

TE

Electric Diaphragm Pumps

Original Instruction
edition 2019 rev 1



Read this instruction manual carefully,
before you install and operate the pump

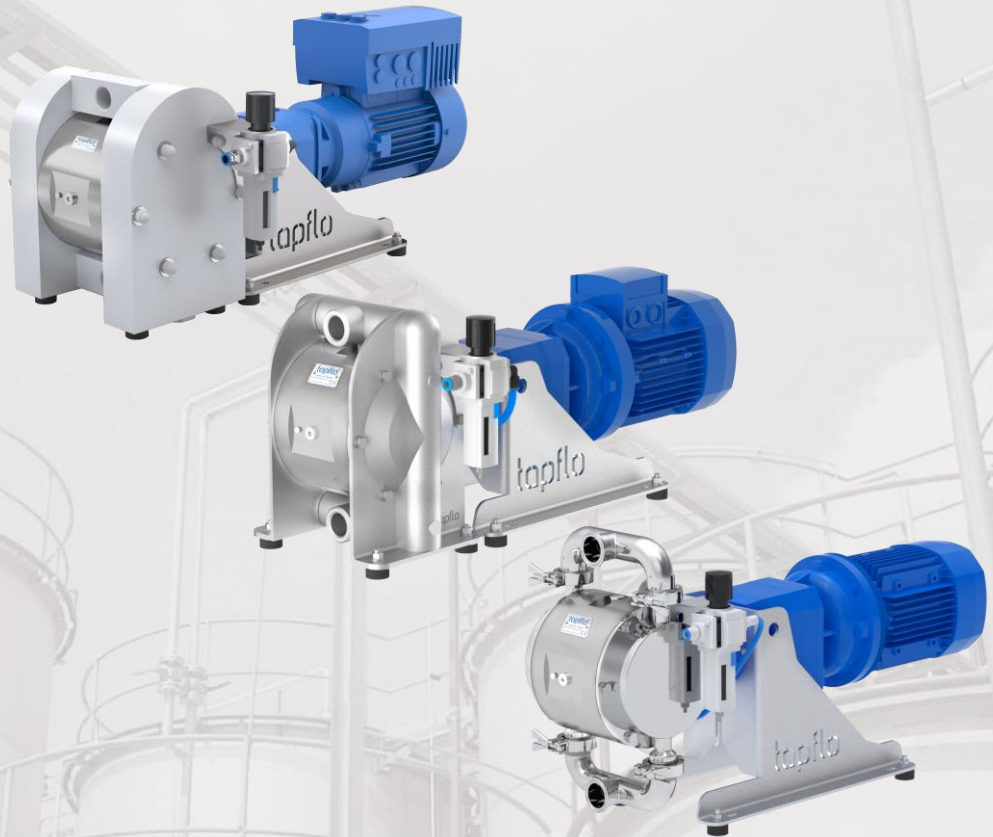


Pump models:

TE50
TE100
TE200

TE70
TE120
TE220

TE80
TE125
TE225



CONTENTS

0. GENERAL	5
0.1. Introduction	5
0.2. Warning symbols	5
0.3. Qualification and training of personnel	5
0.4. Related manuals	6
1. INSTALLATION	7
1.1. Operation principle	7
1.2. Receiving inspection	7
1.3. Lifting and transportation	8
1.4. Storage	8
1.5. Foundation	8
1.6. Environment	9
1.7. Suction and discharge piping	9
1.7.1. Rotary connections (industrial pumps only)	9
1.7.2. Connection of suction pipe	9
1.7.3. Connection of discharge pipe	9
1.8. Health and safety	10
1.8.1. Protection	10
1.8.2. Electrical safety	10
1.8.3. Chemical hazard	10
1.8.4. Air pressure	10
1.8.5. Noise level	11
1.8.6. Temperature hazards	11
1.8.7. Rotating parts	11
1.9. Example of installation	12
1.10. Recommended installations	12
1.10.1. Flooded	12
1.10.2. Self-priming	12
1.11. Instruments	12
1.11.1. Electric power	13
1.11.2. Optional instruments	13
1.11.3. Thermometer	13
1.12. Motor connection	13
1.13. Gear-motor standard	14

CONTENTS

2. OPERATION	15
2.1. Before starting the pump	15
2.2. Starting and operation	15
2.2.1. Dry running	16
2.2.2. Dead head	16
2.2.3. Optimization of the pump lifetime	16
2.3. Pump stopping	16
2.4. Cleaning and disinfection	17
2.4.1. CIP – Cleaning In Place (Sanitary pumps)	17
2.5. Residual risks	17
2.6. Disposal after expiration of the expected lifetime	17
2.7. Waste of electrical and electronic equipment (WEEE) directive	17
2.8. Actions in emergency	18
3. MAINTENANCE	19
3.1. Inspections	19
3.2. When the pump is new or reassembled	19
3.2.1. Performance test	19
3.3. Routine inspection	19
3.4. Complete inspection	20
3.5. Location of faults	21
3.6. Disassembly of the pump	22
3.6.1. Before the disassembly procedure	22
3.6.2. Disassembly procedure	22
3.7. Assembly procedure	25
3.7.1. Test run	26
4. SPARE PARTS	26
4.1. Exploded view	26
4.3. Stocking recommendation	27
4.4. How to order parts	28
4.5. Pump code	28
5. DATA	29
5.1. Capacity curves	29
5.2. Capacity changes	32
5.3. Technical data	33
5.4. Dimensions	35
5.5. Tightening torques	37

CONTENTS

5.6. Permitted loads on manifolds.....	38
6. WARRANTY	39
6.1. Warranty form.....	39
6.2. Returning parts	40
6.3. Warranty.....	40

EC DECLARATION OF CONFORMITY 01/EC/TE/2019

Series: **TE(...)**50...; **TE(...)**100...; **TE(...)**200...; **TE(...)**70...; **TE(...)**120...; **TE(...)**220...; **TE(...)**80...; **TE(...)**125...; **TE(...)**225...;

Serial numbers:

2018 - ... (from 1801-...)

Manufactured by:

Tapflo AB

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This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of declaration: **ELECTRO-MECHANIC DOUBLE DIAPHRAGM PUMPS**

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- Directive 2006/42/EC of European Parliament and of the Council of 17 May 2006 on machinery, amending Directive 95/16/EC;
- Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast) Text with EEA relevance
- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits Text with EEA relevance

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Signed for and on behalf of Tapflo AB



Håkan Ekstrand
Managing director

Tapflo AB, 30.01.2019 r.

0. GENERAL

0. GENERAL

0.1. Introduction

The Tapflo Electro-Mechanic Operated Diaphragm Pump range is a series of pumps for industrial and hygienic applications. The pumps are designed to be safe, simple and easy to use and maintain. The pumps are suitable for almost all different chemicals used by the industry today.

The pumps are powered with an electric motor which is coupled with the diaphragm shaft. To decrease the motor rotational speed a gearbox is used. This provides smooth and almost pulsation free operation.

With proper attention to maintenance, Tapflo Pumps will give efficient and trouble free operation. This instruction manual will familiarise operators with detailed information about installing, operating and maintaining of the pump.

When installing, operating and maintaining of the pump unit you must strictly follow the IOM manual. Otherwise injury or life hazard may occur.

In case any instructions in this manual are unclear or any information is missing, please contact Tapflo before handling the pump.

0.2. Warning symbols

The following warning symbols are present in this instruction manual. This is what they say:



This symbol stands next to all safety instructions in this instruction manual where danger to life and limb may occur. Observe these instructions and proceed with utmost caution in these situations. Inform also other users of all safety instructions. In addition to the instructions in this instruction manual, the general safety and accident prevention regulations must be observed.



This signal stands at points in this instruction manual of particular importance for compliance with regulations and directives, for correct work flow and for the prevention of damage to and destruction of the complete pump or its subassemblies.



This symbol signals possible danger caused by the presence of electric fields or live wires.

0.3. Qualification and training of personnel



The personnel in charge of installation, operation and maintenance of the pumps we produce must be qualified to carry out the operations described in this manual. Tapflo shall not be held responsible for the training level of personnel and for the fact that they are not fully aware of the contents of this manual. In case any instructions in this manual are unclear or any information is lacking, please contact Tapflo before handling the pump.

0. GENERAL

0.4. Related manuals

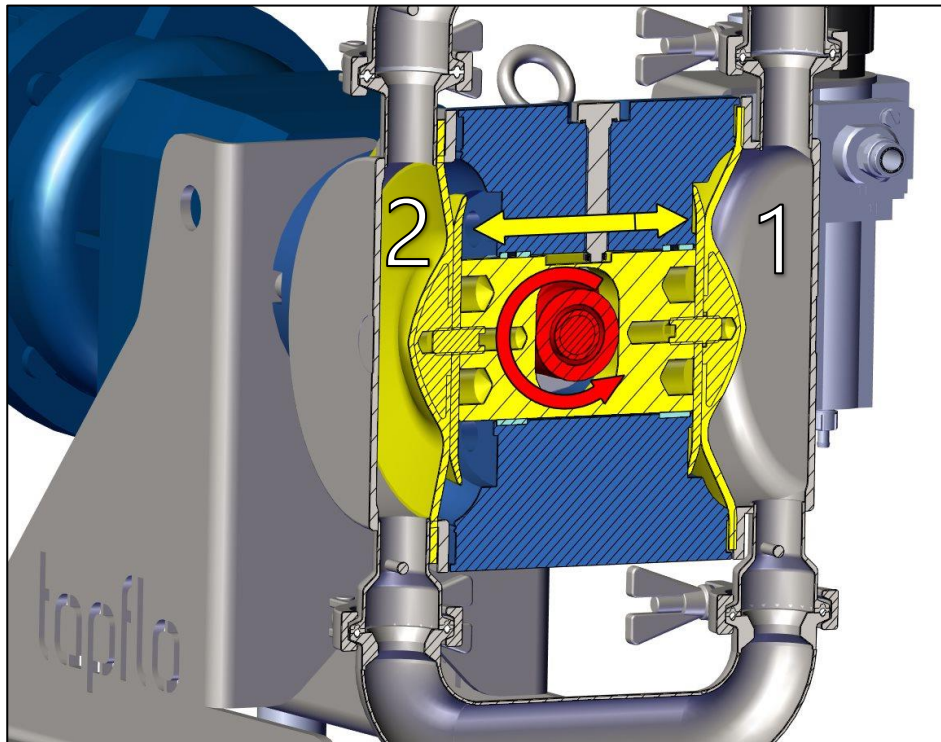
- IOM Manual - PE and PTFE diaphragm pumps
- IOM Manual - Metal series diaphragm pumps
- IOM Manual - Sanitary Series

1. INSTALLATION

1. INSTALLATION

1.1. Operation principle

The Tapflo electric diaphragm pump is driven by a gear-motor. In EODD pumps we have to change rotary motion into reciprocating one. It is obtained by an eccentric shaft with a cam and piston. The rotary movement of the shaft (red part) is transferred to the reciprocating movement of the diaphragm shaft (yellow part).



➤ [Click the image for animation](#)

The Suction Cycle:

➤ **Suction (chamber 1)**

One diaphragm creates a suction action in one chamber (right side) when being pulled back from the housing.

➤ **Discharge (chamber 2)**

The other diaphragm simultaneously transmits the air pressure to the liquid in the second chamber (left side) of the housing, pushing it towards the discharge port.

1.2. Receiving inspection

Although precaution is taken by us when packing and shipping, we urge you to carefully check the shipment on receipt. Make sure that all parts and accessories listed on the packing list are accounted for. Immediately report any damage or shortage to the transport company and to us.

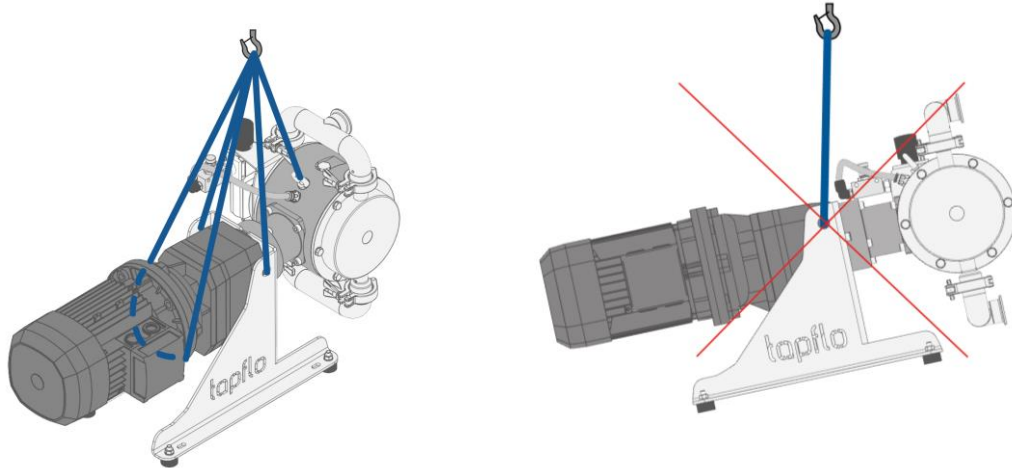
1. INSTALLATION

1.3. Lifting and transportation



Before handling the pump check the weight of the pump (see 5.3. *Technical data*). Refer to Your local standards on how to handle the pump. If the weight is excessive to transport by hand it must be lifted using slings and a suitable lifting device e.g. a crane or forklift.

The pump is equipped with eye bolts to ease transportation.



Never lift the pump under pressure.

Be careful that nobody passes under the pump when lifted.

Never try to lift the pump by the manifolds or hoses attached to the pump.

1.4. Storage



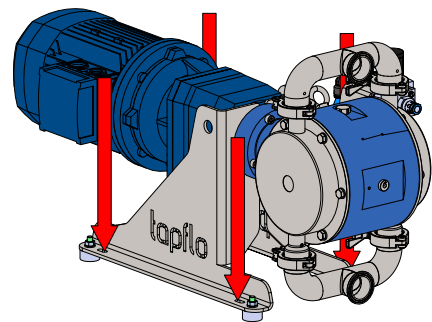
If the equipment is to be stored prior to installation, place it in a clean location. The pump should be stored in an ambient temperature of 15°C (59°F) to 25°C (77°F) and relative humidity below 65%. It should not be exposed to any heat source e.g. radiator, sun as this could result in a negative way on the tightness of the pump. Do not remove the protective covers from the pump.

When in storage, turn the shaft by hand at least twice per month. The pump-motor unit should always be stored indoor in dry, vibration and dust free conditions.

1.5. Foundation



The pump-motor unit must stand on and be fixed to a sufficiently rigid structure that can support the entire perimeter on which the unit stands. The foundation on a firm bottom is the most satisfactory. Once the pump is in position, adjust level with metal shims between the feet and the surface on which it stands. Check that the feet of the pump motor unit stand well on each of them. The surface on which the foundation stands must be flat and horizontal. If the unit is fitted on a steel structure, make sure that it is supported so that the feet do not warp. In any case, it is advisable to fit some anti-vibration rubber pieces between the pump and the brickwork.



1. INSTALLATION

1.6. Environment



- There should be enough space in the vicinity of the pump in order to operate, maintain and repair it.
- The area in which the pump is operated, must be sufficiently ventilated. Excessive temperature, humidity or dirt may affect the pump operation.
- Behind the cooling fan of the motor there must be sufficient room for the hot air to escape the motor.

1.7. Suction and discharge piping

A pump is generally part of a piping system that can include a number of components such as valves, fittings, filters, expansion joints, instruments, etc. The way the piping is arranged and the positioning of the components has a great influence on the operation and the lifetime of the pump. The pump cannot be used as a support for the components connected to it.

The flow of liquid from the pump must be as even as possible. It is advisable to avoid any tight bends or drastic reductions of diameters that may cause flow resistance in the installation. In case of diameter reduction, it is advisable to use appropriate conical reductions (possibly eccentric on suction side and concentric on discharge side) at changes of diameter and at a minimum distance from pump connections of five diameters.

1.7.1. Rotary connections (industrial pumps only)

The suction and discharge connections can be rotated 180°. This simplifies the assembly and installation of the pump. If you wish to rotate the connections, screw a threaded nipple into the connection and rotate it. It is also advised to loosen the upper nuts to ease rotation.

NOTE! Remember to re-torque the housing nuts after this procedure.

1.7.2. Connection of suction pipe

Remember that the suction pipe/connection is the most critical point, especially if the pump is priming. Just a small leakage will dramatically reduce the suction capability of the pump. When connecting the suction pipe, the following is recommended:

- 1) For satisfactory operation, use a reinforced hose (the suction power may otherwise shrink the hose) or other flexible piping. The internal diameter of the hose should be the same as on the suction connection (at the bottom of the pump) to have best suction capability. If the diameter of a hose is smaller, it will affect the pump's performance or cause its malfunction.
- 2) Make sure that the connection between the hose and the pump is completely tight, otherwise the suction capability will be reduced.
- 3) Always use as short suction pipe as possible. Avoid air pockets which can emerge within long piping.

1.7.3. Connection of discharge pipe



For this connection it is only recommended to have a simple and positive flow connection. Use a hose or flexible piping (minimum one meter) between the discharge connection and any rigid fixed piping. Coil the hose at least one turn. All components (hose, pipe, valves etc.) on the discharge piping must be designed for minimum PN 10.

NOTE! Never close the shut-off valve during pump operation!

1. INSTALLATION

1.8. Health and safety

The pump must be installed according to local and national safety rules.



The pumps are constructed for particular applications. Do not use the pump on applications different from that for which it was sold without consulting us to ascertain its suitability.

The pumps are tested with water. If the pumped product can come into reaction with water, please make sure the pump is dry before putting it into operation.

1.8.1. Protection



In the interest of health and safety it is essential to wear protective clothing and safety goggles when operating, and/or working in the vicinity of Tapflo pumps.

1.8.2. Electrical safety



Do not carry out any maintenance or/and operation on the pump while it is running or before it has been disconnected from the power supply. Avoid any danger caused by electric power (for details see current regulations in force). Check that electrical specifications on the data plate are equivalent to the power supply to which it will be connected.

1.8.3. Chemical hazard



Whenever the pump is to be used for pumping a different liquid, it is essential to clean the pump beforehand in order to avoid any possible reaction between the two products.

1.8.4. Air pressure

The pump is equipped with an air treatment system mounted on the side housing of the pump. It should be utilized to supply proper air pressure on the dry side of the diaphragms to ensure proper balancing.

The air pressure on the output of the filter-regulator should be set to $1,5 \pm 0,2$ bar. Do not exceed the recommended air pressure.

When discharge is below 4 bar, pump **can** work without air support to the diaphragm. Nevertheless over 2 bars on discharge we recommend to use air support for optimal diaphragm lifetime.

Discharge pressure	Air side back-up
0 – 2 bar	Not necessary
2 – 4 bar	Recommended

As prevention purpose, a filtration of the air by means of a 5 micron filter or finer is recommended. Recommended air quality according to PN-ISO8573-1:2010 is particles class 6, water class 4 and oil class 4. Dirt or oil in the air can under unfortunate circumstances be the cause of a breakdown.

1. INSTALLATION

1.8.5. Noise level



At tests, the noise level from a Tapflo pump has not exceeded 80 dB(A). Under some circumstances, for example if the pump is operating under high speed, the noise can be inconvenient or hazardous for personnel staying for long periods in the vicinity of the pump. This hazard can be prevented by:

- using suitable ear protection;
- lowering the speed of the pump;
- using elastomer valve balls (EPDM, NBR or polyurethane) instead of PTFE, ceramic or stainless steel, provided that the elastomer is compatible with the pumped liquid.

1.8.6. Temperature hazards

- Raised temperature can cause damage on the pump and/or piping and may also be hazardous for personnel in the vicinity of the pump/piping. Avoid quick temperature changes and do not exceed the maximum temperature specified when the pump was ordered. See also general max temperatures based on water in chapter 6 "DATA".



- When the pump is exposed to ambient temperature variations or if there is big difference between the temperature of the product and the surrounding, the tightening torques of the housing nuts should be checked periodically as part of preventive maintenance (please contact Tapflo for interval proposals). Ambient temperature limits are from 0°C to 40°C.

- If a hot product is pumped, the pump should not stand still when filled for a longer period of time. This could cause leakage from the pump.



- Below 0°C (32°F) plastic materials become more fragile what can cause accelerated wear of parts made of these materials. This is a hazard that has to be accepted when pumping such cold products. Also in such case, when a pump is not operational it should be drained of all liquid.

- Bear in mind that the viscosity of the product changes with temperature. This has to be taken into consideration when selecting the pump.

- The fluid remaining in the connected piping, as well as in the pump itself, may expand because of freezing or heat, which may cause damage to the pump or/and piping, and lead to leakage of the fluid.

- Some parts of the TE pump can become hot during operation and cause burns, therefore make sure to use appropriate protection when handling the pump.

1.8.7. Rotating parts

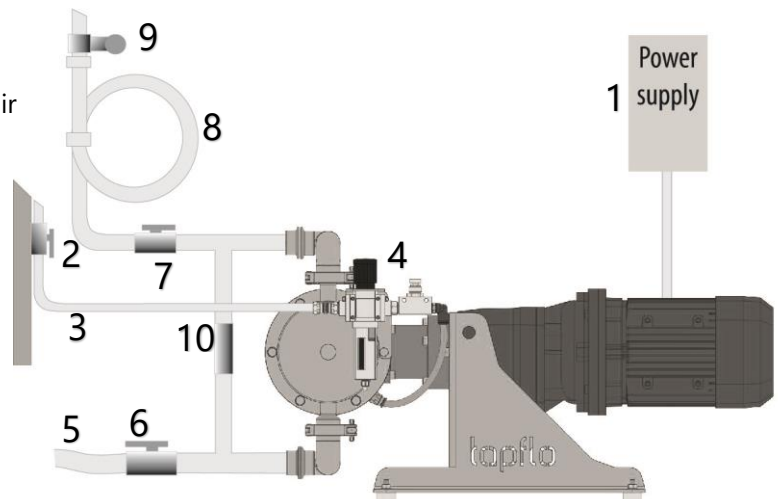


Do not tamper with the protection of the rotating parts, do not touch or approach rotating parts in movement.

1. INSTALLATION

1.9. Example of installation

1. Motor power supply
2. Gate valve – compressed air
3. Flexible hose
4. Air treatment system
5. Flexible piping
6. Gate valve suction
7. Gate valve discharge
8. Coiled flexible piping
9. Flow gauge
10. Safety valve



1.10. Recommended installations

The Tapflo pump is flexible in the way you are able to install it.

1.10.1. Flooded



The piping system is designed with a positive suction head. This is the best way of installation where it is necessary to completely evacuate all liquid from the container, or where viscous (thick) products are transferred.

NOTE! Do not exceed 0,7 bar suction pressure! Higher pressure may cause premature diaphragm failure and irregular pump operation.

1.10.2. Self-priming

The Tapflo pump is designed to pull a high vacuum. It is able to evacuate an empty suction pipe without any damage to the pump. The suction lift is up to 3.5 meters (11.5 ft.) from an empty suction pipe and up to 8 meters (26.2 ft.) from a wetted pipe.



NOTE!

Even if all above safety instructions are met and complied with, there still exists a minor danger in the event of a leakage or mechanical damage of the pump. In such case the pumped product can emerge on sealing areas and connections.

1.11. Instruments



In order to ensure a proper control of the performance and the conditions of the installed pump, we recommend using the following instruments:

- a pressure-vacuum gauge on the suction piping;
- a pressure gauge on the discharge piping.

The pressure intakes must be made of straight pieces of piping at a distance of minimum five diameters from the pump inlets. The pressure gauge on discharge must always be fitted between the pump and the regulation valve. The output can be read on the pressure gauge, transformed into meters and then compared with the typical curves.

1. INSTALLATION

1.11.1. Electric power

The electric power absorbed by the motor can be measured by means of a wattmeter or an amp gauge.

1.11.2. Optional instruments

The optional instruments can indicate if pump is working in an abnormal way. The abnormal conditions can be caused by: accidentally closed valves, lack of pumped liquid, overloads, etc.

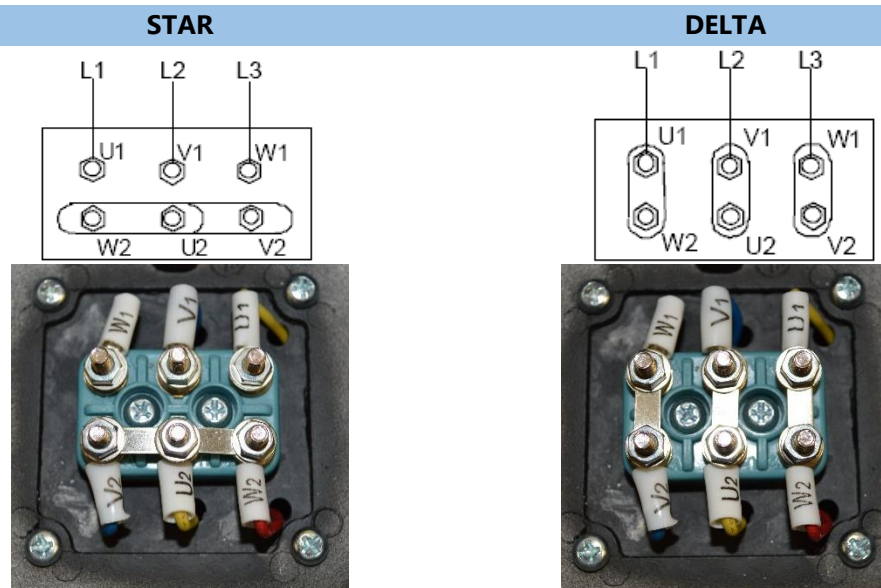
1.11.3. Thermometer

If the temperature of the pumped liquid is a critical parameter, provide the installation with a thermometer (preferably on the suction side).

1.12. Motor connection



An expert electrician must always carry out the electrical connection. Compare the power supply with the data plate specifications and then choose a suitable connection. The type of connection is stated on the motor data plate and can be Y (star) or D (Delta), according to the power supply of the motor (see figure below).



Follow the connection standard used in the plant. In no case connect the electrical motor directly to supply network but use a suitable electric switchboard equipped with a knife switch and suitable safety devices (e.g. motor breaker switches) in the power circuit. Safety devices against overloads must also protect the motors. Make sure that the motor has suitable grounding and that it has been connected properly.

1. INSTALLATION

1.13. Gear-motor standard

As a standard Tapflo EODD pump are equipped with gear-motors of the following parameters:

- International Mounting Arrangement – **B5**
- Number of poles / Rotation speed [rpm] – **4 / 1400**
- **Non ATEX**
- Protection grade – **IP55**
- Voltage – **3 phase**
- Efficiency class – **IE3**
- Shaft ratio – **i=8,2**
- Output rpm – **164-172**
- Thermal protection – **PTC**

TE(...)50...; TE(...)70...; TE(...)80...;

Motor power	-	Output RPM	Voltage	Frequency
0.75 kW	4 poles	172	Δ230 / Y400	50 Hz
	4 poles	206	Y460	60 Hz
0.55 kW	4 poles	114	Δ230 / Y400	50 Hz
	4 poles	137	Y460	60 Hz
0.25 kW	4 poles	56	Δ230 / Y400	50 Hz
	4 poles	67	Y460	60 Hz

TE(...)100...; TE(...)120...; TE(...)125...;

Motor power	-	Output RPM	Voltage	Frequency
15 kW	4 poles	172	Δ230 / Y400	50 Hz
	4 poles	206	Y460	60 Hz
1.1 kW	4 poles	110	Δ230 / Y400	50 Hz
	4 poles	132	Y460	60 Hz
0.55 kW	4 poles	53	Δ230 / Y400	50 Hz
	4 poles	64	Y460	60 Hz

TE(...)200...; TE(...)220...; TE(...)225...;

Motor power	-	Output RPM	Voltage	Frequency
3 kW	4 poles	164	Δ230 / Y400	50 Hz
	4 poles	200	Y460	60 Hz
2.2 kW	4 poles	107	Δ230 / Y400	50 Hz
	4 poles	128	Y460	60 Hz
1.1 kW	4 poles	58	Δ230 / Y400	50 Hz
	4 poles	70	Y460	60 Hz

2. OPERATION

2. OPERATION

2.1. Before starting the pump



- Make sure the pump is installed according to the installation instruction (chapter 1).
- Filling of the pump with liquid before start is not necessary.
- Check manually that the motor is free to turn, moving the motor cooling fan.
- Make sure that the piping is not clogged and is free from residues or foreign objects.
- The suction shut-off valve (if any) must be completely open.
- The shut-off valve on the discharge side (if any) must be completely opened.
- Any auxiliary connections must all be connected.
- When installation is new or reinstalled, a test run of the pump with water should be conducted to make sure that the pump operates normally and does not leak.
- When installation is new or reinstalled, check the pump housing nuts tightening torque (see chapter 5.5 "Tightening torques"). After approximately one week of operation, the torque should be checked again. This is important to prevent possible leakage.
- Starting the electrical motor makes the pump run at full capacity!

2.2. Starting and operation



Open the discharge valve and start the electric motor. The pump must not run with completely closed discharge - these conditions can seriously damage the pump and cause injury to the operator.

If the pressure shown on the pressure gauge on the discharge piping does not increase, turn off the pump immediately and release pressure carefully. Repeat the connection procedure.



Make sure that pressure on the discharge does not exceed 4 bar!

A device must be incorporated into the pump, system, or drive, to prevent the pump exceeding the above stated pressure. Do not allow the pump to operate with a closed/blocked discharge unless a pressure relief device is installed.

A pressure relief valve must be assembled obligatory on the discharge side by the customer.

Pump can be equipped with such a safety device on customer's request (see chapter 4.1. *Dead Head and Stop*).

If there are changes of flow rate, head, density, temperature or viscosity of the liquid, stop the pump and get in touch with our technical service.

Note! Considering the suction capacity when air is still in the suction pipe, it is recommended to start with low speed (using a frequency inverter) at the beginning. At 50 Hz, rise up and shut down should be set to 5 seconds. This is not necessary if the pump is filled with liquid before start.

2. OPERATION

When the pump has been filled with liquid, the speed may be raised in order to increase the suction capacity of the pump. Remember that suction capacity is higher when pump runs slowly.

The performance of the pump can be adjusted by means of a frequency inverter. The pump operation does not depend upon the direction of rotation and can achieve full capacity in both directions of rotation.

2.2.1. Dry running

Although the pump is prepared for dry running it is important to have in mind that long periods of dry run may cause damage to the wearing parts of the pump. What is more, an empty pump should operate at low speeds – controlled by a frequency inverter.

2.2.2. Dead head



The pump cannot operate with closed discharge valve. This may lead to pump malfunction and cause injury to operators in the vicinity of the pump.

The discharge pressure can never exceed 4 bar.

2.2.3. Optimization of the pump lifetime

- Continuous operation at higher frequency than 50 Hz will cause premature wear of the components. As a general rule, we recommend to run the pump at $\pm 20\%$ of the rated frequency.
- When the pump is shut down while pumping a liquid containing particles, the particulate matter contained in the liquid will be deposited and get stuck inside the pump chamber. Therefore after finishing work the pump must be emptied of the remaining fluid. Otherwise, when starting the pump again, the diaphragm may get damaged and the shaft may bend leading to grub screw fracture.
- When reducing the motor rotation speed, control the gear-motor surface temperature if it does not exceed the nominal working temperatures stated by the gear-motor manufacturer

2.3. Pump stopping

It is advisable to stop the pump by means of motor shut down. With larger pumps or longer delivery piping water hammering may occur. It is therefore advised to install a check valve on the discharge to protect the pump. If a suction shutoff valve has been installed, it is advisable to close it completely after pump is fully stopped.



The pump should be stopped by cutting of electrical power to the motor or frequency inverter (if used – at 50 Hz cool down should be set to 5 seconds).

If pump stoppage exceeds 30 minutes – relief the pressure from the diaphragm air side

NOTE! Never stop the pump by completely closing the discharge valve without motor shut down.

2. OPERATION

2.4. Cleaning and disinfection



Cleaning and disinfection of the pump system is of greatest importance when the pump is used in a food processing installation. Use of a pump system that is NOT cleaned or disinfected can cause contamination of the product. The cleaning cycles as well as chemicals to use for the cleaning vary depending on the pumped product and the process. The user is responsible to establish a suitable cleaning and / or disinfection program according to local and public health and safety regulations.

2.4.1. CIP – Cleaning In Place (Sanitary pumps)



The importance of easy cleaning is especially great in hygienic applications. Tapflo sanitary pumps are designed for CIP (cleaning in place). This allows the pump to be internally cleaned without disassembly. The pump can be cleaned by flushing through with a CIP fluid (usually a mild solution of sodium hydroxide and a sanitizing additive) or by injection of hot steam. The CIP fluid temperature varies, but in the sanitary field, the temperature is usually about 90°C. Make sure that the CIP fluid is compatible with the materials in the pump/piping (consult us for further information).

The solution is passed through the system by either the operation of the pump itself, or by a centralized cleaning system. The CIP fluid must pass through the pump at a minimum velocity of 1.5 m/s in the normal flow direction (from inlet to outlet).

It is recommended to run the pump slowly during CIP. This is to obtain pressure balance on both sides of the diaphragm. Lack of pressure balance will have influence on the pump's lifetime. For more information please contact us.

2.5. Residual risks



Even with proper application and observance of all points listed in this operating manual, there is still an estimable and unexpected residual risk when using the pumps. It may leak, fail due to wear, application-related causes or system-related circumstances.

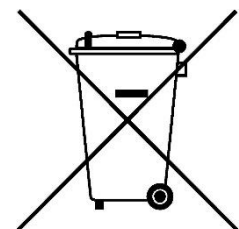
2.6. Disposal after expiration of the expected lifetime

The metallic components like aluminium, stainless steel and carbon steel can be recycled. Plastic parts are not recyclable and must be disposed of as residual waste. The pump must be disposed of properly, according to local regulations. It should be noted that potentially dangerous fluid residues may remain in the pump and can create a hazard to the operator or the environment, therefore the pump has to thoroughly cleaned before disposal.

2.7. Waste of electrical and electronic equipment (WEEE) directive



Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. The WEEE



2. OPERATION

marking applies only to countries within the European Union (EU) and Norway. Appliances are labelled in accordance with European Directive 2002/96/EC. Contact your local waste recovery agency for a designated collection facility in your area.

2.8. Actions in emergency



In case of a leakage of an unknown fluid, respiratory protection should be worn and contact with the fluid avoided. During firefighting, no special hazards are to be expected from the pump itself. In addition, the currently handled fluid and the corresponding safety data sheet must be taken into account. When fluid leakage occurs, the air supply has to be closed and the pressure released. During spillage of an aggressive liquid, local and national safety rules must be followed.

5. DATA

3. MAINTENANCE



Maintenance work on electrical installations must be performed by qualified personnel and only when the power supply has been shut off. Wait five minutes for capacitor to discharge before opening the pump. Follow the local and national safety regulations.

3.1. Inspections

- Periodically check suction and discharge pressures.
- Inspect the gear-motor according to the instructions from the motor manufacturer.
- Gear oil must be exchanged in accordance with the gear manufacturer instruction manual.

3.2. When the pump is new or reassembled



If the pump is new or reassembled after maintenance it is important to retighten the pump housing nuts (pos. 37) after one week of operation.

Make sure to use the right torque – see chapter 5.5 "Tightening torques".

3.2.1. Performance test

When installation is new, a test run of the pump should be conducted. Gauge the capacity at specific pump speed. This information is useful for checking performance in the future as wear takes place. You will be able to set schedules for maintenance of the pump and to select spare parts to be kept on stock.

3.3. Routine inspection



Frequent observation of the pump operation is recommended to detect problems. A change in sound of the running pump can be an indication of wearing parts (see chapter 3.5 "Location of faults" below).

Leaking liquid from the pump and changes of performance may also be detected. Routine inspections should be conducted frequently. We recommend to conduct a daily check and keep records of the following:

- Leakage of fluid from any connection of the pump
- Tightness of all connection parts of the pump and any peripheral equipment
- Complete inspection in regular intervals has been done

In case any of the above is not fulfilled, do not start the pump and implement corrective actions.

Establish a preventive maintenance schedule based on the pump's service history. Scheduled maintenance is especially important to prevent spills or leakage due to diaphragm failure.

Inspect and replace bearing and/or gear-motor shaft extension if failure is suspected.

Inspect and replace gear-motor shaft extension and diaphragm shaft if failure is suspected.

Inspect and replace set screw bearing, set screw and diaphragm shaft if failure is suspected.

5. DATA

3.4. Complete inspection



The intervals for a complete inspection depend upon the operation conditions of the pump. The characteristics of the liquid, temperature, materials used in the pump and running time decide how often a complete inspection is necessary.

Nevertheless, Tapflo recommends to inspect the pump at least once a year. Parts from KIT LIQ should be changed during inspection. Tapflo recommend KIT VAL to be changed once per 2 years as well. See paragraph 5.11 for detailed KIT content.

If a problem has occurred, or if the pump is in need of a complete inspection, refer to chapters 3.4 "*Location of faults*" and 3.5, 3.7 "*Dismantling of the pump*". You are of course warmly welcome to consult Tapflo for further help.

Parts that are subject to wear should be kept in stock, see our recommendations in chapter 4.7 "*Stocking recommendation*".

5. DATA

3.5. Location of faults

PROBLEM	POSSIBLE ISSUE	POSSIBLE SOLUTION
Pump does not run	Dirt in the pump chamber Diaphragm breakdown	Remove debris from the chambers Replace diaphragm
The suction is bad	Suction connection is not tight Suction connection is blocked Valve balls are blocked or damaged Valve seats are worn Pump starts at too high speed Air in suction / discharge line	Tighten the suction line Clean suction line Check dimensions and shape of valve balls Check dimensions and shape of valve seats Start the pump slowly (see chapter 2.2) Vent suction / discharge line
The pump runs irregular	Valve balls are blocked Sealing in centre block Diaphragm breakdown Valve seats are worn	Check dimensions and shape of valve balls Replace sealing Replace diaphragm Check dimensions and shape of valve seats
Bad flow/pressure	Pressure losses on suction side Suction blocked Valve ball worn or broken Valve seats are worn Air in liquid Diaphragm breakdown	Check/change installation on suction side Check / clean suction connection Check dimensions and shape of valve balls Check dimensions and shape of valve seats Seal suction line; check / refill container Check / replace diaphragms
Liquid leaks from the pump	Screws on the housing not properly tightened O-rings on manifolds damaged Damaged diaphragm Tension / stress from the installation	Check tightening torques of the screws Replace O-rings Check / replace diaphragms Adjust installation, eliminate stress, when using a dampener provide separate support for it (see dampener IOM manual).
Liquid comes out of the hole in the coupling cover	Diaphragm breakdown	Replace diaphragm
Diaphragm breakdown	Wrong selection of material Long periods of dry running Too high pressure on suction side	Contact us for information on material selection When dry, run pump slowly (see chapter 2.2) Make sure there is pressure balance between the air and liquid side of the diaphragm
Overheating of motor	Flow rate too high Liquid parameters different than calculated	Reduce the flow / rotation speed of the motor Check pumped liquid parameters
Overheating of the pump	Flow rate too high Liquid temperature too high Foreign objects in the liquid Pump is not filled with liquid	Reduce the flow / rotation speed of the motor Cool the liquid Use a filter on the suction side Fill pump with liquid
Noise and vibration	The pump sucks air Suction pipe is blocked Flow rate too high Loads on the pipes Foreign objects in the liquid Liquid parameters different than calculated	Make sure all connections are tight Check pipes / valves and filters on suction line Reduce the flow / rotation speed of the motor Connect the pipes independent of the pump Use a filter on the suction side Checked pumped liquid parameters
Abnormal wear	The pump sucks air Liquid temperature too high Loads on the pipes Foreign objects in the liquid	Make sure all connections are tight Cool the liquid Connect the pipes independent of the pump Use a filter on the suction side

5. DATA

3.6. Disassembly of the pump

The numbers put in brackets, refer to the part numbers in the spare part drawings and spare part lists in chapter 5. "Spare parts".



The disassembly should be performed only by qualified personnel. There should always be at least two persons present during disassembly.



Each operation to be fulfilled with the machine must always be carried out once all the electrical contacts have been disconnected. The pump-motor unit must be placed in a position where it cannot be started unintentionally.



Before servicing in any way the parts that come in contact with the pumped liquid, make sure that the pump has been fully emptied and washed. When draining the liquid, make sure that there is no danger for people or the environment.

For disassembly of the liquid side of the pump refer to the appropriate IOM manual (Plastic, Metal, Sanitary).

3.6.1. Before the disassembly procedure



Be sure to drain all liquid from the pump. Cleanse or neutralize the pump thoroughly. Disconnect the electrical connection, air supply and then the suction and discharge connections.

3.6.2. Disassembly procedure

NOTE! For disassembly of the pump liquid side, please refer to the adequate IOM pump series manual:

- IOM Manual - PE and PTFE diaphragm pumps
- IOM Manual - Metal series diaphragm pumps
- IOM Manual - Sanitary Series

5. DATA

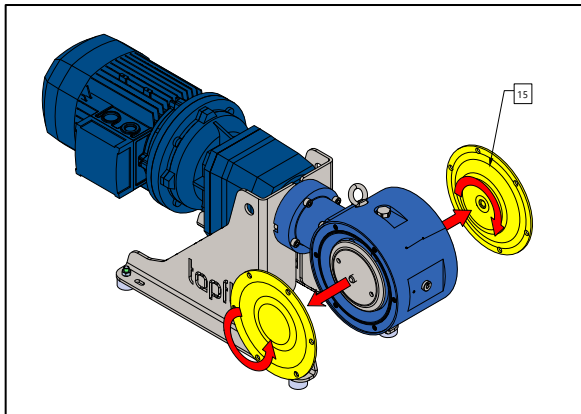


Fig. 3.6.1
Unscrew both diaphragms [15] from the pump centre section.

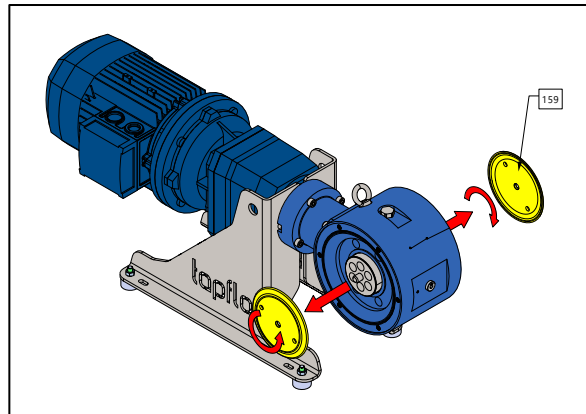


Fig. 3.6.2
Unscrew both diaphragm back-up discs [159] from the pump centre section.

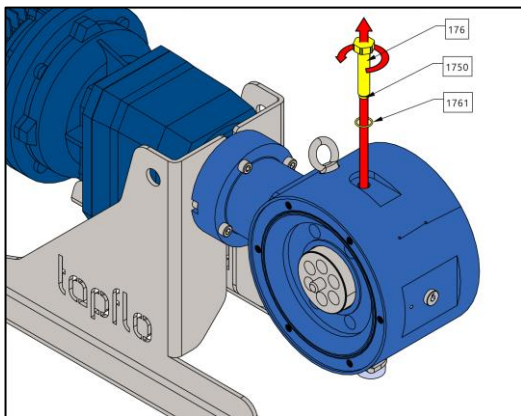


Fig. 3.6.3
Unscrew the set screw [176] and remove it along with the roller bearing [1750]. Take out the O-ring [1761].

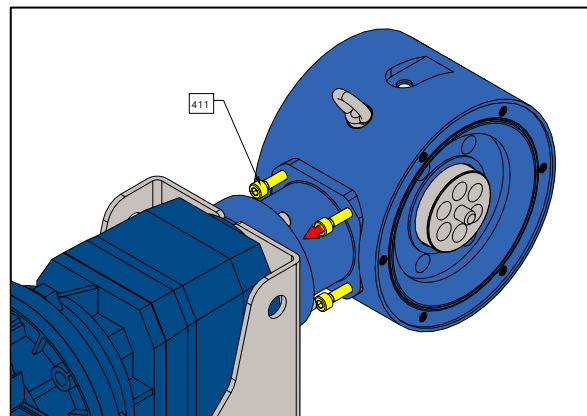


Fig. 3.6.4
Unscrew four coupling cover mounting screws [411].

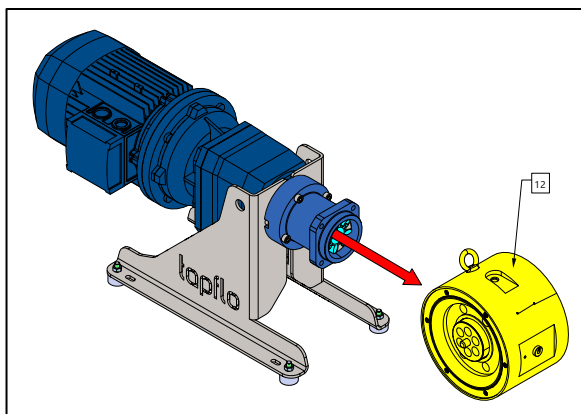


Fig. 3.6.5
Detach the centre block assembly [12] from the coupling.

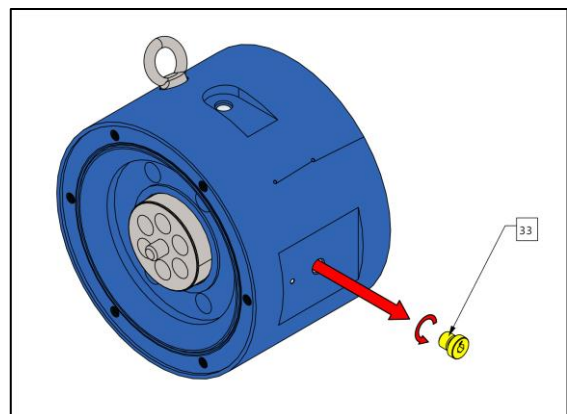


Fig. 3.6.6
Unscrew the centre block plug [33].

5. DATA

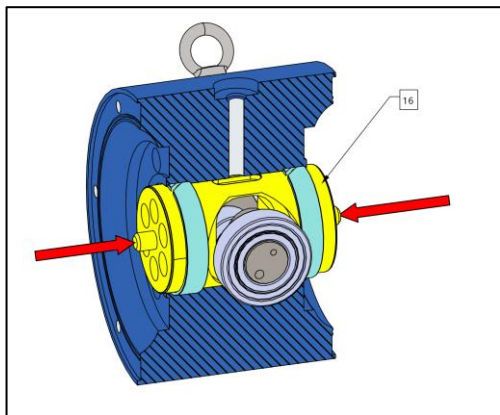


Fig. 3.6.7

By hand, align the diaphragm shaft [16] in the middle of the centre section. This is necessary to allow extraction of the shaft extension.

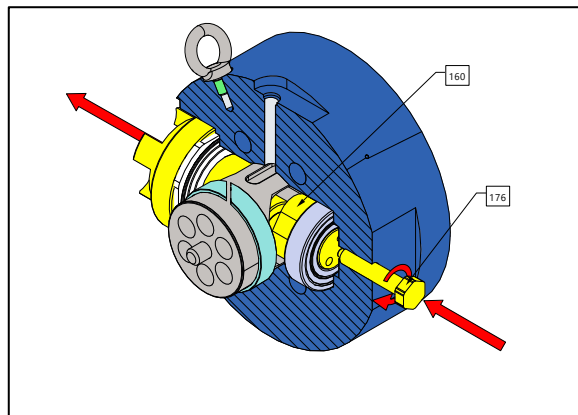


Fig. 3.6.8

Use the set screw [176] to remove the gear-motor shaft extension [160] from the centre section.

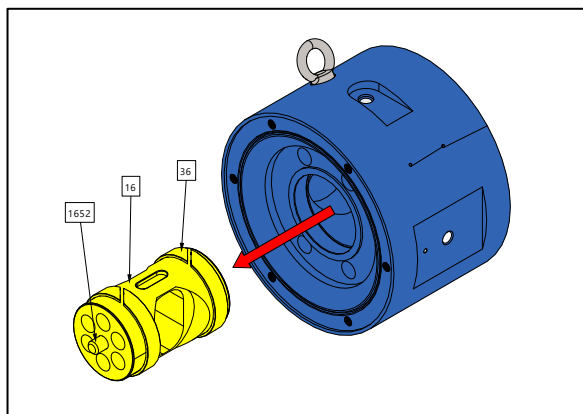


Fig. 3.6.9

Remove the diaphragm shaft [16] along with the grub screws [1652] and wear rings [36] from the centre section.

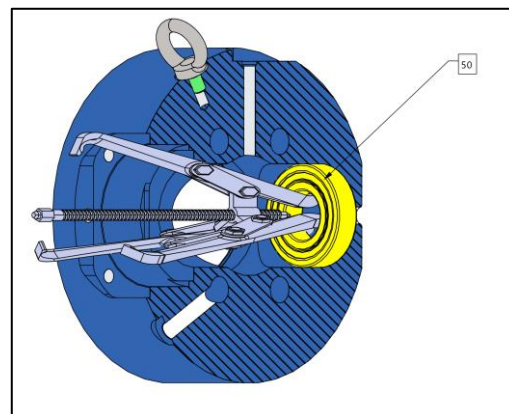


Fig. 3.6.10

If necessary, using a bearing puller remove the fixed bearing [50] from the centre section.

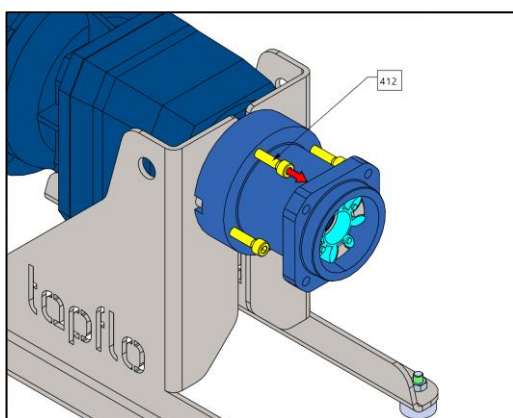


Fig. 3.6.11

Unscrew four coupling cover mounting screws [412].

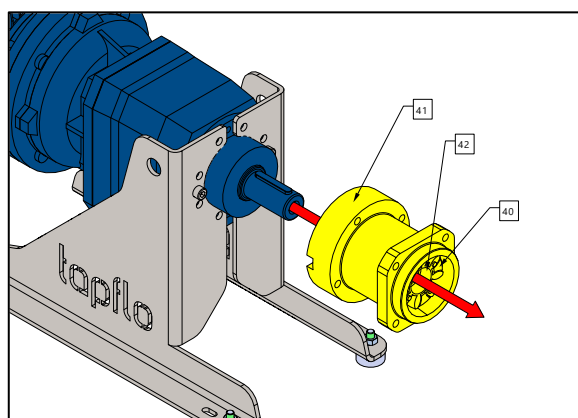


Fig. 3.6.12

Remove the coupling cover [41] along with the motor side coupling [40] and the coupling insert [42] from the gear-motor shaft.

5. DATA

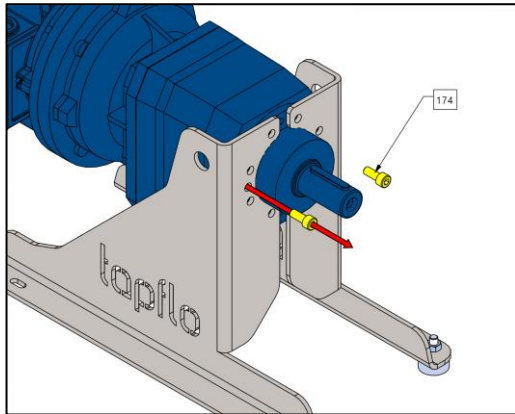


Fig. 3.6.13
Unscrew two stand mounting screws [174].

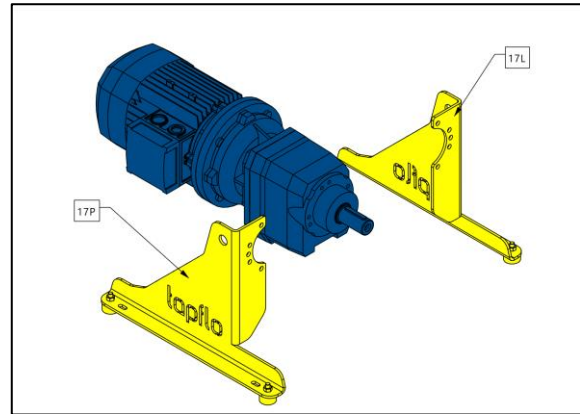


Fig. 3.6.14
Remove both stands [17L] [17R] from the gear-motor.

The pump is now completely disassembled. Check all components for wear or damage and replace if necessary.

3.7. Assembly procedure

The assembly procedure is done in the reverse order to the disassembly.

Nevertheless there are a few things that you have to remember in order to assemble the pump correctly.

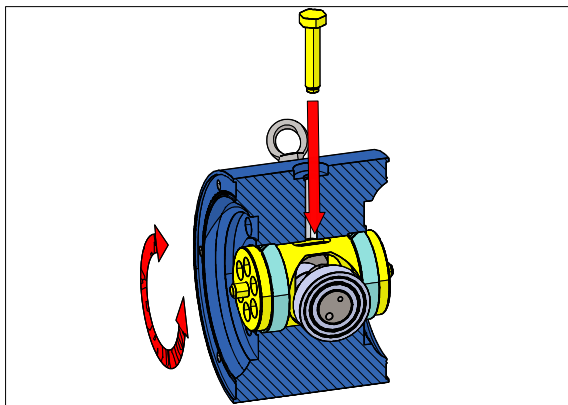


Fig. 3.6.14 Rotate diaphragm shaft left and right to adjust groove with set screw.

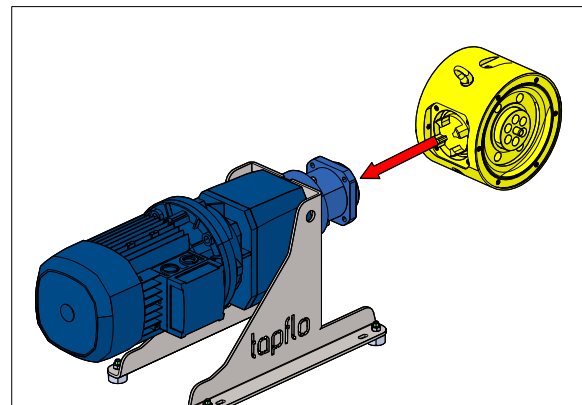


Fig. 3.6.15 Before assembly align coupling spider with gear-motor shaft extension.

5. DATA

3.7.1. Test run

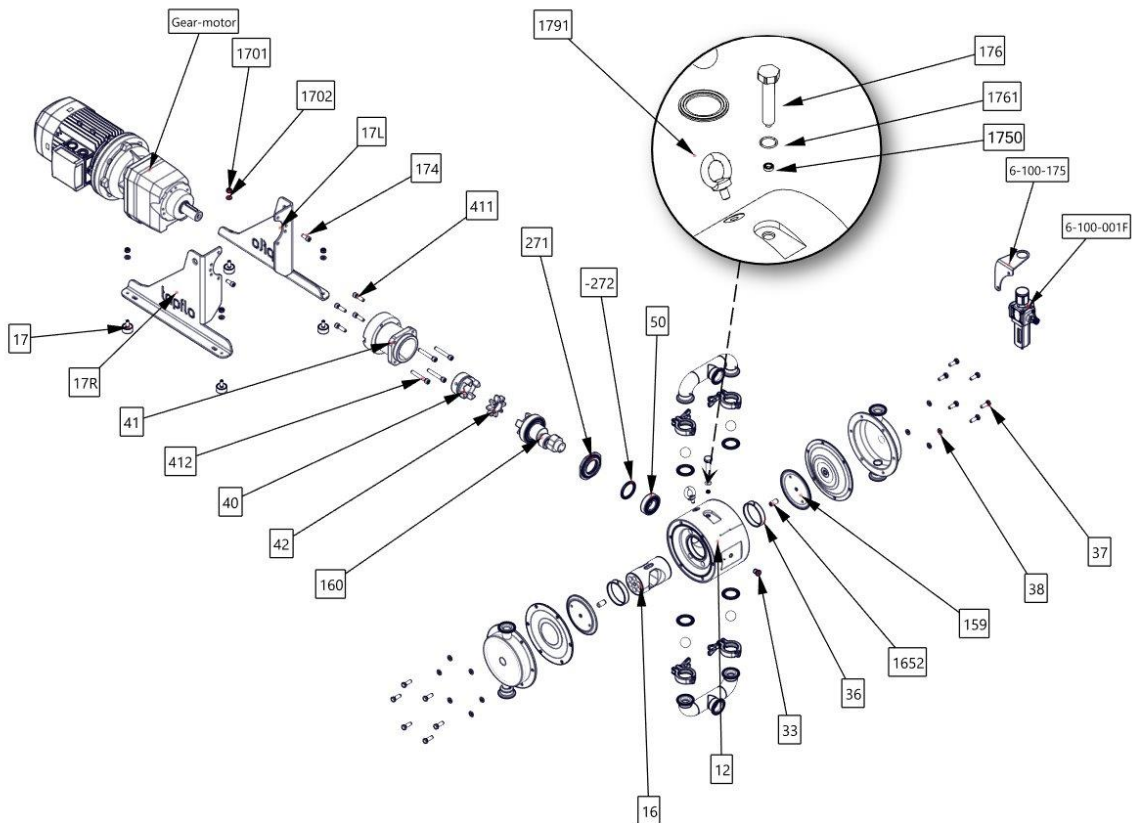


We recommend you to conduct a test run of the pump before installing it in the system, so no liquid gets wasted if the pump leaks or perhaps does not start accordingly to wrong assembly of the pump.

After two weeks of operation retighten the nuts with appropriate torque.

4. SPARE PARTS

4.1. Exploded view



For interactive exploded view go [HERE](#)

4.2. Spare parts list

Full part number consist of three members, pump type (12 for TE pumps), pump size (e.g. 50, 100, ...) and part position which corresponds to the number in the drawing.

e.g. **12-xxx-12**

12 – TE pump

xxx – pump size

12 – part position

Pos.	Q-ty	Description	Material
12	1	Center block	PA6 anodized aluminum
159	2	Diaphragm support plate	AISI 316L
16	1	Diaphragm shaft	Stainless steel
160	1	Gear-motor shaft extension	Coated carbon steel

5. DATA

1652	2	Diaphragm grub screw	
17	4	Rubber feet	Rubber
17L	1	Stand – left	AISI 304
17R	1	Stand – right	AISI 304
1701	4	Rubber feet mounting nut	A4-70
1702	4	Rubber feet mounting washer	A4-70
174	4	Stand mounting screw	A4-70
175	1	Air treatment system mounting bracket	AISI 304
1750	1	Set screw bearing	-
176	1	Set screw	Coated carbon steel
1761	1	Set screw O-ring	NBR, FKM, EPDM
1791	1	Lifting eye-bolt	A2-70
271	1	Center block fixing plate	PA6 aluminum
272	1	Fixing plate O-ring	PTFE / NBR, FKM
273	1	Fixing plate gasket	NBR, FKM, EPDM
33	1	Center block plug	AISI 316Ti
36	2	Diaphragm shaft wear ring	PTFE
37	12	Housing screw	A4-70
38	10	Housing washer	A4-70
40	1	Coupling – motor side	Stainless steel
41	1	Coupling cover	PA6 aluminum
411	4	Coupling cover mounting screw – c/b side	A4-70
412	4	Coupling cover mounting screw – c/b side	A4-70
42	1	Coupling insert	PUR
50	1	Bearing	-

4.3. Stocking recommendation

Even at normal operation some elements in the pump will be worn. In order to avoid expensive breakdowns we recommend having a few spare parts in stock.

Depending on the severity of the operation and the importance of assuring continuous work we offer two different spare part KITS: **KIT LIQ** and **KIT VAL** that include parts on pump wetted side. Please refer to specific series IOM manual for further details on the contents of each KIT and contact Tapflo for KIT pricing.

What is more we recommend to stock the following wear parts:

Pos.	Description	Q-ty
50	Bearing	1
272	Fixing plate O-ring	1
273	Fixing plate gasket	1
1750	Set screw bearing	1
1761	Set screw O-ring	1
42	Coupling insert	1
36	Diaphragm shaft wear ring	2

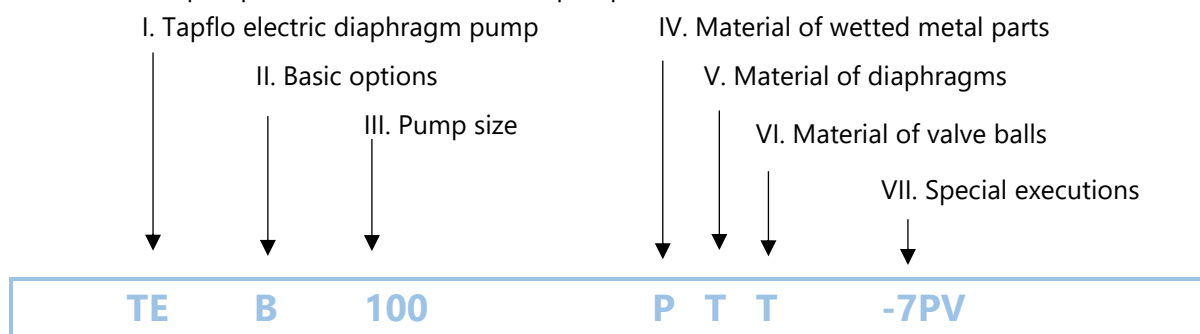
5. DATA

4.4. How to order parts

When ordering spare parts for Tapflo pumps, please let us know what is the **model number** and **serial number** from the pump centre body or housing. Then just indicate the part numbers from the spare parts list and quantity of each item.

4.5. Pump code

The model number on the pump and on the front page of this instruction manual tells the pump size and materials of the pump.



I. TE = Tapflo electric double diaphragm pump

II. Basic options:

- B = Backup diaphragm pump
- J = Heating jacket (sanitary series only)
- K = Built-on dampener (plastic series only)
- L = Valve lifting system (metal series only)
- T = Twin inlet/outlet pump
- Y = High lift valve seats (plastic series only)

III. Pump size

- 50; 100; 200 = Plastic series
- 70; 120; 220 = Metal series
- 80; 125; 225 = Hygienic series

IV. Material of wetted metal parts:

- P = PE
- T = PTFE
- S = Stainless steel AISI316L
- A = Aluminium

V. Material of diaphragms:

- E = EPDM
- N = NBR (nitrile rubber)
- T = PTFE
- B = PTFE TFM 1705b
- V = FKM
- W = White EPDM
- Z = PTFE with white EPDM back
- H = HNBR
- O = NBR FDA (grey)

VI. Material of valve balls:

- E = EPDM
- N = NBR (nitrile rubber)
- T = PTFE
- S = AISI 316 stainless steel
- U = PU (polyurethane)
- K = Ceramic
- V = FKM
- B = PTFE TFM 1635
- P = PE1000
- C = SiC

VII. Special executions:

- 1 = Optional in/outlet material
- 2 = Valve seat insert
- 3 = Optional connection type
- 4 = Backup diaphragm system configuration
- 5 = Other special executions
- 6 = Optional material of centre body
- 8 = Optional material of pos. 18 seals
- 9 = Optional material of housing pin screws
- 10 = Valve lifter sealing material
- 11 = Housing reinforcement plates
- 13 = Twin in-/outlet options

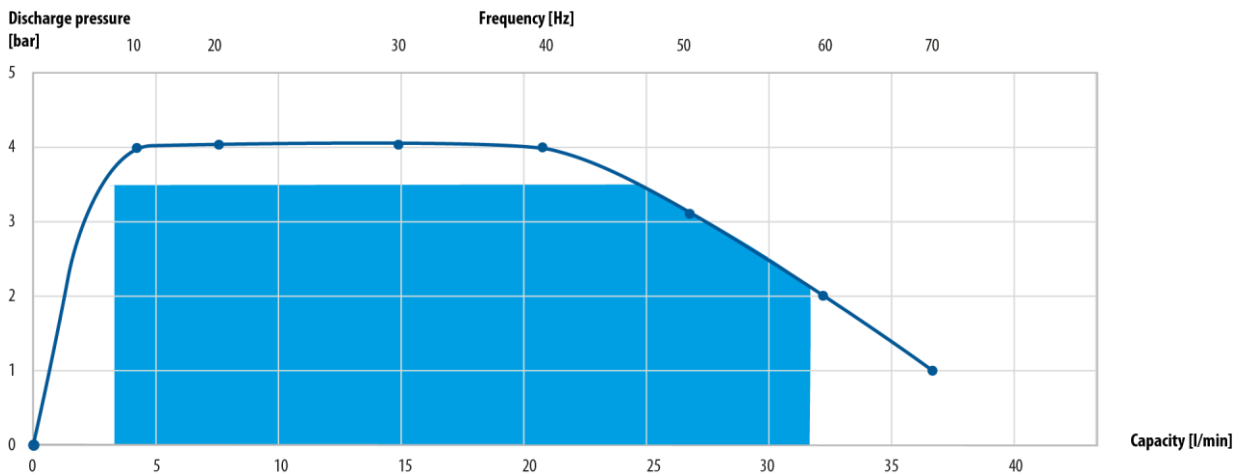
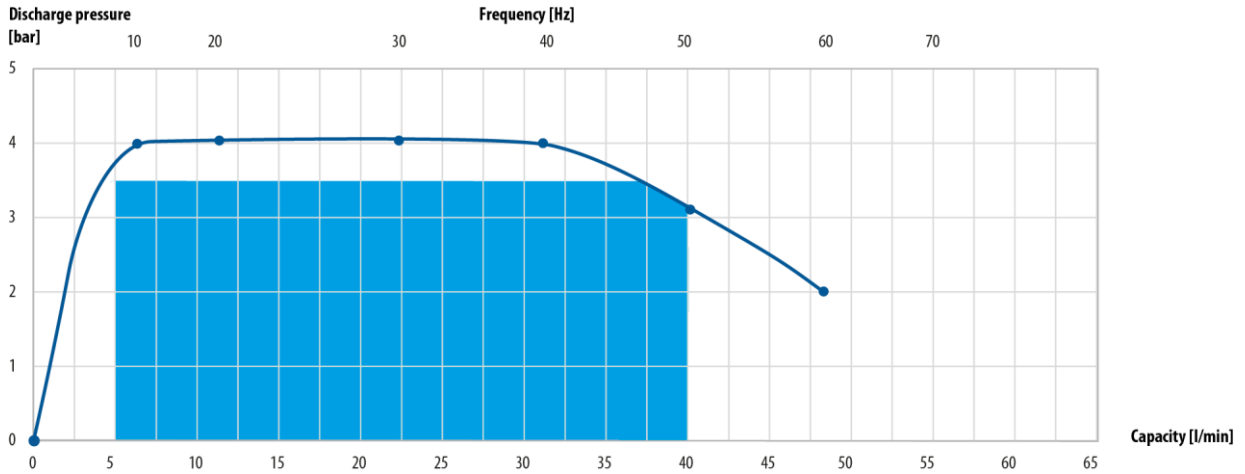
5. DATA

5. DATA

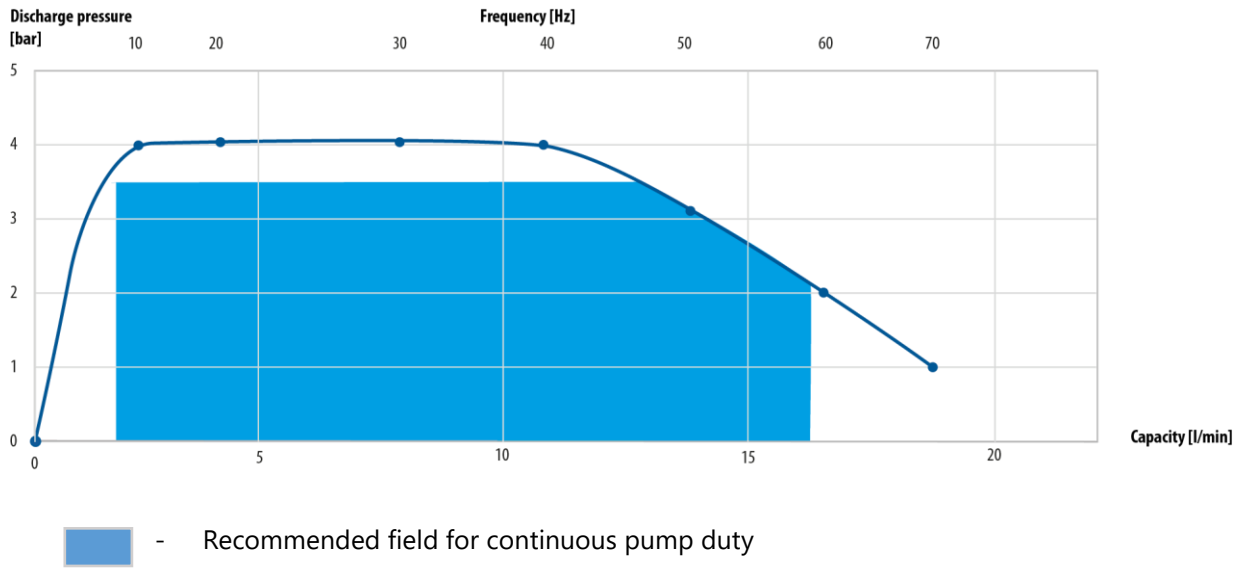
5.1. Capacity curves

The performance curves are based on water at 20°C. Other circumstances might change the performance. See below how the capacity will change at different viscosities and suction lifts.

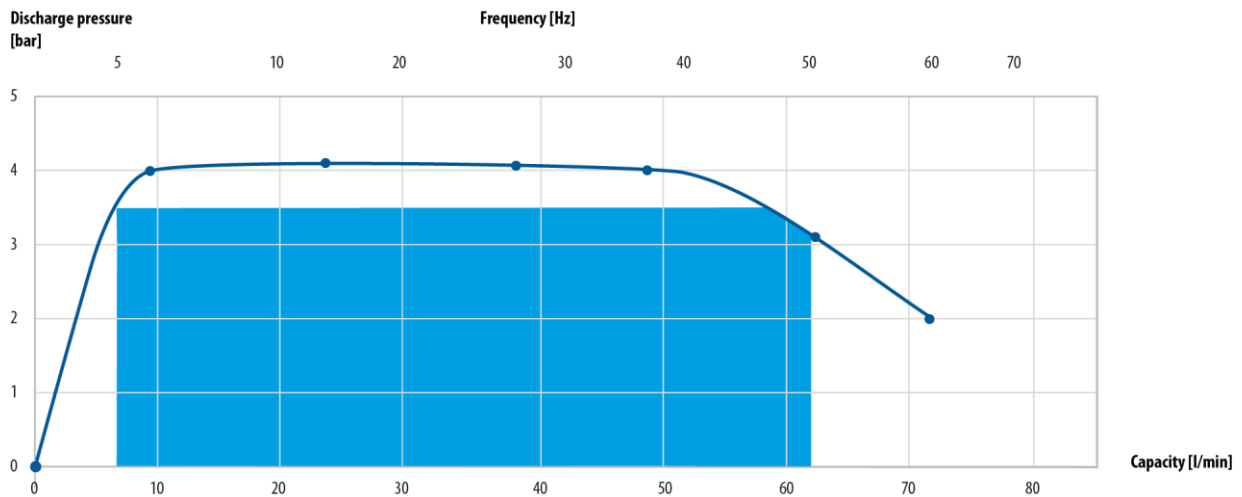
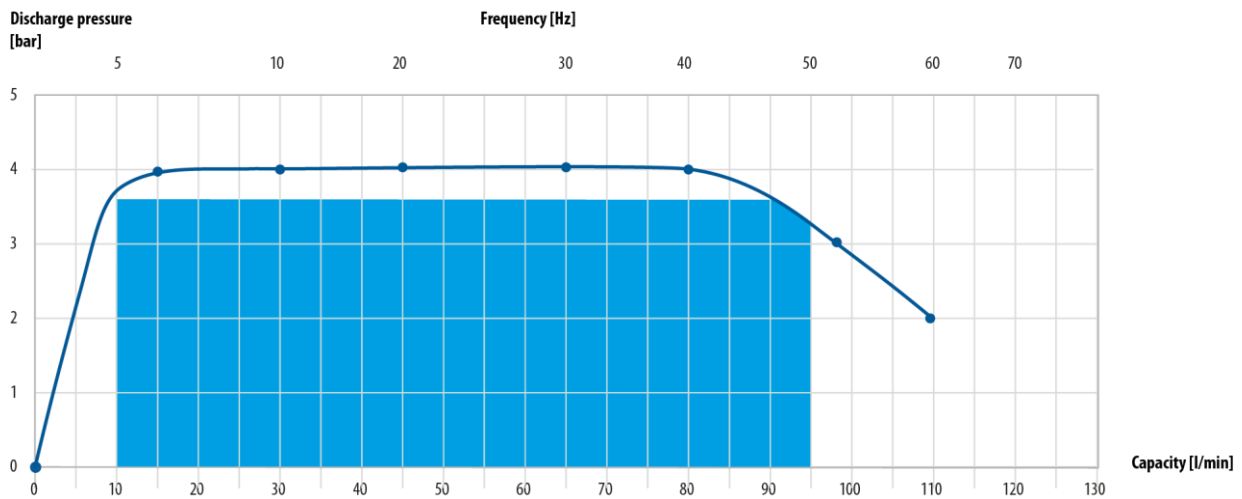
Capacity Curves for TE50; TE70 and TE80 pumps in various gear configuration



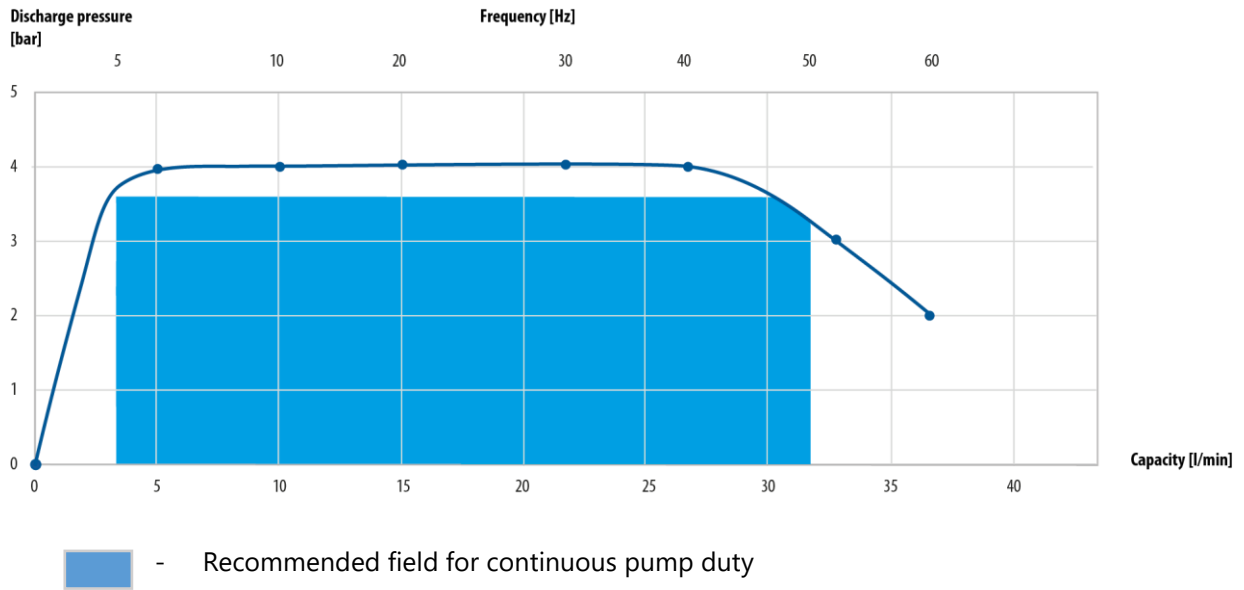
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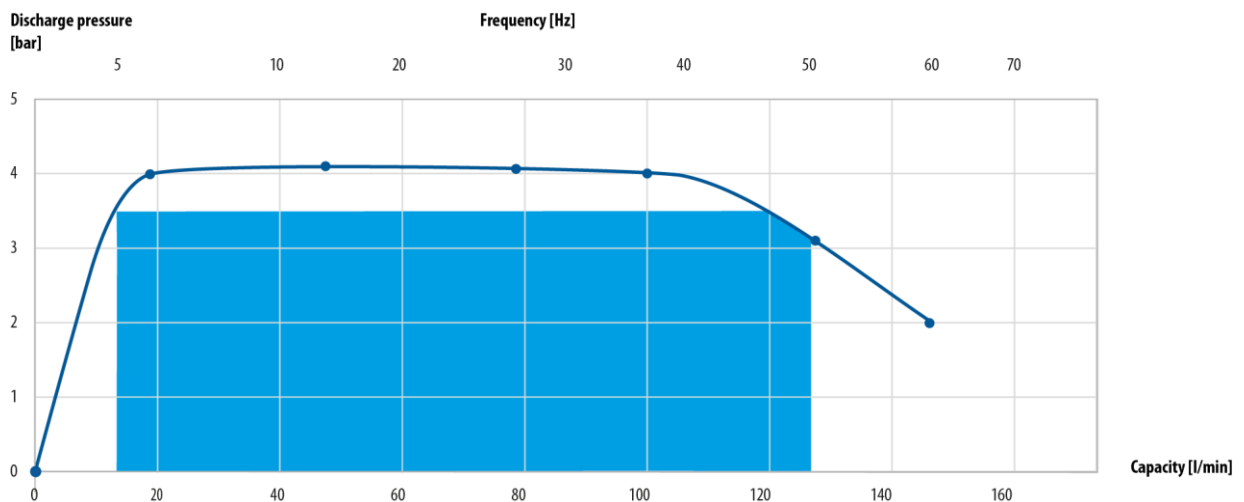
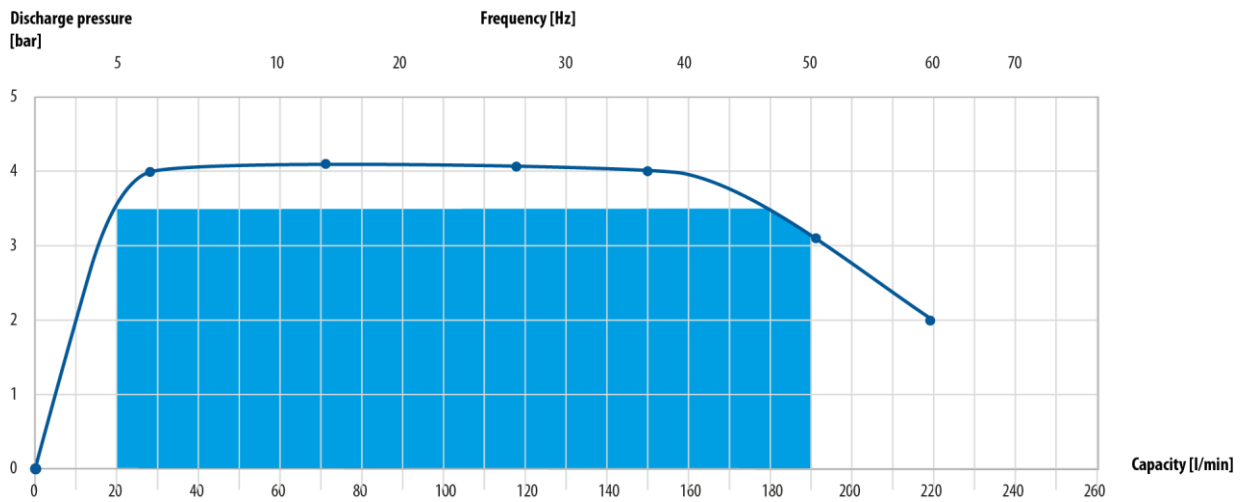
Capacity Curves for TE 100; TE120; TE125 pumps in various gear configuration



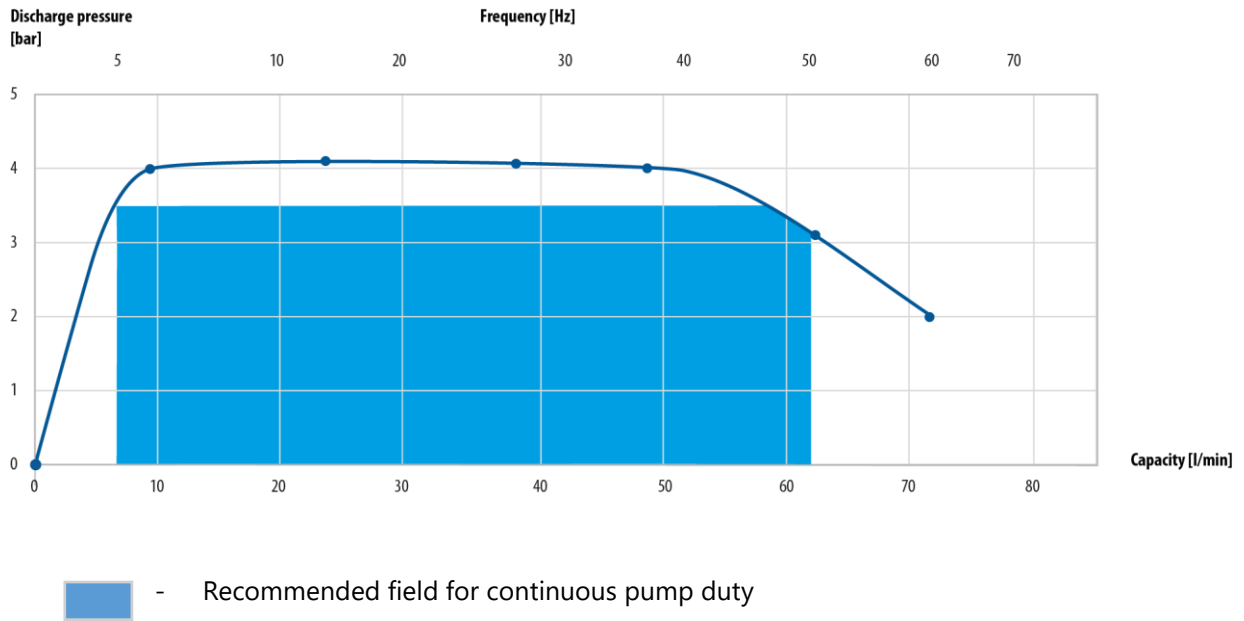
5. DATA



Capacity Curve for: TE200; TE220; TE225 pumps in various gear configuration

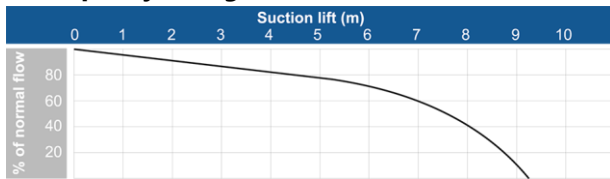


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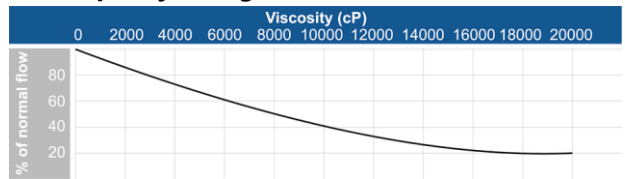


5.2. Capacity changes

Capacity changes at different suction lifts



Capacity changes at different viscosities



5. DATA

5.3. Technical data

TECHNICAL DATA	PUMP TYPE					
	TE50 P	TE100 P	TE200 P	TE50 T	TE100 T	TE200 T
Max capacity* [l/min] / [US GPM]	48 / 12.7	110 / 29	220 / 58.1	48 / 12.7	110 / 29	220 / 58.1
Volume per stroke** [ml] / [cu in]	116 / 7.08	280 / 17.1	854 / 52.1	116 / 7.08	515 / 31.4	854 / 52.1
Max air pressure [bar] / [psi]	1.5 / 22	1.5 / 22	1.5 / 22	1.5 / 22	1.5 / 22	1.5 / 22
Max discharge pressure [bar] / [psi]	4 / 58	4 / 58	4 / 58	4 / 58	4 / 58	4 / 58
Max suction lift dry*** [m] / [Ft]	3.5 / 11	3 / 9.8	3.5 / 11	3.5 / 11	3 / 9.8	3.5 / 11
Max suction lift wet [m] / [Ft]	8 / 26	8 / 26	8 / 26	8 / 26	8 / 26	8 / 26
Max size of solids ø in [mm] / [in]	4 / 0.16	6 / 0.24	10 / 0.39	4 / 0.16	6 / 0.24 18 / 0.7****	10 / 0.39
Maximum pump speed [cycles per minute]	172 @50Hz 206 @60Hz		164 @50Hz 200 @60Hz	172 @50Hz 206 @60Hz		164 @50Hz 200 @60Hz
Max liquid temp. with EPDM/NBR [°C] / [°F]	70 / 158	70 / 158	70 / 158	80 / 176	80 / 176	80 / 176
Max liquid temp. with PTFE [°C] / [°F]	70 / 158	70 / 158	70 / 158	110 / 230	110 / 230	110 / 230
Connection standard	1/2" BSP female thread (G)	1" BSP female thread (G)	1 1/2" BSP female thread (G)	1/2" BSP female thread (G)	1" BSP female thread (G)	1 1/2" BSP female thread (G)

TECHNICAL DATA	PUMP TYPE					
	TE70 S	TE120 S	TE220 S	TE70 A/C	TE120 A/C	TE220 A/C
Max capacity* [l/min] / [US GPM]	48 / 12.7	110 / 29	220 / 58.1	48 / 12.7	110 / 29	220 / 58.1
Volume per stroke** [ml] / [cu in]	87.5 / 5.34	420 / 25.6	933 / 56.9	87.5 / 5.34	420 / 25.6	933 / 56.9
Max air pressure [bar] / [psi]	1.5 / 22	1.5 / 22	1.5 / 22	1.5 / 22	1.5 / 22	1.5 / 22
Max discharge pressure [bar] / [psi]	4 / 58	4 / 58	4 / 58	4 / 58	4 / 58	4 / 58
Max suction lift dry*** [m] / [Ft]	3 / 9.8	3.5 / 11	3.5 / 11	3 / 9.8	3.5 / 11	4 / 13
Max suction lift wet [m] / [Ft]	8 / 26	8 / 26	8 / 26	8 / 26	8 / 26	8 / 26
Max size of solids ø in [mm] / [in]	4 / 0.16	6 / 0.24		4 / 0.16	6 / 0.24	10 / 0.39
Maximum pump speed [cycles per minute]	172 @50Hz 206 @60Hz		164 @50Hz 200 @60Hz	172 @50Hz 206 @60Hz		164 @50Hz 200 @60Hz
Max liquid temp. with EPDM/NBR [°C] / [°F]	80 / 176	80 / 176	80 / 176	80 / 176	80 / 176	80 / 176
Max liquid temp. with PTFE [°C] / [°F]	110 / 230	110 / 230	110 / 230	110 / 230	110 / 230	110 / 230
Connection standard	3/4" BSP female thread (G)	1" BSP female thread (G)	1 1/2" BSP female thread (G)	3/4" BSP female thread (G)	1" BSP female thread (G)	1 1/2" BSP female thread (G)

TECHNICAL DATA	PUMP TYPE		
	TE80	TE125	TE225
Max capacity* [l/min] / [US GPM]	48 / 12.7	110 / 29	220 / 58.1
Volume per stroke** [ml] / [cu in]	320 / 19.5	515 / 31.4	1415 / 86.4
Max air pressure [bar] / [psi]	1.5 / 22	1.5 / 22	1.5 / 22
Max discharge pressure [bar] / [psi]	4 / 58	4 / 58	4 / 58
Max suction lift dry*** [m] / [Ft]	3 / 9.8	3.5 / 11	4 / 13
Max suction lift wet [m] / [Ft]	8 / 26	8 / 26	8 / 26
Max size of solids ø in [mm] / [in]	4 / 0.16 18 / 0.7****	6 / 0.24 18 / 0.7****	10 / 0.39 51 / 2****
Maximum pump speed [cycles per minute]	172 @50Hz 206 @60Hz		164 @50Hz 200 @60Hz
Max liquid temp. with EPDM/NBR [°C] / [°F]	80 / 176	80 / 176	80 / 176
Max liquid temp. with PTFE [°C] / [°F]	110 / 230	110 / 230	110 / 230
Connection standard	DN 25 SMS 3017 tri-clamp	DN 38 SMS 3017 tri-clamp	DN 51 SMS 3017 tri-clamp

* = @ 60 Hz

** = Based on pumps with EPDM diaphragms. Pumps with PTFE diaphragms have about 15% less volume.

*** = With stainless steel valve balls, other materials may reduce suction. Please consult us in this matter.

**** = Flap valve version.

5. DATA

COMPONENT	MATERIAL
Pump housing and all wetted parts	PE, PTFE, Aluminium, PTFE coated aluminium, Cast Iron, AISI316L Stainless steel
Centre block (not wetted)	PA6 Aluminium - anodized
Diaphragms	PTFE, PTFE with white back, EPDM, white EPDM, NBR, FKM, HNBR, TFM modified PTFE
Back-up disc	AISI316L
Valve balls	PTFE, EPDM, NBR, AISI 316, PU, Ceramic, SiC, PE1000
O-rings / Gaskets (wetted)	EPDM, FKM, FEP/FKM, NBR, Klingersil (TE100 and TE120) PTFE, FKM (TE125)
Housing pin screws	A4-80
Diaphragm shaft	Coated and hardened steel
Pump stand	AISI 304 Stainless steel
Internal mechanism	Coated and hardened steel, A4, PE1000
Internal seals	PTFE
Bearings	steel
Coupling	PUR and steel
Coupling cover	PA6 anodized aluminium

5. DATA

5.4. Dimensions

Dimensions in mm (where other is not indicated)

Dimensions in inch (where other is not indicated)

General dimensions only, ask us for detailed drawings. Changes reserved without notice.

	PUMP SIZE								
	TE50	TE100	TE200	TE70 S	TE120	TE220	TE80	TE125	TE225
A*	653	780	864	653	781	865	653	804	864
	25.71	30.71	34.02	25.71	30.75	34.06	25.71	31.65	34.02
B	244	256	372	244	246	351	244	234	351
	9.61	10.08	14.65	9.61	9.69	13.82	9.61	9.21	13.82
C*	246	322	450	275	325	453	370.6	434	639
	9.69	12.68	17.72	10.83	12.80	17.83	14.57	17.09	25.16
D	190	252	345	192	257	348	294	350	528
	7.48	9.92	13.58	7.56	10.12	13.70	11.57	13.78	20.79
E	290	330	360	290	330	360	290	390	450
	11.42	12.99	14.17	11.42	12.99	14.17	11.42	15.35	17.72
F	214	214	311	214	214	311	214	204	311
	8.43	8.43	12.24	8.43	8.43	12.24	8.43	8.03	12.24
G	230	270	300	230	270	300	230	330	390
	9.06	10.63	11.81	9.06	10.63	11.81	9.06	12.99	15.35
H	38	45	69	37	42	68	52	62	79
	1.5	1.77	2.72	1.46	1.65	2.68	2.05	2.44	3.11
I	25	38	54	33	54	70	36	44	50
	0.98	1.5	2.13	1.30	2.13	2.76	1.42	1.73	1.97
J	330	370	400	330	370	400	330	430	490
	12.99	14.57	15.75	12.99	14.57	15.75	12.99	16.93	19.29
K	154	171	228	142	146	194	140	141	186
	6.06	6.73	8.98	5.59	5.75	7.64	5.51	5.55	7.32
L	160	163	279	180	241	346	248	307	447
	6.3	6.42	10.98	7.09	9.49	13.62	9.76	12.09	17.60
M	10	10	10	10	10	10	10	10	10
	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
N	BSP	½"	1"	1 ½"	¾"	1"	1 ½"	-	-
	TC ¹	-	-	-	-	-	-	1"	1 1/2"
	DIN ²	-	-	-	-	-	-	DN25	DN40
	SMS ³	-	-	-	-	-	-	25	38
	RJT	-	-	-	-	-	-	1"	1 1/2"
O	312	335	450	300	305	406	298	310	398
	12.28	13.19	17.72	11.81	12.01	15.98	11.73	12.20	15.67
P	8.5 x	8.5 x	8.5 x	8.5 x	8.5 x	8.5 x	8.5 x	8.5 x	8.5 x
	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
	0.33 x	0.33 x	0.33x	0.33 x	0.33 x	0.33 x	0.33 x	0.33 x	0.33 x
	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73

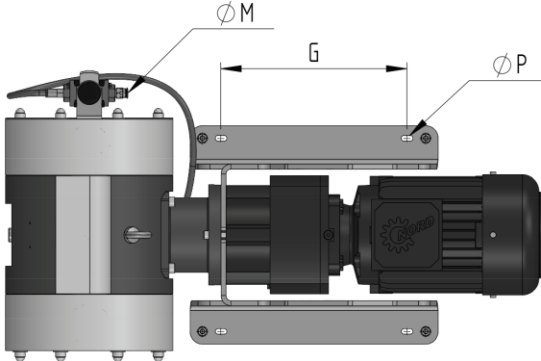
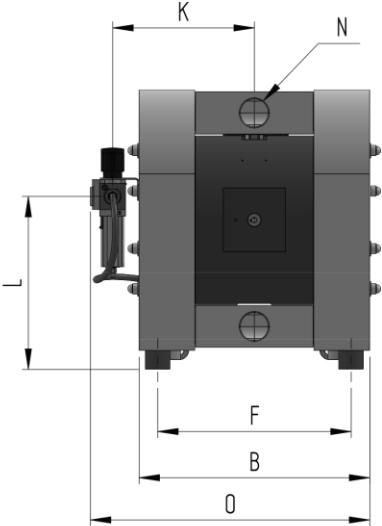
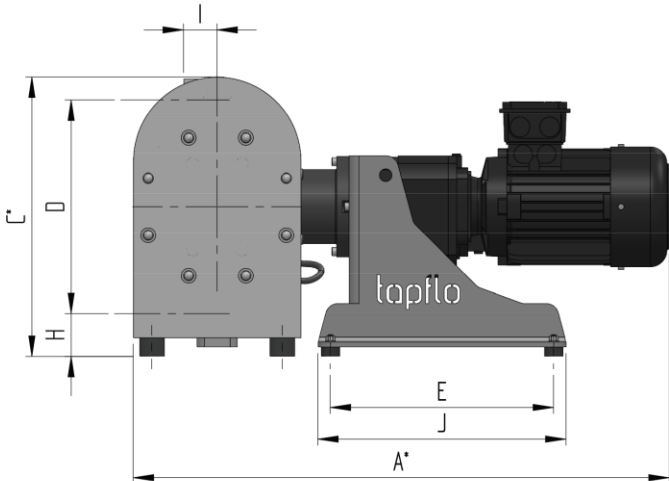
¹ SMS3017

² DIN 11851

³ SMS 1145

*Max height and length may vary depending on motor type

5. DATA



5. DATA

5.5. Tightening torques

Checking of the tightening torques is necessary after all periods of stoppage, when temperature variations are a factor and after all transport and maintenance of the pump. What is more, for proper operation and safety the torque values should be checked frequently as part of preventive maintenance (please contact Tapflo for interval proposals). Although pump applications vary, a general guideline is to re-torque the pump every two weeks.

PUMP SIZE	MOUNTING TORQUE [Nm]
TE50	8
TE100	16
TE200	20

PUMP SIZE	MOUNTING TORQUE [Nm]
TE70 A	12
TE120 A	18
TE220 A	20

PUMP SIZE	MOUNTING TORQUE [Nm]
TE80	8
TE125	16
TE225	16

PUMP SIZE	MOUNTING TORQUE [Nm]
TE70 S	8
TE120 S	16
TE220 S	20

5. DATA

5.6. Permitted loads on manifolds

We recommend not to exceed the following loads and forces reacting on the manifolds.

TE50		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	31	5.3
Y	31	5.3
Z	31	5.3

TE80		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	31	6.3
Y	31	6.3
Z	31	6.3

TE100		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	35	6.1
Y	35	6.1
Z	35	6.1

TE125		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	35	7.3
Y	35	7.3
Z	35	7.3

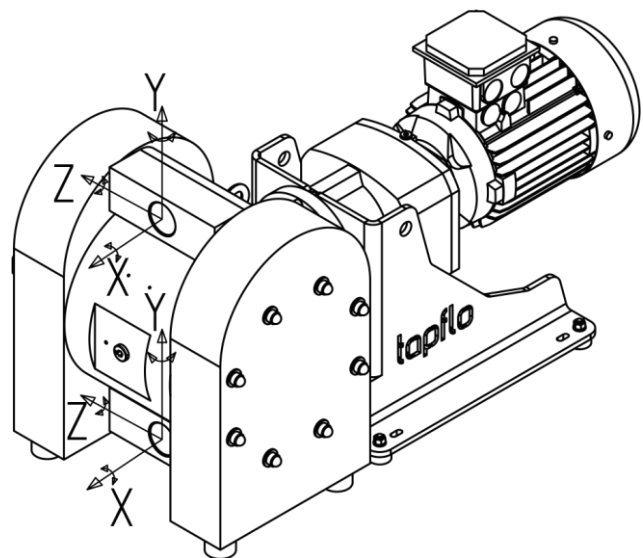
TE200		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	43	7.4
Y	43	7.4
Z	43	7.4

TE225		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	43	8.8
Y	43	8.8
Z	43	8.8

TE70		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	31	6.3
Y	31	6.3
Z	31	6.3

TE120		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	35	7.3
Y	35	7.3
Z	35	7.3

TE220		
Direction	Load [N] (inlet/outlet)	Moment of force (inlet/outlet) [Nm]
X	43	8.8
Y	43	8.8
Z	43	8.8



6. WARRANTY

6.2. Returning parts

When returning parts to Tapflo please follow this procedure:

- Consult Tapflo for shipping instructions.
- Cleanse or neutralize and rinse the part/pump. Make sure the part/pump is completely empty from liquid.
- Pack the return articles carefully to prevent any damage during transportation.

Goods will not be accepted unless the above procedure has been complied with.

6.3. Warranty

Tapflo warrants products under conditions as stated below for a period of not more than 5 years from installation and not more than 6 years from date of manufacturing.

1. The following terms and conditions apply to the sale of machinery, components and related services and products, of Tapflo (hereinafter "the products").
2. Tapflo (the manufacturer) warrants that:
 - a. its products are free of defects in material, design and workmanship at the time of original purchase;
 - b. its products will function in accordance with Tapflo operative manuals; Tapflo does not guarantee that the product will meet the precise needs of the Customer, except for those purposes set out in any invitation to render documents or other documents specifically made available to Tapflo before entering into this agreement;
 - c. high quality materials are used in the construction of the pumps and that machining and assembly are carried out to the highest standards.

Except as expressly stated above, Tapflo makes no warranties, express or implied, concerning the products, including all warranties of fitness for a particular purpose.

3. This warranty shall not be applicable in circumstances other than defects in material, design, and workmanship. In particular warranty shall not cover the following:
 - a. Periodic checks, maintenance, repair and replacement of parts due to normal wear and tear (seals, O-rings, rubber items, diaphragms, air valves etc.);
 - b. Damage to the product resulting from:
 - b.1. Tampering with, abuse or misuse, including but not limited to failure to use the product for its normal purposes as stated at the time of purchase or in accordance with Tapflo instructions for use and maintenance of the product, or the installation or improper ventilation or use of the product in a manner inconsistent with the technical or safety standard in force;
 - b.2. Repairs performed by non-skilled personnel or use of non-original Tapflo parts;
 - b.3. Accidents or any cause beyond the control of Tapflo, including but not limited to lightning, water, fire, earthquake, and public disturbances, etc.;

6. WARRANTY

4. The warrantee shall cover the replacement or repairing of any parts, which is documented faulty due to construction or assembling, with new or repaired parts free of charges delivered by Tapflo. Parts subjected to normal tear and wear shall not be covered by the warranty. Tapflo shall decide as to whether the defective or faulty part shall be replaced or repaired.
5. The warrantee of the products shall be valid for a period in accordance to the current law from the date of delivery, under the condition that notice of the alleged defect to the products or parts thereof be given to Tapflo in written within the mandatory term of 8 days from the discovery. Repair or replacement under the terms of this warranty shall not give a right to an extension to, or a new commencement of, the period of warranty.
6. Repair or replacement under the terms of this warranty shall not give a right to an extension to, or a new commencement of, the period of warranty. Repair or replacement under the terms of this warranty may be fulfilled with functionally equivalent reconditioned units. Tapflo qualified personnel shall be solely entitled to carry out repair or replacement of faulty parts after careful examination of the pump. Replaced faulty parts or components will become the property of Tapflo.
7. The products are built in accordance with standard CE normative and are tested (where applicable) by Tapflo. Approval and tests by other control authority are for the customer's account. The products shall not be considered defective in materials, design or workmanship if they need to be adapted, changed or adjusted to conform to national or local technical or safety standards in force in any country other than that for which the unit was originally designed and manufactured. This warranty shall not reimburse such adaptations, changes or adjustments, or attempt to do so, whether properly performed or not, nor any damage resulting from them, nor any adaptation, change or adjustments to upgrade the products from their normal purpose as described in the products operative manual without the prior written consent of Tapflo.
8. Installation, including electric and other connections to utility mains according to Tapflo drawings, is for the cost and responsibility of the customer, unless otherwise agreed in writing.
9. Tapflo will not be liable on any claim, whether in contract, tort, or otherwise, for any indirect, special, incidental, or consequential damages, caused to the customer or to third parties, including loss of profits, arising by any possible infringement of par. 3 above or by the customer or third parties being in the impossibility of using the products.

Steady the above, Tapflo liability to the customer or third parties from any claim, whether in contract, tort, or otherwise, shall be limited to the total amount paid by the customer for the product that caused the damages.

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