TP, TPD

Installation and operating instructions

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GRUNDFOS

Original installation and operating instructions

CONTENTS

Warning

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

1. Symbols used in this document

Warning

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

Caution

If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

Note

Notes or instructions that make the job easier and ensure safe operation.

2. General information

These instructions apply to the pump types TP and TPD fitted with Grundfos 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.

3. Delivery and handling

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.

3.2 Handling

Warning

The lifting eyes fitted to large pump motors can be used for lifting the pump head (motor, motor stool and impeller). The lifting eyes must not be used for lifting the entire pump.

TPD:

The centrally positioned thread of the pump housing must not be used 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. See figures 1 and 2.

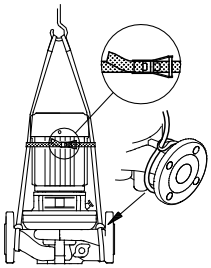

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Fig. 1 TP

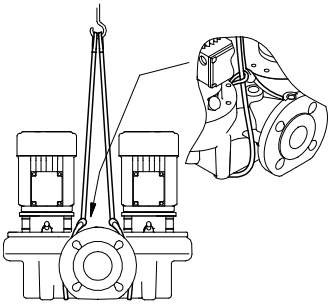

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Fig. 2 TPD

Pumps with lifting eyes must be lifted by means of nylon straps and shackles. See figures 3 and 4.

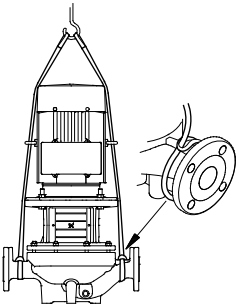

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Fig. 3 TP

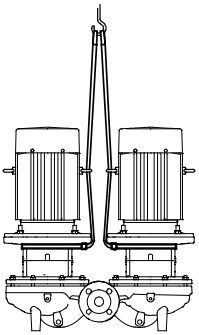

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Fig. 4 TPD

4. 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
- domestic hot water systems
- industrial systems in general.

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

4.1 Pumped liquids

Thin, clean, non-aggressive and non-explosive liquids, not containing 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
- domestic hot 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.

5. Installation

Warning

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

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 fig. 5.

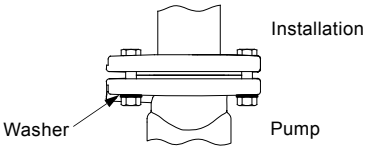

Fig. 5 Use of washers for oval bolt holes

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 pipework.

Pumps with motors of 11 kW and up may only be installed in horizontal pipework 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 table *TP, TPE pumps from 11 kW and up suspended in the pipes* on page 29.

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 x DN). See fig. 6. 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.

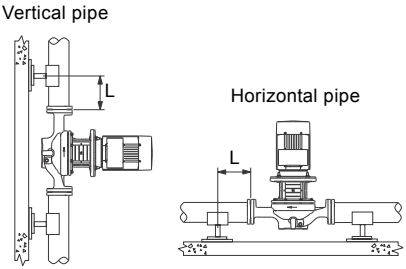

Fig. 6 Pump suspended directly in the pipes

Caution The motor must never fall below the horizontal plane.

For inspection and motor/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 fig. 7.

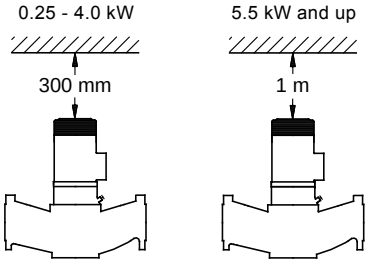

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Fig. 7 Required clearance above the motor

Twin-head pumps installed in horizontal pipes must be fitted with an automatic air vent in the upper part of the pump housing. See fig. 8. The automatic air vent is not supplied with the pump.

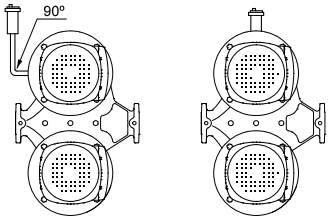

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Fig. 8 Automatic air vent

If the liquid temperature falls below the ambient temperature, 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 fig. 9.

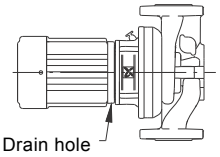

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Fig. 9 Drain hole in motor flange

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. Whenever possible (pumps with motors smaller than 11 kW), the pump must be installed with the motor shaft in horizontal position. See fig. 8.

Caution The technical data in section *9. Technical data* must be observed.

5.1 Pipework

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 pipework is 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 pipework.

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

To avoid sediment build-up, do not fit the pump at the lowest point of the system.

Install the pipes so that air locks are avoided, especially on the inlet side of the pump. See fig. 10.

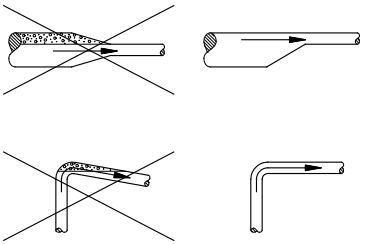

Fig. 10 Correct pipework on the inlet side of the pump

Caution The pump is not allowed to run against a closed outlet valve as this will cause an increase in temperature/formation of steam in the pump which may cause damage to the pump.

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/a drain to the outlet pipe. The drain can for instance be connected to a tank. A minimum flow rate equal to 10 % of the flow rate at maximum efficiency is needed at all times.

Flow rate and head at maximum efficiency are stated on the pump nameplate.

5.2 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, but for motors of 90 kW and up as well as the pumps stated in the table below, vibration damping is mandatory:

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 remaining system.

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

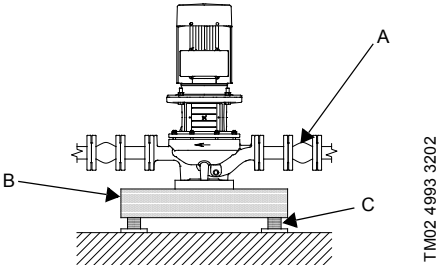

Fig. 11 Foundation for TP pump

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

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

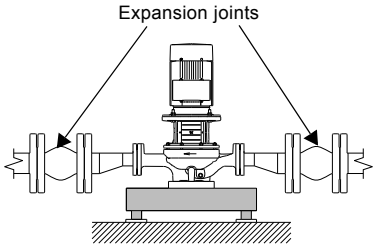

Fig. 12 TP pump installed with larger expansion joints

5.3 Foundation

We recommend that you install the pump on a concrete foundation which is heavy enough to provide permanent and rigid support to 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. See fig. 11.

5.3.1 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.

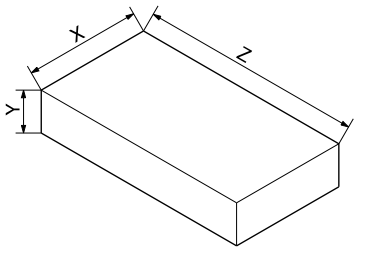

Fig. 13 Foundation for TP, TPD Series 300 pumps

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		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
950	≤ DN 200	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

Concrete foundation dimensions				
Pump weight [kg]		Y (height) [mm]	Z (length) [mm]	X (width) [mm]
800	DN 300 / DN 350 / DN 400	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

5.4 Terminal box positions

Warning

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 any of 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.

5.5 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.

Base plates with dimensions are shown on page 32.

5.6 Insulation

Caution

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 fig. 14 when insulating the pump.

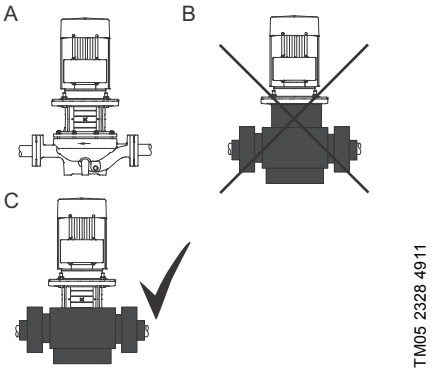

Fig. 14 Insulation of TP pumps

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

5.7 Frost protection

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

6. Electrical connection

Make the electrical connection in accordance with local regulations.

Warning

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

Connect the pump to an external mains switch with a minimum contact gap of 3 mm in all poles.

The operating voltage and frequency are marked on the pump nameplate. 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.

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

6.1 Frequency converter operation

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

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.

In the case of frequency converter operation, consider the following:

- In 2-pole motors from 45 kW, 4-pole motors from 30 kW and 6-pole motors from 22 kW, one of the motor bearings must be electrically insulated to prevent damaging currents from passing through the motor bearings.
- In the case of noise-critical applications, the motor noise can be reduced by fitting an output filter between the motor and the frequency converter. In particularly noise-critical applications, we recommend that you fit a sinusoidal filter.
- The length of the cable between motor and frequency converter affects the motor load. Therefore, check that the cable length meets the specifications laid down by the frequency converter supplier. For supply voltages between 500 and 690 V, either fit a sinusoidal filter to reduce voltage peaks or use a motor with reinforced insulation.
- For supply voltages of 690 V, use a motor with reinforced insulation and fit a sinusoidal filter.

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

6.1.1 Other motor makes than Grundfos

Contact Grundfos or the motor manufacturer.

7. Startup

7.1 Flushing the pipe system

Caution

The pump is not designed to pump liquids containing solid particles such as pipe debris and welding slag. Before starting up the pump, the pipe system must be thoroughly cleaned, flushed and filled with clean water.

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

7.2 Priming

Caution

Do not start the pump until it has been filled with liquid and vented. To ensure correct venting, the vent screw must point upwards.

Closed systems or open systems where the liquid level is above the pump inlet:

1. Close the isolating valve on the outlet side and loosen the vent screw in the motor stool. See fig. 15.

Warning

Pay attention to the direction of the vent hole and 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.

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).

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. See fig. 15.
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.

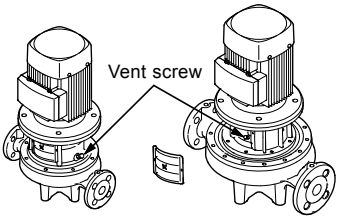

Fig. 15 Position of vent screw

7.3 Checking the direction of rotation

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

Note

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.

7.4 Starting

1. Before starting the pump, completely open the isolating valve on the inlet side of the pump and leave the isolating valve on the outlet side almost closed.
2. Start the pump.
3. Vent the pump during starting by loosening the vent screw in the motor stool until a steady stream of liquid runs out of the vent hole. See fig. 15.

Warning

Pay attention to the direction of the vent hole and 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.

4. When the pipe system has been filled with liquid, slowly open the isolating valve on the outlet side until it is completely open.

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

Under normal conditions, the leaking liquid will evaporate. As a result, no leakage will be detected.

However, liquids such as kerosene will not evaporate. The leakage may therefore be seen as a shaft seal failure.

7.6 Frequency of starts and stops

Frame size	Maximum number of starts per hour		
	Number of poles		
	2	4	6
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, i.e. 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 pumping domestic hot water, the duty and standby pumps must be alternated on a regular basis, i.e. once a day, to avoid blocking of the standby pump due to deposits (calcareous deposits, etc.). We recommend automatic pump change.

8. Maintenance and service

Warning

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

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.

8.1 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.

8.2 Motor

Check the motor 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.

Lubrication

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.

Lubricate the motor 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^2/s) at 40 °C (104 °F) and 8 cSt (mm^2/s) at 100 °C (212 °F).
- The grease filling rate must be 30-40 %.

8.3 Service

Warning

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

If Grundfos is requested to service the pump, Grundfos must be contacted with details about the pumped liquid, etc. before the pump is returned for service. Otherwise Grundfos can refuse to accept the pump for service.

Possible costs of returning the pump are paid by the customer.

8.4 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.

8.4.1 Pumps with two-part coupling

Pumps 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. See fig. 16.

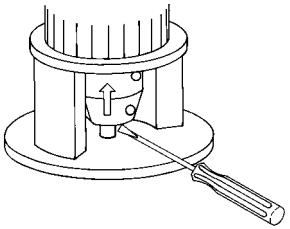

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Fig. 16 Raising the coupling and the pump shaft

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. See fig. 17.

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.

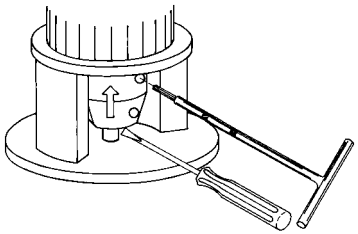

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Fig. 17 Tightening the screws

8.4.2 Pumps with integral shaft/coupling

For pumps with integral shaft/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.

8.5 Blanking flanges

For twin-head pumps, a blanking flange with a pump housing gasket is available. See fig. 18.

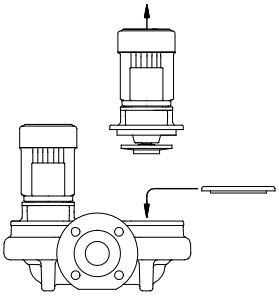


Fig. 18 Fitting the blanking flange

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

9. Technical data

9.1 Ambient temperature

Maximum 55 °C (131 °F).

9.2 Liquid temperature

-40 - +150 °C (-40 - +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.

Note

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.

9.3 Operating pressure/test pressure

The pressure test has been made with water containing anti-corrosive 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

9.4 Inlet pressure

To ensure optimum and quiet pump operation, the inlet pressure (system pressure) must be adjusted correctly. See the table on page 16.

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.

9.5 Enclosure class

Closed drain hole in motor: IP55.

Open the drain hole in motor: IP44. See fig. 9.

9.6 Electrical data

See motor nameplate.

9.7 Sound pressure level

Pumps with single-phase motors

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

Pumps with three-phase motors

See the table on page 28.

9.8 Environment

Non-aggressive and non-explosive atmosphere.

Relative air humidity: Maximum 95 %.

10. Fault finding the product

Warning

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

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
1. Motor does not run when started.	a) Power supply failure. b) Fuses blown. c) Motor protection device has tripped. d) Main contacts in motor protection device are not making contact or the coil is faulty. e) Control circuit fuses are defective. f) Motor is defective.
2. Motor protection device trips immediately when power supply is switched on.	a) Power supply failure. b) Contacts in motor protection device are faulty. c) Cable connection is loose or faulty. d) Motor winding is defective. e) Pump is mechanically blocked. f) Overload setting too low.
3. Motor protection device trips occasionally.	a) Overload setting too low. b) Supply voltage periodically too low or too high. c) Differential pressure across pump too low.
4. Motor protection device has not tripped but the pump does not run.	a) Check the power supply. b) Check fuses. c) Check the main contacts in the motor protection device and coil. d) Check the control circuit.
5. Pump capacity not constant.	a) Pump inlet pressure is too low. b) Inlet pipe/pump partly blocked by impurities. c) Pump draws in air.
6. Pump runs but gives no water.	a) Inlet pipe/pump blocked by impurities. b) Foot or non-return valve blocked in closed position. c) Leakage in the inlet pipe. d) Air in inlet pipe or pump. e) Motor rotates in the wrong direction.
7. Pump runs backwards when switched off.*	a) Leakage in the inlet pipe. b) Foot or non-return valve defective. c) Foot or non-return valve blocked in open or partly open position.
8. Leakage in the shaft seal.	a) Pump shaft position is incorrect. b) Shaft seal is defective.

Fault	Cause
9. Noise.	a) Pump is cavitating. b) Pump does not rotate freely (frictional resistance) because of incorrect pump shaft position. c) Frequency converter operation: See section *6.1 Frequency converter operation*. d) Resonance in the installation. e) Foreign bodies in the pump.
10. Pump runs constantly (applies only to pumps with automatic start/stop).	a) Stop pressure is too high in relation to the required quantity of water. b) The water consumption is larger than anticipated. c) Leakage in the outlet pipe. d) The direction of rotation of the pump is incorrect. e) Pipes, valves or strainer blocked by impurities. f) Pump controller, if used, is defective.
11. Period of operation is too long (applies only to pumps with automatic start/stop).	a) Stop pressure is too high in relation to the required quantity of water. b) Pipes, valves or strainer blocked by impurities. c) Pump partly blocked or seized up. d) The water consumption is larger than anticipated. e) Leakage in the outlet pipe.

* In twin-head pump installations, the standby pump will often rotate slowly.

11. Disposal

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

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

Subject to alterations.

Appendix

GB: Inlet pressure stated in bar relative pressure (pressure gauge value measured on the suction side of the pump)

BG: Относително входно налягане в bar (стойност на манометъра в смукателната страна на помпата)

CZ: Tlak na sání vyjádřený v barech je relativní tlak (hodnota na manometru měřená na sací straně čerpadla)

DE: Zulaufdruck in bar Relativdruck (Manometerdruck auf der Saugseite der Pumpe gemessen)

DK: Tilløbstrykket angivet i bar relativt tryk (manometerværdi målt på pumpens sugeside)

EE: Rõhk sisendis, antud baarides, on suhteline rõhk (manomeetri näit, mõõdetuna pumba imipoolel)

ES: Presión de aspiración indicada en bar como presión relativa (valor del manómetro medido en la aspiración de la bomba)

FI: Tulopaine ilmoitettuna baareina on suhteellinen paine (painemittarin lukema mitattu pumpun imupuolella)

FR: Pression d'entrée indiquée en bar (valeur mesurée à l'aide d'un manomètre placé sur le côté aspiration de la pompe)

GR: Πίεση αναρρόφησης σε bar σχετικής πίεσης (μετρούμενη τιμή πίεσης στην πλευρά αναρρόφησης της αντλίας)

HR: Ulazni tlak u barima relativnog tlaka (manometarski tlak izmjeren na usisnoj strani crpke)

HU: Hozzáfolyási nyomás bar-ban, túlnyomás (nyomásmérő mért értéke a szivattyú szívóoldalán)

IT: Pressione di aspirazione indicata in bar (valore misurato con un manometro posto sul lato aspirazione della pompa)

LT: Manometrinis slėgis įvade bar (manometru matuojama slėgio vertė siurblio įvado pusėje)

LV: Ieplūdes spiediens tiek noradīts nosacītas spiediena mērvienības, baros (manometra radījumi tiek mērīti sūkņa sūcpusē)

NL: Inlaatdruk weergegeven in bar relatieve druk (drukopnemer waarde, gemeten aan de zuigkant van de pomp)

PL: Ciśnienie na króćcu ssawnym pompy wyrażone w barach (mierzone manometrem na stronie ssawnej pompy)

PT: Pressão de entrada com a pressão relativa apresentada em bar (ponto de medida na parte de aspiração da bomba)

RO: Presiunea de intrare exprimată în bar ca presiune relativă (valoarea masurată de manometru pe partea de aspiraţie a pompei)

RS: Ulazni pritisak je dat u barima relativnog pritiska (manometarska vrednost merena na usisnoj strani pumpe)

SE: Tilloppstrycket angivet i bar relativt tryck (manometervärde mätt på pumpens sugsida)

SI: Vhodni tlak v barih relativni tlak (izmerjena vrednost na sesalni strani črpalke)

SK: Vstupný tlak uvedený v baroch relatívneho tlaku (hodnota na manometru meraná na sacej strane čerpadla)

AR: ب سحب المضخةضغط المدخل المذكور بالبار هو ضغط نسبي (قيمة قياس الضغط المقاسة على جان)

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 25-50R/2	0.1	0.1	0.2	0.5	-	-	-
TP 25-80R/2	0.1	0.1	0.1	0.3	-	-	-
TP 25-90R/2	0.1	0.1	0.2	0.5	-	-	-
TP 32-50R/2	0.1	0.1	0.1	0.2	-	-	-
TP 32-80R/2	0.1	0.1	0.2	0.5	-	-	-
TP 32-90R/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	-
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	-

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
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 50-960/2	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, TPD 80-330/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 80-400/2	0.2	0.4	0.9	1.6	2.2	3.8	-
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, TPD100-310/2	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

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 100-650/2	1.4	1.6	2	3	3.5	5.1	6.4
TP 100-800/2	1.3	1.5	1.9	2.9	3.4	5	6.3
TP 100-950/2	1.3	1.5	1.9	2.9	3.4	5	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

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	-
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	-

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
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, TPD 80-270/4	0.1	0.1	0.2	0.9	1.5	3.1	-
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 100-60/4	0.6	0.8	1.3	2.0	2.6	4.3	-
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 100-140/4	0.2	0.4	0.8	1.8	2.3	3.9	5.2
TP, TPD 100-170/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
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, TPD 100-370/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
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 125-150/4	0.2	0.4	0.8	1.8	2.3	3.9	5.2
TP, TPD 125-160/4	0.1	0.1	0.2	1.0	1.5	3.1	-
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, 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

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 150-260/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP 150-280/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
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
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 200-240/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
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 200-660/4	0.2	0.4	0.9	1.7	2.2	3.8	5.1
TP 250-280/4	0.1	0.1	0.1	0.8	1.4	3.1	-
TP 250-310/4	0.1	0.1	0.1	0.8	1.4	3.1	-
TP 250-390/4	0.1	0.1	0.1	0.8	1.4	3.1	-
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	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	2	2.5	4.1	5.4
TP 300-550/4	0.3	0.5	0.9	1.9	2.4	4	5.3

Pump type (50 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 350-230/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-280/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-310/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-360/4	1.5	1.7	2.1	3.1	3.6	5.2	6.5
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

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	-

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	-

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
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	-
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	-

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
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	-
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	5.6	6.9
TP 100-1360/2	1.8	2	2.4	3.4	3.9	5.5	6.8
TP 100-1510/2	1.8	2	2.4	3.4	3.9	5.5	6.8

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 100-80/4	1.2	1.4	1.9	2.7	3.2	4.9	-
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	-
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	-

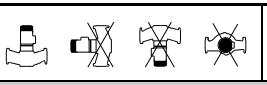
Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP, TPD 125-160/4	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 125-200/4	0.1	0.1	0.2	0.9	1.4	3.1	-
TP, TPD 125-230/4	0.1	0.1	0.4	1.1	1.7	3.3	-
TP 125-220/4	0.1	0.1	0.4	1.1	1.7	3.3	4.5
TP, TPD 125-280/4	0.1	0.1	0.4	1.1	1.7	3.3	4.5
TP, 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	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	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	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
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

Pump type (60 Hz)	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
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 250-450/4	1.5	1.7	2.2	2.9	3.5	5.2	-
TP 250-530/4	1.5	1.7	2.2	2.9	3.5	5.2	-
TP 250-580/4	1.4	1.6	2.1	2.9	3.4	5.1	-
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 350-280/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-330/4	1.9	2.1	2.5	3.5	4.0	5.6	6.9
TP 350-390/4	1.9	2.1	2.5	3.5	4.0	5.6	6.9
TP 350-440/4	1.9	2.1	2.5	3.5	4.0	5.6	6.9
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

Maximum sound pressure level

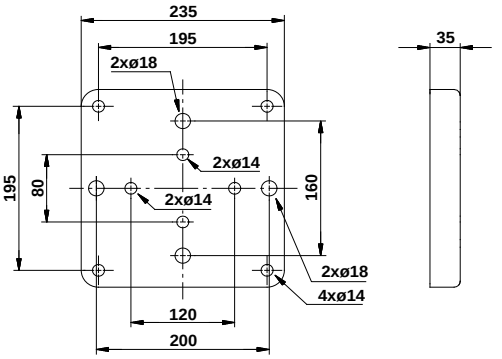
Three-phase motors [kW]	50 Hz [dB(A)]			60 Hz [dB(A)]	
	2-pole	4-pole	6-pole	2-pole	4-pole
0.12	< 70	< 70	-	< 70	< 70
0.18	< 70	< 70	-	< 70	< 70
0.25	56	41	-	< 70	45
0.37	56	45	-	57	45
0.55	57	42	-	56	45
0.75	53	59.5	-	57	49
1.1	53	49.5	-	58	53
1.5	58	50	47	64	53
2.2	60	51	52	65	55
3.0	59.5	53	63	53.5	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
110.0	76	70	-	81	75
132.0	76	70	-	81	75
160.0	76	70	-	81	75
200.0	-	70	-	81	75
250.0	-	73	-	86	77
315.0	-	73	-	-	77
355.0	-	75	-	-	-
400.0	-	75	-	-	-
500.0	-	75	-	-	-
560.0	-	78	-	-	-
630.0	-	78	-	-	-

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, TPE 80-330/2	●	-	11	-	●
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, TPE 80-340/4	●	-	11	-	●
TP, TPE 100-250/4	●	●	11	-	●
TP, TPE 100-330/4	●	●	15	-	●
TP, TPE 100-370/4	●	●	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, TPE 150-200/4	●	●	15	-	●
TP, TPE 150-220/4	●	●	18.5	-	●
TP 150-250/4	●	●	22	-	●
TP, TPE 150-260/4	-	●	18.5	●	-
TP 150-280/4	-	●	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 200-240/4	-	●	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	●	-

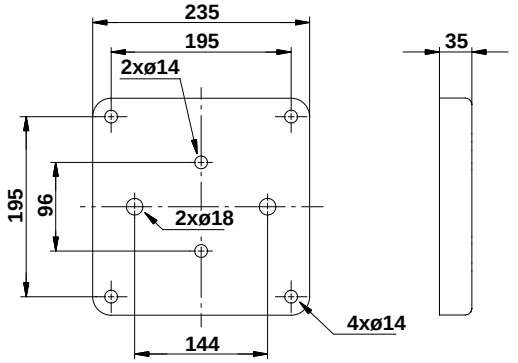
Pump type	PN 16	PN 25	P2 [kW]		
TP 300-190/4	-	●	30	●	-
TP 300-220/4	-	●	37	●	-
TP 300-250/4	-	●	45	●	-
TP 300-290/4	-	●	55	●	-
TP 300-390/4	-	●	75	●	-
TP 300-420/4	-	●	90	●	-
TP 300-430/4	-	●	110	●	-
TP 300-500/4	-	●	132	●	-
TP 300-550/4	-	●	160	●	-
TP 350-230/4	-	●	55	●	-
TP 350-280/4	-	●	75	●	-
TP 350-310/4	-	●	90	●	-
TP 350-360/4	-	●	110	●	-
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	-	●

Pump type	PN 16	PN 25	P2 [kW]		
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	●	-
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	●	-



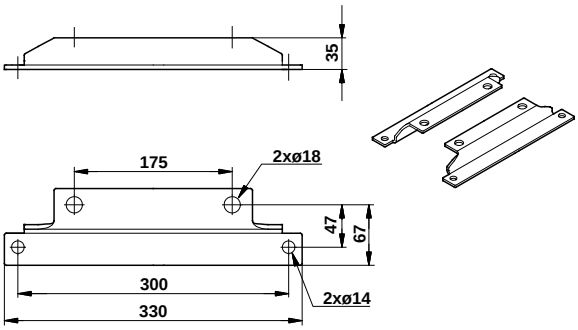
TM00 9835 0497

Fig. 1



TM00 3755 5097

Fig. 2



TM02 5336 2602

Fig. 3

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