 TP, TPE 100	60 Hz: TP 65-40/4, 65-80/4 TP 80 TP 100  2 x M16 x 30 mm



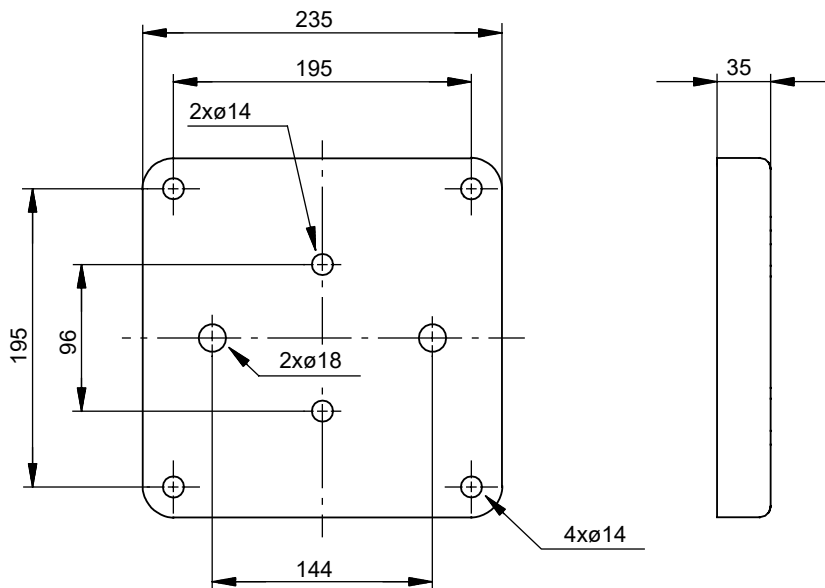
TMD 09835



### B.8. Dimensions of base plates, TP, TPE Series 300

Pump type	Hexagon head screws
50 Hz:	
TP, TPE 32	60 Hz:
TP, TPE 40	TP, TPE 32
TP, TPE 50	TP, TPE 40
TP, TPE 65	TP, TPE 50
TP, TPE 80-xx/2	TP, TPE 65
TP, TPE 80-70/4	TP, TPE 80-xx/2
TP, TPE 80-90/4	TP 80-110/4
TP, TPE 80-110/4	TP, TPE 80-150/4
TP, TPE 80-150/4	TP, TPE 80-170/4
TP, TPE 80-170/4	TP, TPE 100-230/2
TP, TPE 100-160/2	TP, TPE 100-300/2
TP, TPE 100-200/2	TP, TPE 100-370/2
TP, TPE 100-240/2	

2 x M16 x 30 mm



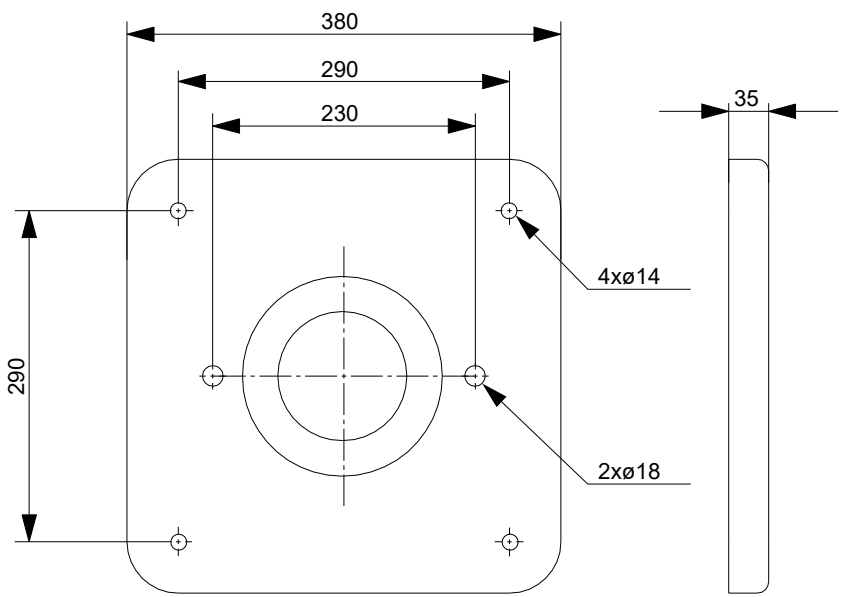
TIM003755

**Pump type**

**Hexagon head screws**

50 Hz:	60 Hz:
TP, TPE 80-240/4	TP, TPE 80-230/4
TP, TPE 80-270/4	TP, TPE 80-280/4
TP, TPE 80-340/4	TP, TPE 80-340/4
TP, TPE 80-340/4	TP, TPE 80-410/4
TP, TPE 100-250/2	TP, TPE 80-460/4
TP, TPE 100-310/2	TP, TPE 80-510/4
TP, TPE 100-360/2	TP, TPE 100-350/2
TP, TPE 100-390/2	TP, TPE 100-380/2
TP, TPE 100-480/2	TP, TPE 100-530/2
TP 100-530/2	TP, TPE 100-630/2
TP 100-650/2	TP, TPE 100-700/2
TP 100-800/2	TP 100-760/2
TP 100-950/2	TP 100-940/2
TP 100-1040/2	TP 100-1040/2
TP 100-1200/2	TP 100-1200/2
TP 100-1410/2	TP 100-1360/2
TP, TPE 100-xx/4	TP 100-1510/2
TP, TPE 125-xx/4	TP, TPE 100-xx/4
TP, TPE 150-xx/4	TP, TPE 125-xx/4
TP 125-xx/6	TP, TPE 150-xx/4
TP 150-xx/6	TP, TPE 100-260/4
	TP 100-350/4

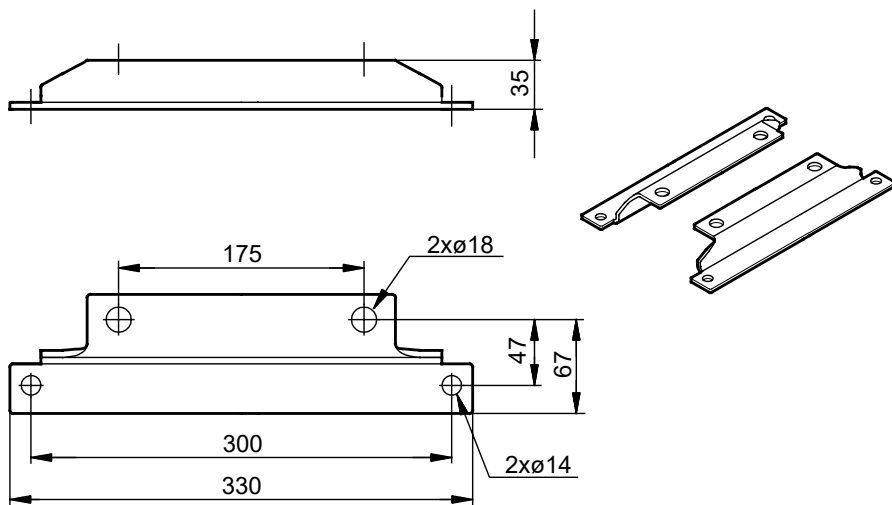
2 x M16 x 30 mm



TM028869

### B.9. Dimensions of base plates, TPD, TPED Series 300

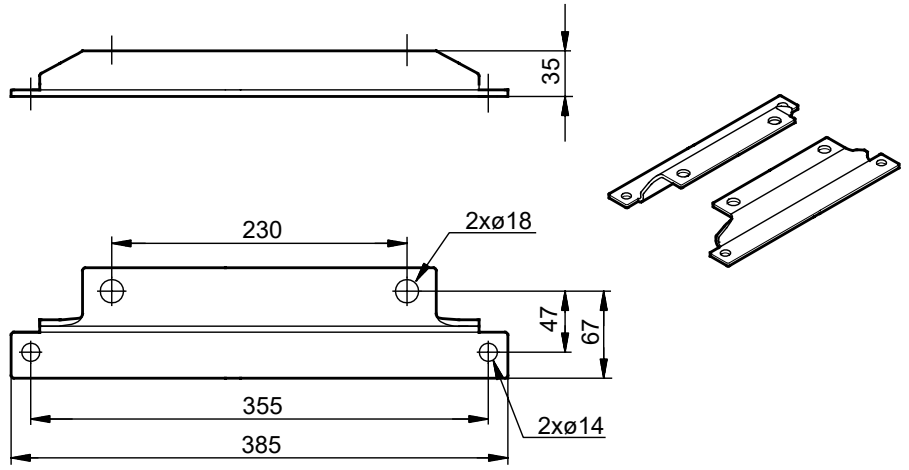
Pump type	Hexagon head screws
50 Hz:	
TPD, TPED 32	
TPD, TPED 40	
TPD, TPED 50	
TPD, TPED 65	
TPD, TPED 80-xx/2	
TPD, TPED 80-70/4	
TPD, TPED 80-90/4	
TPD, TPED 80-110/4	
TPD, TPED 80-150/4	
TPD, TPED 80-170/4	
TPD, TPED 100-160/2	
TPD, TPED 100-200/2	
TPD, TPED 100-240/2	
60 Hz:	
TPD 32	
TPD 40	
TPD 50	
TPD 65	
TPD 80-xx/2	
TPD 80-110/4	
TPD 80-150/4	
TPD 80-170/4	
TPD 100-230/2	
TPD 100-300/2	
TPD 100-370/2	
	4 x M16 x 30 m



TM025336

Pump type	Hexagon head screws
50 Hz:	
TPD, TPED 100-250/2	
TPD, TPED 100-310/2	
TPD, TPED 100-360/2	
TPD, TPED 100-390/2	
TPD, TPED 100-65/4	
TPD, TPED 100-70/4	
TPD, TPED 100-90/4	
TPD, TPED 100-110/4	
TPD, TPED 100-130/4	
TPD, TPED 100-170/4	
60 Hz:	
TPD 100-350/2	
TPD 100-380/2	
TPD 100-530/2	
TPD 100-630/2	
TPD 100-700/2	
TPD 100-100/4	
TPD 100-130/4	
TPD 100-150/4	
TPD 100-170/4	

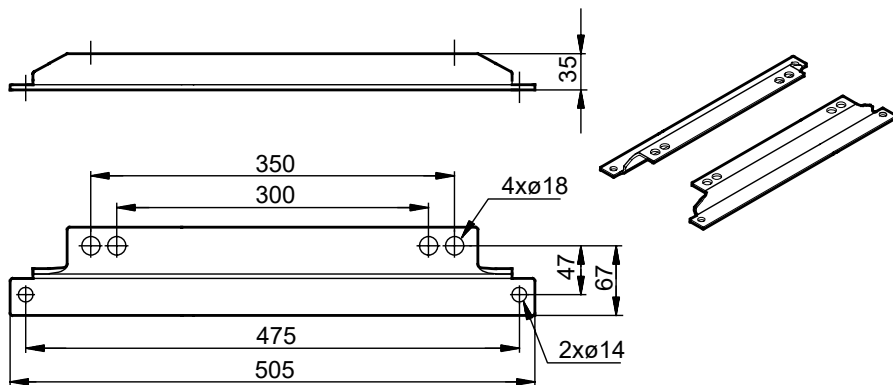
4 x M16 x 30 mm



TM028870

Pump type	Hexagon head screws
	60 Hz:
	TPD 80-230/4
50 Hz:	TPD 80-280/4
TPD, TPED 80-240/4	TPD 80-340/4
TPD, TPED 80-270/4	TPD 80-410/4
TPD, TPED 80-340/4	TPD 80-460/4
TPD, TPED 100-200/4	TPD 80-510/4
TPD, TPED 100-250/4	TPD 100-200/4
TPD, TPED 100-330/4	TPD 100-240/4
TPD, TPED 100-370/4	TPD 100-260/4
TPD, TPED 100-410/4	TPD 100-290/4
TPD, TPED 125-xx/4	TPD 100-340/4
TPD, TPED 150-xx/4	TPD 100-350/4
TPD 125-xx/6	TPD 100-390/4
TPD 150-xx/6	TPD 100-470/4
	TPD 125-xx/4
	TPD 150-xx/4

4 x M16 x 30 mm



TM028871

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