

ISO 9001  
BUREAU VERITAS  
Certification



RECIPROCATING  
ROTARY PISTON PUMPS



# Recomendations and care

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to be observed  
on installation  
**TRIEF family**



## 1. OPERATING PRINCIPLE

The rotor has a liquid-tight fit inside the pump casing, with an equally tight fit between the piston and block and of each of these with the rotor.

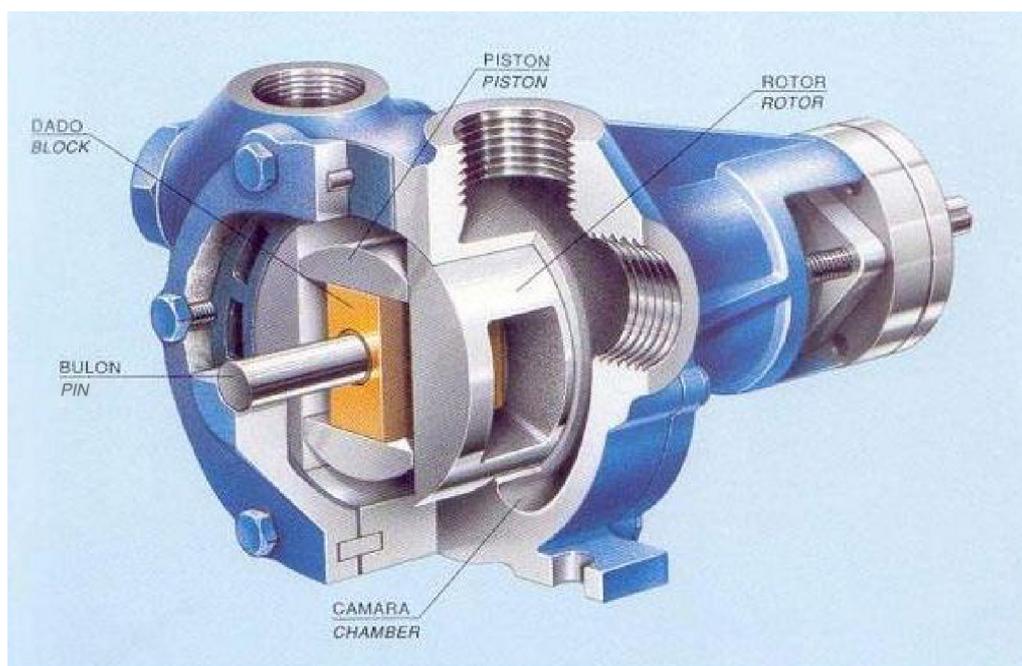
When the pump is in operation, the piston slides back and forth in the rotor groove, drawing liquid from one end of the rotor groove and discharging it at the opposite end.

At the same time, the block slides back and forth in the groove in the piston, drawing liquid through one rotor opening and discharging it through the other. The rotor, which functions as a rotary valve, channels the liquid from the inlet opening around the chamber and into the discharge opening.

This action, although rotary, in fact fulfils the same type of pumping principle as a direct-acting piston pump. Therefore, there are two pistons pumping through two cylinders, making the rotary action of the rotor serve as a valve. The reciprocating action of the piston is provided by the central block bearing, which rotates on a block pin eccentric to the rotor shaft. Since the rotor is concentric with the shaft and the block bearing is eccentric to that shaft, the rotation of the rotor creates an alternating piston action of the piston and block within their respective cylinder grooves. Four overlapping piston and block strokes per rotor revolution produce a uniform discharge with pulsation reduced to a minimum. High volumetric efficiency is achieved thanks to the piston-type action and the tight fit of the moving parts.

Standard pumps are sealed with asbestos-free Latitex gaskets. When required by the customer, they are supplied with "Roten"-type mechanical seals. All monoblock pumps are fitted with nitrile rubber seals.

**Under zero leakage conditions, the pumps will be sealed with Roten-type mechanical seals.**



**1.1 TECHNICAL DATA**

SERIES	PORT DIAMETER			MAXIMUM SPEED RPM	
100	3/8" THREAD	<b>Maximum working temperature</b> 300°C	<b>Maximum viscosity</b> 200,000cSt	1450	<b>Maximum pressure</b> 5 bar
200	3/4" THREAD			1450	
300	1" THREAD			580	
400	1 ½" THREAD			490	
500	2 1/2" THREAD			465	
600	3 ½"THREAD			365	
600-B	FLANGE 4"			365	
700	DIN-2573			345	
800	FLANGE 5"			325	

The operating limits are only for pumps with standard materials.

**2. SAFETY DATA**



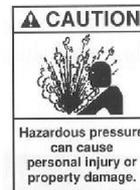
Failure to disconnect and lock out the power before performing maintenance can result in serious injury or death.



If hazardous or toxic fluids are pumped, the system must be flushed and decontaminated, both inside and out, before maintenance.



Operating the pump without properly installed guards can cause serious injury to people, damage to property or death.



Operating the pump with the valve closed can cause breakage of system components, injury to people or damage to property.

**Note:**

The pump must not run dry as this would cause an increase in pump surface temperature and lead to wear and damage of pump components, resulting in pump malfunctions. Check all the valves in the system to confirm that they are in the correct position.

## 3. INSTALLATION

### Note:

Trief motor-driven pumps must only be installed in systems designed by qualified personnel.

The system must comply with all relevant standards and codes and include warning signs for all implied hazards.



- Installation, electrical connections and earthing must comply with local regulations and the National Electrical Code.
- Install a switch near the pump unit that disconnects all phases.
- Disconnect and lock out the power supply before proceeding with installation or maintenance.

The power supply must meet the specifications indicated on the motor nameplate.

Motors equipped with thermal protection automatically shut off the motor's electrical circuit in the event of an overload. The motor may start unexpectedly and without warning.

### 3.1. CLEANING BEFORE INSTALLATION

Foreign particles entering the pump **will cause severe damage.**

The supply tank and suction line must be cleaned and flushed before installation and commissioning.

### 3.2. LOCATION AND PIPELINES

A poorly designed piping system, or improper pump unit installation, will significantly reduce pump performance and life.

The following piping system layout and pump installation is recommended:

- 1.** To minimise losses in the suction line, position the pump as close as possible to the power supply.
- 2.** The diameter of the suction line and fittings must be at least equal to the pump inlet diameter.
- 3.** Minimise the number of elements (valves, elbows, etc.) in the suction line and changes in line direction. When used, such elements should be located at least 5-10 times the pipe diameter from the pump inlet.
- 4.** We recommend installing a filter at a distance from the pump inlet equal to 5-10 times the pipe diameter. For viscosities below 1,000 SSU, the filter needs to have a net open area equal to 4 times the surface area of the suction pipe. For viscosities over 1,000 SSU, refer to the filter manufacturer's instructions. The filters must be cleaned regularly to prevent lack of supply to the pump.
- 5.** The suction and discharge lines must be free of leaks.
- 6.** To facilitate the expansion and contraction of the pipes, expansion joints should be installed at a distance of 0.9 metres from the pump inlet and outlet.
- 7.** All lines and piping elements must be properly supported to prevent loads in the piping being transmitted to the pump.

### 3.3. PUMP MOUNTING

We recommend mounting the pump-motor unit permanently by fixing the base plate, with suitably sized anchor bolts, to a properly levelled concrete floor in accordance with recommended industry standards.

A solid foundation will reduce system noise and vibration and improve pump performance.

Consult ANSI standards, or an appropriate pump manual, for information on proper pump mounting and foundations.

Check the alignment of the coupling after fixing the pump and base assembly to the foundation.

### 3.4. COUPLING ALIGNMENT

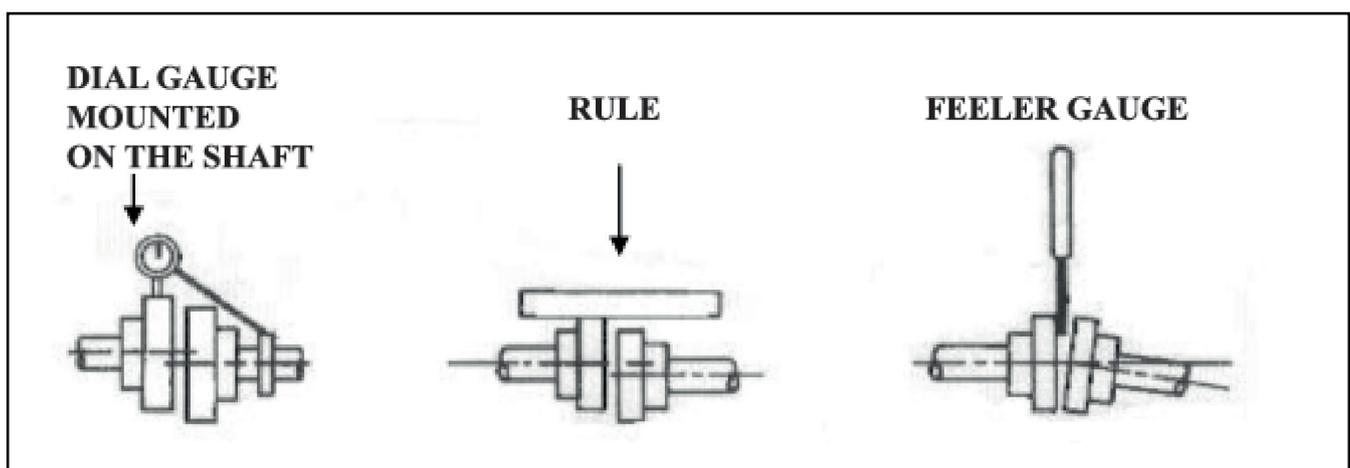
The pump must be coupled directly to the gearbox and/or drive system by means of a flexible coupling.

The coupling alignment, both angular and parallel, between pump, gearbox, motor, etc., **MUST** be maintained in accordance with the manufacturer's instructions.

Use of a dial gauge is considered preferable for checking **parallel** alignment (if a dial gauge is not available, use a rule). Rotate both shafts by hand, checking the clock readings over one complete revolution. The maximum deviation should be less than 0.005" (0.127 mm).

To check the **angular** alignment, insert a feeler gauge between the two halves of the coupling. Check the gap every 90° around the coupling (four check points). The maximum variation should not exceed 0.005" (0.127 mm).

Checking alignment:



When belts are used for transmission, ensure that the belts have sufficient electrical conductivity to prevent electrostatic discharges. Use belts with an electrical resistance of less than 10<sup>9</sup> ohms and avoid using aluminium or light metal pulleys with a magnesium content of greater than 7.5%.

The guards for the coupling must be made of non-sparking material. Light metals containing greater than 7.5% magnesium should never be used. If couplings or pulleys have aluminium parts, the guards should be made of brass.

### 3.5. PUMP ROTATION

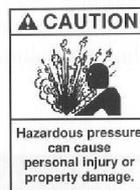
The pump can rotate in both directions. When turning anticlockwise, it will draw in from the left-hand side, while turning clockwise it will draw from the right-hand side, looking at the pump from the pump shaft.

When the pump has a built-in bypass, the pump must turn towards the side where the bypass tensioning rod is located, always looking at the pump from the pump shaft, for the bypass to work properly.

## 4. OPERATION



Operating the pump without properly installed guards can cause serious injury to people, damage to property or death.



Operating the pump with the valve closed can cause breakage of system components, injury to people or damage to property.

### 4.1. CHECKS BEFORE COMMISSIONING

- Inspect the entire piping system and supports to ensure that loads from the lines are not transmitted to the pump.
- Ensure that all valves and other elements installed in the piping system are in the start-up or operating position.
- Run the motor briefly to confirm that the pump rotates in the correct direction.

## 4.2. COMMISSIONING PROCEDURE

- 1. Start the motor; priming should occur within one minute.**
2. Check the pressure and vacuum gauges to ensure that the system is operating within the intended parameters.
3. Inspect piping, fittings and equipment associated with the system for leaks, noise, vibration or overheating.
4. If possible, check the flow rate to ensure that the pump is operating within the expected parameters.
5. Check the safety relief valve setting by briefly closing a valve in the discharge line and reading the pressure. The pressure should be 10-20 psi (69-138 kPa) higher than the maximum operating pressure, or the external bypass valve setting (if fitted).

Do not operate the pump with a closed valve in the discharge line for more than 15 seconds.

## 4.3. BYPASS REGULATION

The bypass lets you regulate both the flow rate and the pressure in the pump. It also acts as a safety valve. To regulate the bypass, rotate the rod or tensioning stud, part no. 17. Turning it clockwise will increase the pressure and anticlockwise it will decrease it.

## 4.4. HEATING CHAMBER

ACCP, AXP, ACP models are equipped with a heating or cooling chamber to heat fluids that tend to solidify at low temperatures or to cool liquids.

Oil or steam is used, which is supplied from an external circuit, entering the chamber through the four threaded holes in the chamber lid.

The maximum recommended pressure inside the chamber is 10 bar (145 psi).

The liquid used in the heating chamber must have an ignition temperature at least 50°C above the maximum pump surface temperature.

**Note:**

When hot liquids are pumped, the user must take appropriate measures to prevent harm due to contact by positioning warning signs where they can be seen easily.

**4.5. MAXIMUM SURFACE TEMPERATURE**

The heating or cooling chamber temperature is maintained by connecting it to an external circuit through which hot liquids such as oil or steam circulate in order to heat very viscous liquids or liquids that could "freeze" inside the pumping chamber. The chamber lids are fitted with connections ranging from 3/8" gas to 1/2" gas, depending on the model, through which the steam or hot oil is fed.

In the presence of potentially explosive gases, the pump surface temperature must be equal to or less than 80% of the gas ignition temperature.

In the presence of potentially explosive dusts, the temperature must be equal to or less than 2/3 of the ignition temperature of the dust.

The maximum surface temperature is to be the lowest of these possible values.

It is the user's responsibility to ensure that the pump operates within the above-mentioned temperature limits.

<b>MAXIMUM/MINIMUM TEMPERATURES OF DIFFERENT ELASTOMERS</b>		
<b>ELASTOMER TYPE</b>	<b>ELASTOMER BRAND</b>	<b>MIN/MAX TEMP</b>
FPM	VITON	-25°C/+170°C
NBR	NITRILE	-30°C/+70°C
PTFE	TEFLON	-15°C/+170°C
FFKM	CHEMRAZ	-50°C/+230°C

A poorly designed installation (see section 3.2 of this document), the pump running dry (without liquid) or the fluid recirculating inside the pump without being pumped into the discharge tank will cause an increase in pump surface temperature.

The pump must be freely exposed to the atmosphere to enable cooling of it.

## 5. PUMP MAINTENANCE

### Note:

Maintenance must only be carried out by qualified technicians following the appropriate procedures and warnings according to this manual.



Failure to disconnect and lock out the power before maintenance may result in electric shock, burns or death.



If hazardous or toxic fluids are pumped, the system must be flushed and decontaminated, both inside and out, before maintenance.



Failure to decompress the system before performing maintenance on the pump may result in injury to people or damage to property.

### Roller bearings:

The grease in the bearing (part no. 18) must be renewed once a year.

Loosen the bearing housing (mark no. 13) clean off the old grease with diesel oil and, after drying, apply a special bearing grease and put the housing back in place.

The shaft is supported by the bearing and a bronze-graphite bush at the other end, which is self-lubricating and does not require greasing.

### Gaskets:

Each time the pump is disassembled, new gaskets must be fitted. This is because they are made of a very thin special paper material (0.3 / 0.5 mm), which can easily become compressed, even scratched or cracked, preventing it from sealing tightly. When fitting new gaskets, to fix their position, it is advisable to apply a little oil or thin grease to the gasket or part to help it adhere and find its position.

### Gland and packing\*:

When leakage is visible, tighten gland, part no. 12, to compress the packing, part no. 24 (Latitex 2761), gently compressing until no leakage is visible (do not overtighten to avoid overheating).

When the packing does not compress when tightening (it has hardened too much), the packing needs to be replaced. This should be done immediately, as hardened packing can damage the shaft, besides failing to seal and prevent leakage.

When the packing needs to be replaced, use a complete set of new packing. The packing is supplied in batches with the correct number of strips.

Never add new packing strips to a set of used packing strips.

### Packing adjustment

It is important that the packing is correctly adjusted to prevent overheating.

1. While the liquid is being pumped, evenly tighten the nuts, part no. 12/1, on the press a little.
2. Measure the temperature of the packing a few minutes after each tightening to check for overheating.
3. Tighten the nuts until the drip is controlled and no overheating occurs



**Note:**

A small leakage to lubricate the packing is desirable, but it is unacceptable in some cases, depending on the application.

*\*In the case of explosive atmospheres, mechanical seals compatible with the pumped liquid should be used for sealing the pump.*

## 6. PUMP TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE
<p style="text-align: center;"><b>Reduced capacity</b></p>	<ul style="list-style-type: none"> <li>• Discharge line too long, diameter too small or high viscosity.</li> <li>• Safety relief valve partially open, worn or incorrectly seated.</li> <li>• Air entering the suction line.</li> <li>• Suction line or valves blocked or too restrictive.</li> </ul>
<p style="text-align: center;"><b>Cavitation</b></p>	<ul style="list-style-type: none"> <li>• Suction line restricted.</li> <li>• Viscosity high for the line.</li> <li>• Revolutions too high for the viscosity.</li> </ul>

<p style="text-align: center;"><b>Overheating</b></p>	<ul style="list-style-type: none"> <li>• Packing very tight.</li> <li>• Motor/pump misaligned.</li> <li>• Excessive friction between moving parts.</li> </ul>
<p style="text-align: center;"><b>Mechanical leakage</b></p>	<ul style="list-style-type: none"> <li>• O-rings not compatible with pumped liquids.</li> <li>• Notched, cut or damaged O-rings.</li> <li>• Damaged, worn or dirty shaft in the seal area.</li> <li>• Excessively lubricated ball bearings.</li> <li>• Mechanical joint faces with cracks, scratches, pitting or soiling.</li> </ul>
<p style="text-align: center;"><b>Noise</b></p>	<ul style="list-style-type: none"> <li>• Cavitation.</li> </ul> <p>Excessive pump vacuum due to:</p> <ul style="list-style-type: none"> <li>• Oversized or restricted suction pipe fittings.</li> <li>• Pump speed too high for the viscosity or volatility of the liquid.</li> <li>• Pump too far from the source of the fluid.</li> <li>• Pump operation for a long time with a blocked discharge pipe.</li> <li>• The pump is not firmly mounted.</li> <li>• Worn or damaged bearings.</li> <li>• Vibrations due to improperly secured piping.</li> <li>• Bent shaft or misaligned motor coupling.</li> <li>• Failure of a system valve.</li> <li>• Safety valve set at too low a value.</li> </ul>

**WARRANTY**

For the pump manufactured by us, No....., for the period of one year from the date of manufacture, against all defects in material and construction (within the instructions given in this sheet, in addition to checking the nameplate for all details, including the product to be handled). If an incident occurs, notify the technical support service so they can advise you correctly. If the incident is still not resolved, we will send a technician to solve it. Total or partial disassembly of the pump will result in loss of warranty.

If, once our technician is on site, the problem is found not to be caused by a pump defect, the call-out and travel expenses will be invoiced.

The manufacturer "Bombas TRIEF S,L." will decide how to proceed in view of its reports.

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<b>PART</b>	<b>MATERIAL</b>	<b>MODEL</b>
Pump casing	GG.20	TRIEF-1
Rotor cover	GG.20	TRIEF-2
Chamber rotor cover	GG.20	TRIEF-2-C
Chamber cap	Steel	TRIEF-2-C/1
Bypass cover	GG.20	TRIEF-3
Chamber cover	GG.20	TRIEF-3-C
Fixed cover	GG.20	TRIEF-4
Rotor	GG.20	TRIEF-5
Piston	GG.20	TRIEF-6
Block	Bronze	TRIEF-7
Tensioner cover	GG.20	TRIEF-8
Tensioner gasket cover	Klinger	TRIEF-8/1
Port cover	GG.20	TRIEF-9
Port cover gasket	Klinger	TRIEF-9/1
Grille	GG.20	TRIEF-10
Shaft	F-114	TRIEF-11
Gland	GG.20	TRIEF-12
Press nut	F-111	TRIEF-12/1
Press stud	F-111	TRIEF-12/2
Bearing cover	GG.20	TRIEF-13
Bearing cover screws	DIN 912-8.8	TRIEF-13/1
Valve housing	Bronze	TRIEF-14
Valve housing gasket	Klinger	TRIEF-14/1
Valve seat	Bronze	TRIEF-15
Spring	Steel	TRIEF-16
Tensioning stud	F-111	TRIEF-17
Nut	Brass	TRIEF-17/1
Counter nut	Brass	TRIEF-17/2
Roller bearing	Balls	TRIEF-18
Cap	Bronze	TRIEF-19
Bearing housing washer	F-111	TRIEF-22
Cover bolt	Steel	TRIEF-23
Packing	Graphite asbestos	TRIEF-24
Casing gaskets	Klinger	TRIEF-25
Clamping screws	DIN-933-8.8	TRIEF-32

