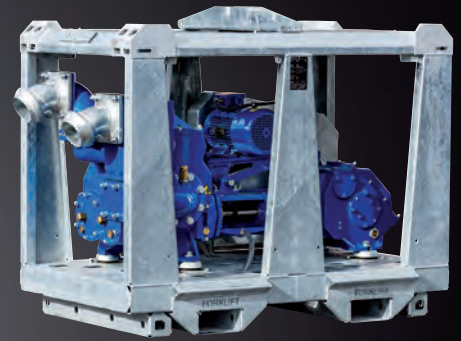


# User Manual

## PT series





Pumps PT series

**Product and dealer information**

**Note**

For the specifications of the pump, drive and enclosure, refer to the corresponding type plates.

Delivery date : \_\_\_\_\_

**Product information**

Model : \_\_\_\_\_

Identification number : \_\_\_\_\_

Motor serial number : \_\_\_\_\_

Trailer serial number (optional) : \_\_\_\_\_

Customer's product number : \_\_\_\_\_

**Dealer information**

Name : \_\_\_\_\_

Address : \_\_\_\_\_

City : \_\_\_\_\_

Country : \_\_\_\_\_

	Dealer contact	Telephone number	Email
Sales	:	_____	_____
Parts	:	_____	_____
Service	:	_____	_____



## Pumps PT series

This user manual is for the PT series of pumps. The original version was written in Dutch by BBA Pompen en Buizen BV.

The PT series of pumps are manufactured by:  
BBA Pompen en Buizen BV  
Zutphensestraat 242  
7325 WV Apeldoorn

Hereafter, the manufacturer will simply be referred to as BBA Pumps.

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**Disclaimer**

Despite the care that has been put into the compilation of the text and illustrations, neither the author nor the publisher can be held liable for any consequential damages resulting from possible errors in this publication.

The original manual was written in Dutch. Versions in other languages are translations of the original instructions. A translation may contain information that differs from the original due to interpretation of the content and meaning of the original text.

In the case of such discrepancies, the original Dutch-language instructions will be considered the sole authentic source for the purpose of determining the content and meaning of the text.

This manual reflects the state of the art in technology at the time of publication.

BBA Pumps BV reserves the right to make changes to technical and design specifications at any time without prior notice.

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### Preface

This user manual contains information for the installation, use and user maintenance of a pump from the PT series. The information in this manual must therefore be strictly followed. Read and understand the manual completely before installing and commissioning the pump.

Contact BBA Pumps if you have any questions or anything is unclear.

BBA Pumps cannot be held responsible for accidents and/or damage that result from failure to follow the guidelines in this manual.

Keep this manual with the pump. You can order an extra copy of the manual from BBA Pumps.

This manual is part of the pump. If the pump is transferred to another user, this manual must accompany it. Depending on which drive motor/engine is used, this user manual may be accompanied by the manual for the drive motor/engine or it can be found at [www.bbapumps.com](http://www.bbapumps.com) or for North America at [www.bbapumpsusa.com](http://www.bbapumpsusa.com). Read the supplied manual carefully and follow the procedures and safety instructions.

### Version and application

The PT series consists of different types of pumps in various versions. The pump is available as a separate component or as a complete installation. The complete pump unit can be driven by an electric motor or diesel engine and can be mounted on an open frame, on a half-closed frame or in a noise attenuating enclosure. From this point forward we simply refer to an enclosure. For movement of the pump unit around the site, the pump frame can be equipped with wheels and a tow bar.

The pumps are suitable for pumping clean liquids.

#### Note

**Because the PT series consists of a large number of different types of pumps in various versions, the illustrations in this manual may not match the actual situation.**

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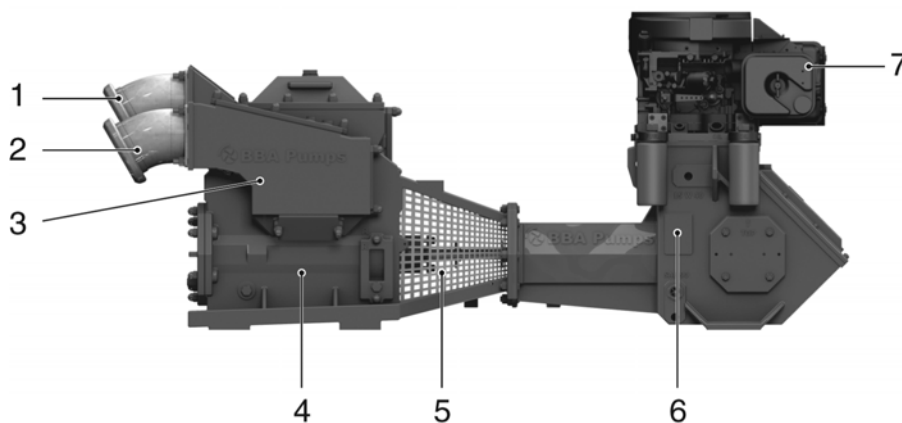
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# 1 Description, application and working principle

## 1.1 Description

The PT series piston pumps have been designed for vertical and horizontal dewatering applications. These high efficiency positive displacement pumps are self-priming and suitable for pumping a mix of water and air under any conditions. Furthermore, these pumps can run dry without damage or excessive wear to any part of the unit. The data sheet that accompanies the pump includes all data for the pump unit. Before the pump unit is connected, an assessment must always be made to determine whether it is suitable for the intended application.

## 1.2 Construction of the pump unit



1. Discharge side
2. Suction side
3. Stone catcher
4. Pump housing
5. Protection screen (depending on pump version)
6. Drive
7. Engine

## 1.3 Intended use

The PT series piston pump is only intended for pumping water from filters or drainage hose(s), NOT for pumping dirty water drawn directly from the suction hose, with or without a strainer.

Long fibres will cause immediate malfunctions. The maximum permissible particle size is 5 mm.

Contamination results in accelerated wear of the gland packing, gaskets, valve seals, cylinder sleeves and piston cups.

The PT series piston pumps are suitable for pH-neutral water (pH value 7) at a maximum temperature of 30 °C and not for chemically polluted water or water with a pH value higher than 7.

For liquids other than water, pH values higher than 7 or temperatures higher than 30 °C you must contact BBA Pumps and ask whether the pump unit can be made suitable for such use.



**Caution**

The pump units in the PT series are not intended for pumping liquids containing larger suspended solids. Damage resulting from pumping liquids other than clean water containing no solids is excluded from coverage under the warranty.

## 1.4 Unintended use

- It is not permitted to use the pump unit for pumping salt water.
- It is not permitted to use the pump unit for pumping liquids containing larger suspended solids.
- It is not permitted to use the pump unit for pumping flammable and/or explosive substances.
- It is not permitted to deploy a standard pump unit in an environment in which there is a danger of fire and/or explosion.
- It is not permitted to deploy a standard pump unit in an ATEX environment.
- Use the pump unit only for those applications listed on the specification sheet for the pump unit.
- It is not permitted to use the pump unit for any application and/or field of activity other than that for which the pump unit was originally specified and installed without written permission from BBA Pumps.



**WARNING**

BBA Pumps is not responsible for incorrect use and/or application of the pump unit.

## 1.5 Warranty

See the BBA warranty book for the warranty conditions.

## 2 Data

### 2.1 Specification sheets

For a detailed overview of the data, dimensions and weights, see the specification sheet for the pump unit concerned at [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com).

### 2.2 Noise level

Because the pump, with or without the drive unit, is usually part of a complete installation, the final configuration is usually not known at the time of delivery. The noise level also depends in part on the noise production of the other components in the installation.

BBA Pumps conducts random noise measurements on a complete installation. The measurements are taken at a distance of 1 m (3.3 ft) and a height of 1.6 m (5.2 ft). The average of the measured values is less than 80 dB(A).

These measurements do not take the drive system or piping into consideration. It is assumed, however, that the pump is set up/installed in accordance with the instructions and is operating without cavitation.

#### Correction in dB(A) as a function of the distance from the sound source

Distance (metric)	Distance (imperial)	Correction
metres	feet	dB(A)
1	3.3	8.0
5	16.5	22.0
10	33	28.0
15	49.5	31.5
20	66	34.0
25	82.5	35.9
30	99	37.5
35	115.5	38.9
40	132	40

**LwA value -/- Correction = dB(A)**

Example:

Measured LWA value	76 dB(A)
Distance	7 m (23.1 ft)
Correction	24.9 dB(A)
Noise level	51.1 dB(A)

### 2.3 Applied directives and standards

The pumps from the PT series are affixed with the CE marking. This means that these pumps conform to the applicable European directives on health and safety. The applied directives are listed in the EC Declaration of Conformity.

The pumps from the PT series also conform to the harmonised standard NEN-EN 809:1998+A1:2009 'Pumps and pump units for liquids - Common safety requirements'.

## 3 Warnings and safety instructions

### 3.1 Warning and safety symbols

This manual contains warning and safety symbols. Do not ignore the instructions. They are provided for the benefit of your health and safety and to prevent damage to the environment and the pump unit.



#### **DANGER**

When the danger symbol with the text **DANGER** is shown, it is accompanied by information that is of great importance for the safety of everyone concerned. Ignoring the information can result in injury (possibly severe) or even death.



#### **WARNING**

When the warning symbol with the text **WARNING** is shown, it is accompanied by information that is of great importance for everyone concerned with the pump unit. Ignoring the information can result in injury or damage (possibly severe) to the pump unit.

### 3.2 Safety instructions – general

The pump unit conforms to the European Machinery Directive. However, this does not exclude the possibility of accidents if used incorrectly.

Use of the pump for an application and/or deployment of the pump in an environment other than defined at the time of purchase is strictly prohibited and can result in a hazardous situation.

This is particularly true for corrosive, toxic or other hazardous liquids. The pump unit may only be installed, operated and maintained by persons who have received appropriate training and are aware of the associated dangers.

The installer, operator and maintenance personnel must comply with the local safety regulations. The company management is responsible for ensuring that all work is performed by qualified personnel in a safe manner. It is not permitted to make changes to the pump unit without written permission from BBA Pumps.

If any changes are made to the pump without the written permission of BBA Pumps, BBA Pumps disclaims all liability. Hearing protection must be worn if the noise emission level exceeds 85 dB(A).

It is not permitted to tow a pump unit fitted with wheels and a tow bar on public roads; these provisions are only intended for moving the pump unit around the site.

### 3.3 Safety instructions – pump

Do not exceed the limit values of the pump curves. See the specification sheet for the pump concerned at [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com).

Ensure that hot/cold and rotating parts of the pump are shielded adequately to prevent unintentional contact.

It is not permitted to start the pump if such guards are missing or damaged.

The company management must ensure that everyone who works with/on the pump unit is aware of the type of liquid that is being pumped. These persons must know what measures are to be taken in the event of leakage.

Dispose of any liquids that have leaked, in a responsible manner. Observe local regulations.

If pumping liquids with a temperature of 50 °C (122 °F) or higher, the hot surfaces of the pump and piping must be shielded. Apply 'hot surface' warning symbols.

If volatile and/or hazardous liquids are being pumped, the hazards of these substances must be taken into consideration when performing work on the pump unit. Make use of personal protective equipment and provide sufficient ventilation.

Never allow the pump unit to run with a blocked discharge line. The heat build-up could lead to an explosion.



#### **WARNING**

**Use certified lifting equipment with an adequate lifting capacity and always lift from directly above. Lifting from an angle can lead to dangerous situations.**

**Lifting work may only be performed by appropriately authorised personnel.**

**Because many different versions of the pump unit are available, only general instructions are provided. See the specification sheet for the particular pump unit for the weight and dimensions at [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com).**

### 3.4 Safety instructions – electric driven pump unit

The electrical system must be in compliance with the regulations of the local electricity producer and the EN 60204-1 standard.

The electrical system to which the pump unit is connected must be equipped with a reliable safety circuit.

If the electrical system is deficient in any way, the pump unit may not be started.



### 3.5 Safety instructions – diesel driven pump unit

- Never run the engine in an enclosed space.
- Provide a proper gas-tight discharge for exhaust gases.
- Provide sufficient ventilation.
- Never fill the fuel tank while the engine is running.
- Wear hearing protection while in the vicinity of a running engine.



#### **DANGER**

**Exhaust gases contain carbon monoxide. Carbon monoxide is a colourless, odourless and deadly gas which, when inhaled, prevents the body from absorbing oxygen, resulting in asphyxiation. Severe carbon monoxide poisoning can result in brain damage or death.**

### 3.6 Safety instructions – during maintenance and repair

Work may only be performed on the pump unit when it has been put out of operation.

Follow the procedure described in this manual to put the pump unit out of operation.

Ensure that all pressure within the pump unit has been relieved before beginning the work.

When opening the pump follow all the instructions for handling the pumped liquid, such as those concerning protective clothing, safety goggles, no smoking, etc.

Consult the Material Safety Data Sheet (MSDS) for the pumped liquid.

If the pump unit is being used to pump a hazardous liquid, it must first be cleaned and neutralised.

Protect the drive motor against unintended and unauthorised activation throughout the duration of the work activities.

Maintenance work on the electrical system may only commence after the power supply has been disconnected and may only be performed by personnel who have been trained and authorised to do so.

In the interest of safety, only use parts purchased from or approved by the supplier.

Modifications to the pump unit or the application are only permitted after consultation with the suppliers. The reliability of the pump unit can only be guaranteed when the pump unit is used for the application and in the manner for which it is intended, as specified at the time of delivery.

When the work is complete, all the safety provisions and protective measures must be reinstalled and made functional.

Review the operating instructions before restarting the pump unit.

### 3.7 Training and knowledge level of personnel

The company management must ensure that all the maintenance, inspection and installation work is performed by authorised and qualified personnel who possess the required level of knowledge concerning the BBA pump.

The responsibilities of the concerned personnel and the personnel responsible for their supervision must be explicitly defined by the company management. If the personnel have insufficient knowledge, the company management must arrange for suitable training, provided by the supplier or manufacturer of the pump.

The company management must also ensure that the content of this manual is clear to all employees who work with/on the pump unit.

### 3.8 Environmental protection






Pollution poses a serious threat to the environment. The following rules must be observed to prevent environmental pollution:

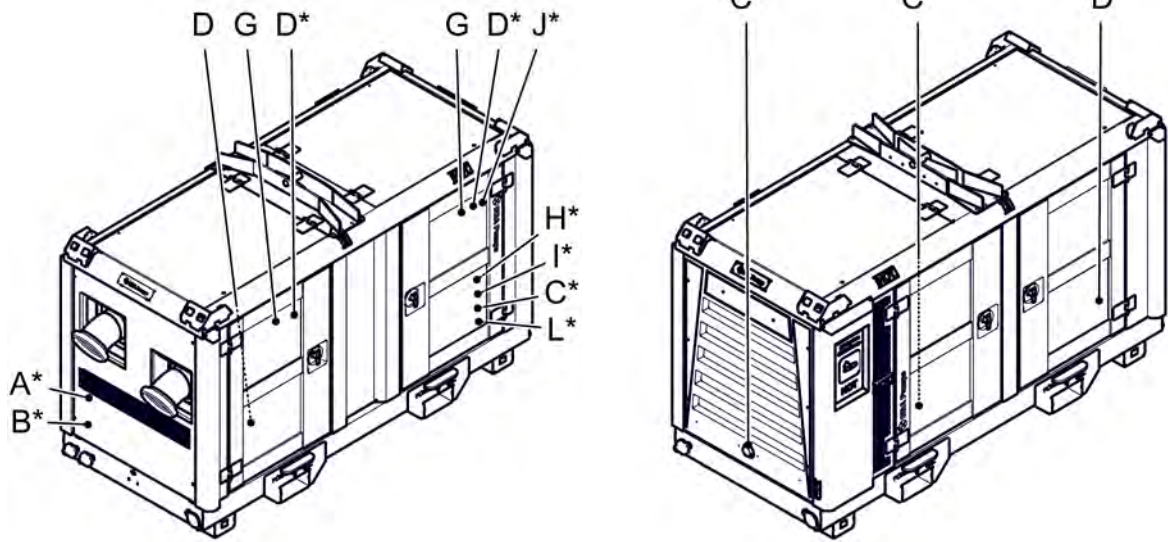
- Check the pump unit and the connected piping for leaks on a regular basis.
- If an external fuel tank is used, the connections and routing of the piping must be checked carefully. Use only pipes and connections made of materials suitable for diesel. The use of incorrect materials, or pipes that are incorrectly connected, can result in leaks that can cause environmental damage.
- Do not dispose of any environmentally harmful substances in drains, sewers or on the ground. This is illegal and punishable.
- Keep environmentally harmful substances separate and submit them to a designated disposal facility for processing or destruction.
- Maintain the pump unit in accordance with the instructions.

### 3.9 Warning stickers

Warning stickers are applied to the pump unit as applicable to the specific version. Make sure these symbols are and remain clearly legible.

## Pumps PT series

- A**  Label for the transport of hazardous materials (hazardous goods) in accordance with the safety standard for the transport of hazardous goods.  
The UN 1202 class 3 placard indicates the presence of gas oil, diesel fuel or light heating oil.
- B**  Diesel is hazardous to the environment, with substantial remediation costs if it leaks into a drain, waterway or the ground.
- C**  Caution: hot surface
- D**  Caution: crushing danger
- E**  Oil
- F**  Hazardous or irritating substances
- G**  General hazard
- H**  Danger: high voltage
- I**  Danger: magnetic field
- J**  Wear hearing protection
- K**  Instructions for use
- L**  Dispose of in an environmentally responsible manner at the end of the product's useful life.



\* Only applies to diesel driven pump units.

## 4 Receiving, transport and storage

### 4.1 Receiving

Carefully check the pump unit upon receipt for any damage that may have occurred during transport. Check whether the shipment matches the bill of lading. Report any damage or incomplete shipment to the transporter straight away. The transporter must immediately note this on the shipping documentation.

### 4.2 Transport



**WARNING**

Always disconnect all external connections before moving the pump unit.



**WARNING**

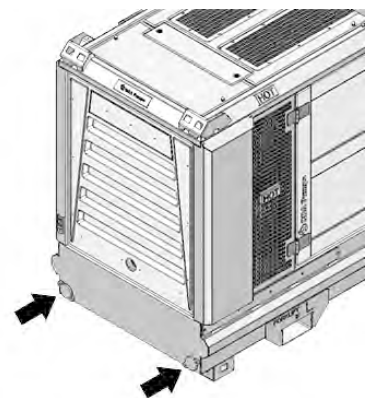
Use certified lifting equipment with an adequate lifting capacity and always lift from directly above. Lifting from an angle can lead to dangerous situations. Lifting work may only be performed by appropriately authorised personnel. Because many different versions of the pump unit are available, only general instructions are provided. See the specification sheet for the particular pump unit for the weight and dimensions at [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com).

**Note**

Contact BBA Pumps if you have any questions or when in doubt.

To prevent liquids from leaking and causing dangerous situations during transport of the pump unit, the following precautionary measures must be taken:

- Disconnect the suction and discharge lines from the pump.
- If an external fuel tank was used, the fuel lines from the external tank must be disconnected. Take necessary measures to contain any draining fuel.
- Drain any liquid that is present in the pump unit.
- Clean the pump unit.
- Drain the drip tray under the tank via the drain plugs (see figure). Make sure that no diesel or oil is released into the environment.



### 4.3 Lifting instructions PTclassic / PT130 / PT150 pump unit



**DANGER**

Never walk under a raised load. This can result in a life-threatening situation.



**WARNING**

Always disconnect all external connections before moving the pump unit.



**WARNING**

Neither the lifting eye on the engine nor the lifting eye of the (bare shaft) pump may be used for transport of the pump unit.

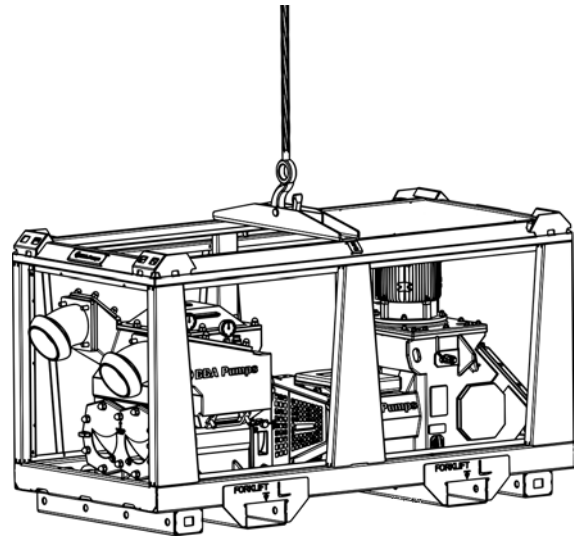
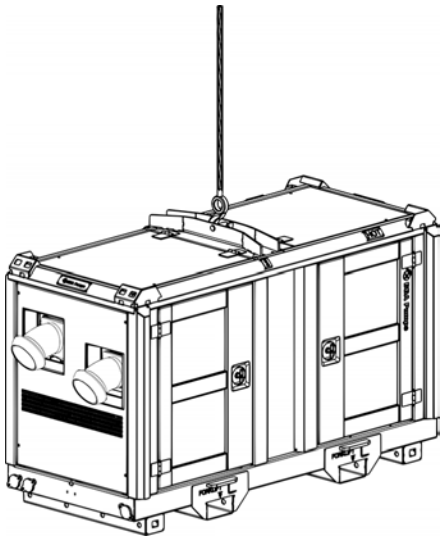


**WARNING**

Lifting forces must be as vertical as possible; the maximum lifting angle is 15°.

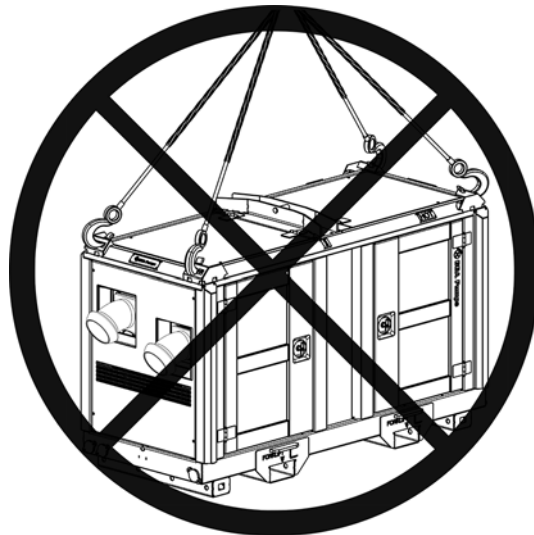
**Pump unit in enclosure or on frame**

There is a lifting eye located on the top of the enclosure. Only lift the unit from this lifting eye.



**WARNING**

If the pump unit is installed on a swampy or muddy surface, the installation may be 'stuck' to the ground.



**DANGER**

**NEVER** move or lift the pump unit by the angle profiles on top of the enclosure or stacking frame.



**DANGER**

The standard lifting eyes on BBA pump units, both in low-noise enclosure and open frame, are **NOT** designed to lift the additional weight of trailers or other components. It is strictly forbidden to use the standard lifting provision to lift or move the pump units with a higher total weight than stated in the specification sheets. This can result in a life-threatening situation.

#### 4.4 Lifting instructions PT200 pump unit



**DANGER**

**Never** walk under a raised load. This can result in a life-threatening situation.



**DANGER**

**NEVER** move or lift the pump unit by the angle profiles on top of the enclosure or stacking frame.



**WARNING**

**Always** disconnect all external connections before moving the pump unit.



**WARNING**

**Neither** the lifting eye on the engine nor the lifting eye of the (bare shaft) pump may be used for transport of the pump unit.

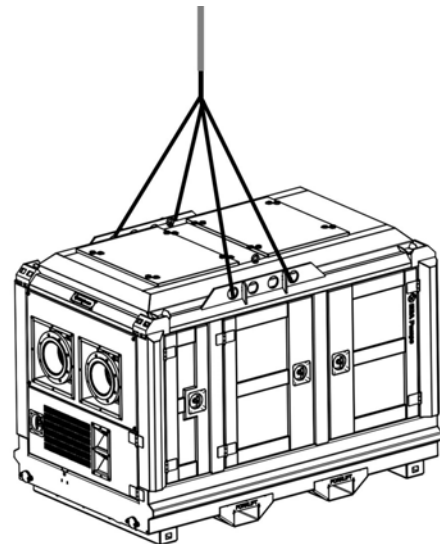
**WARNING**

Lifting forces must be as vertical as possible; the maximum lifting angle is 15°.

**Pump unit in enclosure**

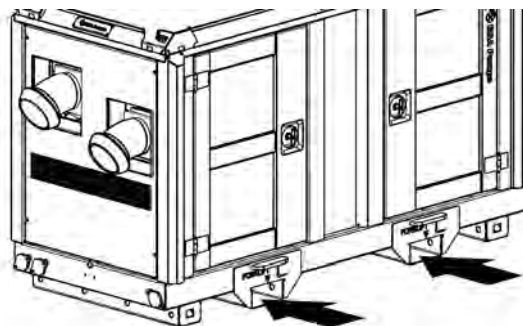
There are four lifting eyes located on the top of the enclosure.

Use only these lifting eyes for lifting operations. Select lifting eyes on both sides so that the pump unit is in balance.



## 4.5 Moving the pump unit with a forklift

Forklift pockets (if present) can be used for moving the pump unit with a forklift. The forks of the forklift must be inserted into these pockets to lift the pump unit.





## 4.6 Storage/preservation 6-12 months

When pumps are shipped they may be coated with a preservation agent. This remains effective for 6-12 months.

If the pump is to be stored for 6-12 months, the pump must be drained.

The pump must be stored in a covered, well-ventilated area. Temperatures below freezing and high humidity must be avoided.

## 4.7 Storage longer than 6-12 months

For storage longer than 6-12 months, take the following measures:

1. Apply a layer of preservation agent to all unpainted parts and rotating parts.
2. Seal the suction flange liquid-tight.
3. Seal the connection for flushing, circulation or cooling (if present).

### Note

**The type of preservation agent to be used depends on the materials and the application. Consult BBA Pumps for the correct preservation agent.**

1. Fill the pump with preservation agent.
2. Seal the pressure flange liquid-tight.



### WARNING

**The BBA pump units may be stacked for storage purposes. Pump units may not be stacked more than two high. Consult the specification sheet to check whether the pump unit concerned is stackable.**

## 4.8 Inspection during storage

1. Make sure the pump units are not stacked more than two high (if applicable).
2. Check the level of the preservation agent once every three months. Add additional preservation agent if necessary.
3. If the pump is to be stored for 6-12 months, the pump must be drained.

## 4.9 Transport of pump with preservation agent

Prior to transport, check the pump for leakage of preservation agent.



### WARNING

**Leakage of preservation agent can cause the floor to become dangerously slippery and may lead to preservation agent entering the environment.**

## 4.10 Removal of preservation agent

Mineral-based lubrication oil is used as the preservation agent.

Drain the preservation agent before putting the machine in operation.

If the preservation agent is detrimental to the pumped liquid, flush the pump thoroughly.

1. Drain the preservation agent. Contain the liquid (see 9.10 'Draining the pump').
2. Flush the pump thoroughly. Capture the liquid.
3. Dispose of the preservation agent and flushing liquid in a responsible manner.

### Note

**If preservation agent is to be applied again, do not reuse the old preservation agent.**

## 5 Pump unit installation

### 5.1 Placement – general



**WARNING**

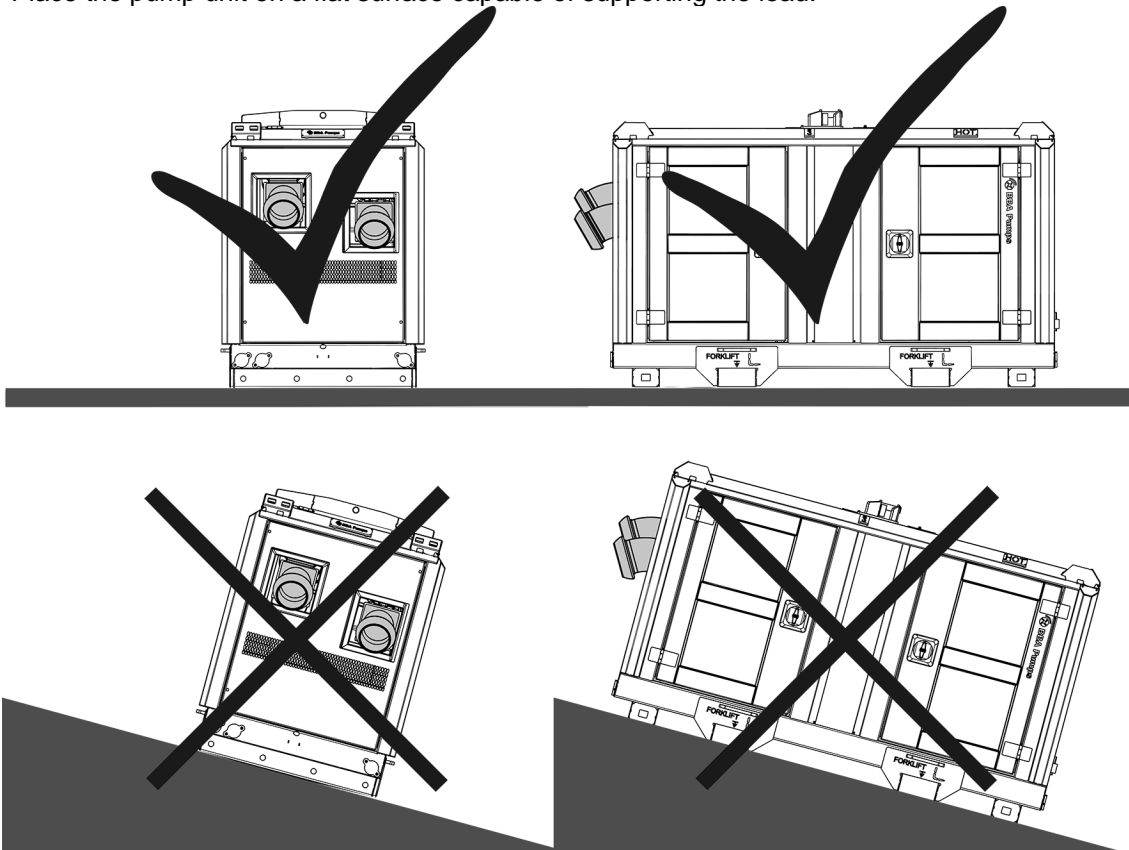
Failure to follow the guidelines for the placement and installation of the pump can result in danger to the user and/or severe damage to the pump unit.

**Note**

BBA Pumps is not responsible for accidents and damage that result from failure to follow the guidelines in this manual. Such use results in forfeiture of the right to assert any warranty or damage compensation claims.

Because many different versions of the pump unit are available, only general instructions are provided. See the specification sheet for the particular pump unit for technical data. Contact BBA Pumps if you have any questions or when in doubt.

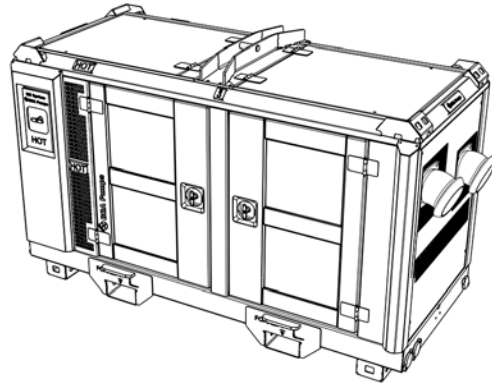
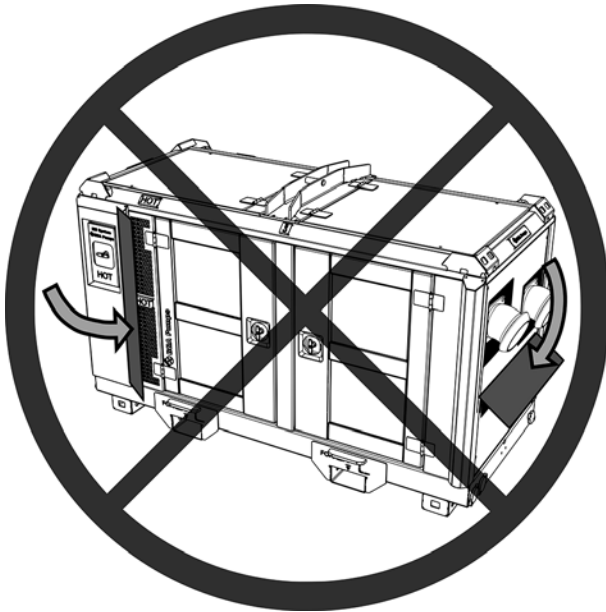
- Place the pump unit on a flat surface capable of supporting the load.



- Make sure there is sufficient space around the pump unit for operation and maintenance activities.

**WARNING**

Make sure nothing is covering any of the sides of the pump unit, because the sides of the pump units are used to dissipate heat. The diesel drive pump unit also uses the sides for the intake of combustion air and exhaust of combustion gases.



- When pumping hot liquids, ensure that there is sufficient air circulation to prevent bearings and lubricants from overheating.
- Connect an electric driven pump unit in conformance with local regulations. The cables must be dimensioned in accordance with the specifications.
- For installation of a diesel driven pump unit, see also chapter 7 'Pump unit with diesel drive'.
- For installation of an electric driven pump unit, see also chapter 8 'Pump unit with electric drive'.
- Install the prescribed safeguard(s) in the correct manner.

## 5.2 Outdoor use

The PT pump unit is suitable for outdoor use.

In addition to the general instructions, the following additional requirements must be met:

- Ensure that there is sufficient free space around the air intake so the engine is able to draw as much air as it needs.
- Ensure that there is sufficient free space around the hot air outlet. Maintain at least 2 m (6.6 ft) of clearance.
- Avoid dusty conditions and locations where corrosion or erosion can occur.
- In the case of electric drive: do not exceed the ratings of the electric motor in terms of insulation class and protection class.
- In the case of an electric motor not supplied by BBA Pumps, follow the guidelines provided with the motor.

### 5.3 Indoor use

In addition to the general instructions, the following additional requirements must be met:

- Ensure that the area has adequate ventilation.
- If equipped with a diesel engine, make sure the exhaust gases are discharged outdoors.
- Ensure that there is sufficient free space around the air intake so the engine is able to draw as much air as it needs.
- Prevent high ambient temperature and humidity.
- Avoid dusty conditions and locations where corrosion or erosion can occur.
- In the case of electric drive: do not exceed the ratings of the electric motor in terms of insulation class and protection class.
- In the case of an electric motor not supplied by BBA Pumps, follow the guidelines provided with the motor.

### 5.4 Placement in an area with a potentially flammable or explosive atmosphere

The standard pump unit is not suitable for placement in a potentially flammable or explosive atmosphere. In some cases, after consultation with BBA Pumps and implementation of the prescribed measures, written approval may be provided by BBA Pumps for use of the pump unit in the specified situation.



#### **DANGER**

**Failure to follow the guidelines for use of the pump unit in a potentially flammable or explosive atmosphere can create an extremely dangerous situation.**

### 5.5 Piping guidelines – general

The pipes must comply with the following guidelines:

- Select the diameter and length of the suction and discharge pipes as well as those of any additional components such that the inlet pressure remains above the minimum allowable value. The operating pressure must not exceed the maximum allowable value. The power rating of the installed drive system must be sufficient.
- The diameters of the pipes must be equal to or greater than the connection sizes on the pump.
- If possible, the transition between various pipe diameters must be made with a transition angle of approx. 8 degrees.
- The pipe must be properly aligned with the pump connection.
- It must be possible to connect the flanges of the pipes and pump together without putting any of the parts under stress.
- In the case of vibration and/or hot liquids, install expansion elements in the pipes.
- Support the pipes directly in front of the pump unit. The weight of the pipes and fittings may not be supported by the pump unit.
- The shut-off valves must be of a type that allows straight-line flow, such as in a globe valve. The internal diameter of the shut-off valve must be the same as that of the pipe.
- A shut-off valve in the discharge line may not be used to regulate the flow. A shut-off valve may only be used to depressurise the pump.
- If there is a possibility that a backflow of liquid could cause the pump to turn in the opposite direction when stopped, a non-return valve or shut-off valve must be placed in the piping to prevent this.
- Install measurement instruments in the piping for monitoring during operation.

- If applicable, connect the pump unit to a suitable safety system. This is left to the judgement of the designer of the installation.
- Insulate or shield hot pipes.
- Observe specific regulations that pertain to the suction and discharge pipes.
- Thoroughly clean all parts that come into contact with the transported liquid before putting the pump unit in operation.
- Make sure the pump never pumps against a closed pipe; it is a positive displacement pump.
- Make sure that the discharge line is depressurised before disconnecting it.
- The less resistance the pump has on the discharge side, the more pressure that remains to pump the water away.
- Make sure there is no positive pressure (pre-pressure) on the suction side of the pump; such situations can result in dangerous total pressures and may also damage the pump.



**WARNING**

**The designer of the installation that includes the pump unit is responsible for correct installation of the pump unit.**

**Failure to follow the guidelines can result in an excessive load on the pump unit and/or pipes, which can cause severe damage to the pump unit and/or pipes.**

**Possible leakage of liquid can lead to a dangerous situation.**

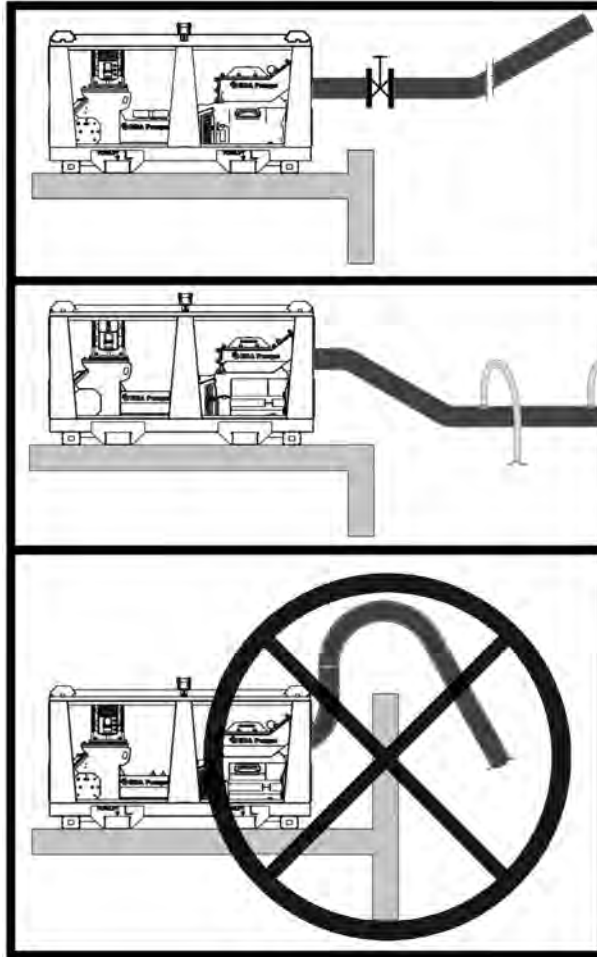
## 5.6 Suction pipe

The suction pipe must meet the following requirements:

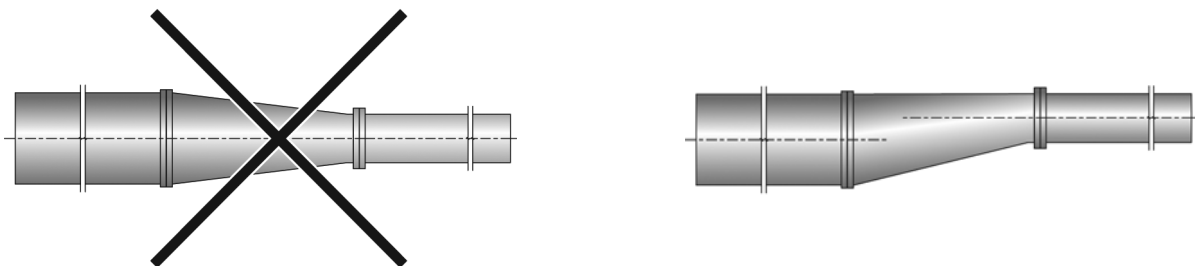
- Place the pump unit as close as possible to the level of the pumped liquid.
- The pipe must be as short as possible.
- Run the pipe so it slopes upwards towards the pump unit to prevent the formation of air pockets.

## Pumps PT series

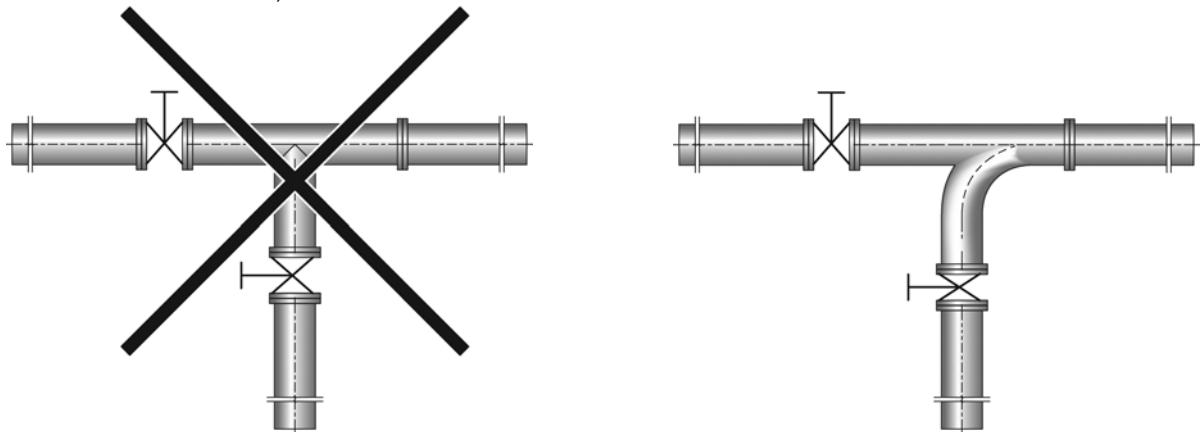
- Lay the pipe so as to prevent the formation of air pockets.



- Use the least possible number of bends.
- Bends must have the largest possible radius.
- The piping system must be completely airtight.
- When there is a change of diameter in the piping, use an eccentric reducer to prevent the accumulation of air.



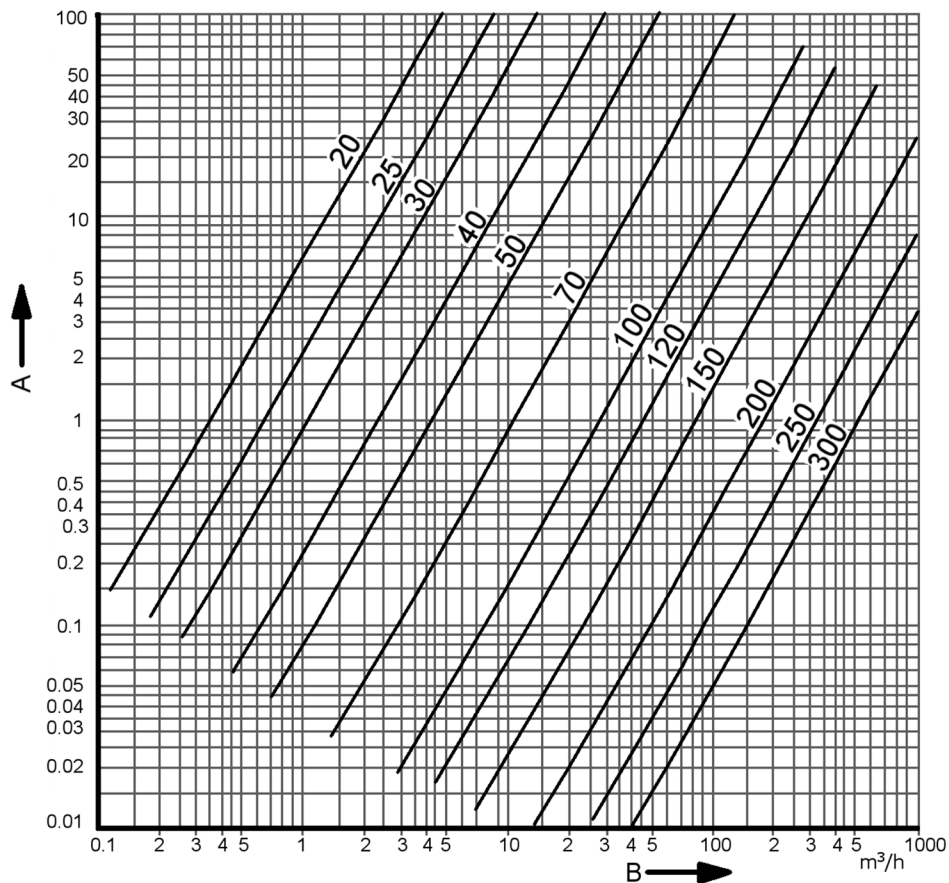
- When a tee is installed, use one with an inflow bend.



**WARNING**

In all cases in which pre-pressure is desired you must contact BBA Pumps for advice. Pre-pressure may not be employed without written permission from BBA Pumps.

- Pipes cause resistance, as shown in the table below. Nomogram for the calculation of the piping resistances, valid for liquids with a viscosity of 1 cSt (e.g. water).





## Pumps PT series

A: Piping resistance in metres per 100 m of pipe:

B: Volume flow

The values shown on the lines in the graph are the pipe diameters in mm.

- The fittings that are used also have resistance. The table below shows the resistance of the fittings converted to the equivalent length of straight pipe (smooth steel pipe).

Internal pipe diameter	Resistance in:					
	Bends		Tee	Shut-off valves		Non-return valve
	90°	45°		Gate	Globe	
mm	m	m	m	m	m	m
100	2.5	1.5	6.7	0.7	34.0	8.5
150	3.7	2.25	10.0	1.1	51.0	12.7
200	5.0	3.0	13.5	1.4	68.0	17.0
Internal pipe diameter	Resistance in:					
	Bends		Tee	Shut-off valves		Non-return valve
	90°	45°		Gate	Globe	
inch	ft	ft	ft	ft	ft	ft
3.94	8.20	4.92	22.0	2.30	112	27.9
5.90	12.1	7.38	32.8	3.61	167	41.7
7.87	16.4	9.84	44.3	4.59	223	55.8

**Recommended diameter of the suction pipe**

Maximum flow rate in suction pipe = 4 m/s (13.28 ft/s)

m/h	US gallons	FLOW (L/sec)	2" 50	3" 75	4" 100	5" 125	6" 150	8" 200	10" 250
7.2	31.7	2	1.02	0.45	0.25	0.16	0.11	0.06	0.04
14.4	63.4	4	2.04	0.91	0.51	0.33	0.23	0.13	0.08
21.6	95.1	6	3.06	1.36	0.76	0.49	0.34	0.19	0.12
28.8	126.8	8	4.07	1.81	1.02	0.65	0.45	0.25	0.16
36	158.5	10	5.09	2.26	1.27	0.81	0.57	0.32	0.20
43.2	190.2	12	6.11	2.72	1.53	0.98	0.68	0.38	0.24
50.4	221.9	14	7.13	3.17	1.78	1.14	0.79	0.45	0.29
57.6	253.6	16	8.15	3.62	2.04	1.30	0.91	0.51	0.33
64.8	285.3	18	9.17	4.07	2.29	1.47	1.02	0.57	0.37
72	317	20	10.19	4.53	2.55	1.63	1.13	0.64	0.41
90	396.3	25	12.73	5.66	3.18	2.04	1.41	0.80	0.51
108	475.5	30	15.28	6.79	3.82	2.44	1.70	0.95	0.61
144	634	40	20.37	9.05	5.09	3.26	2.26	1.27	0.81
180	792.5	50	25.37	11.32	6.37	4.07	2.83	1.59	1.02
216	951	60	30.56	13.58	7.64	4.89	3.40	1.91	1.22

**Dewatering applications**

A piston pump like the PT is designed for wellpoint dewatering and drain dewatering.

What makes this pump especially well suited to these dewatering applications is its ability to handle lots of air.

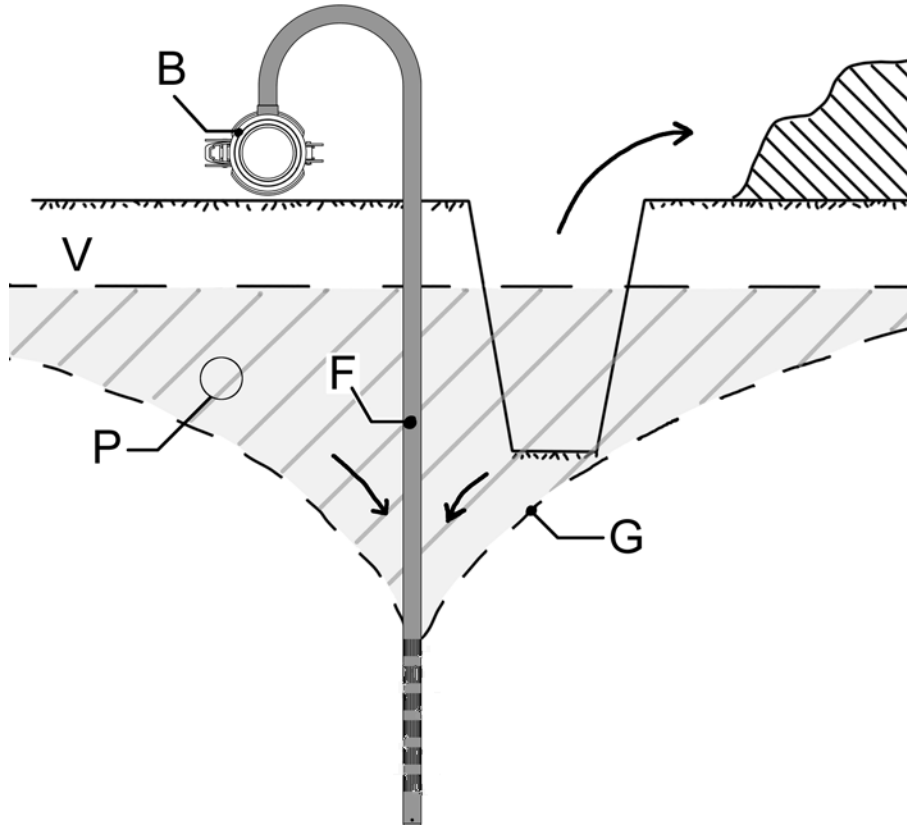
The main dewatering applications for which a PT pump can be used, and their associated characteristics, are listed below.

- Wellpoint dewatering (vertical)
- Drain dewatering (horizontal)

### Wellpoint dewatering

Wellpoint dewatering is used for trench and excavation dewatering.

The drawing shows how groundwater behaves when the system is started, for a trench in the ground.



- B. Header pipe                      V. Water table  
P. Cone of depression          F. Filter  
G. Hydraulic gradient

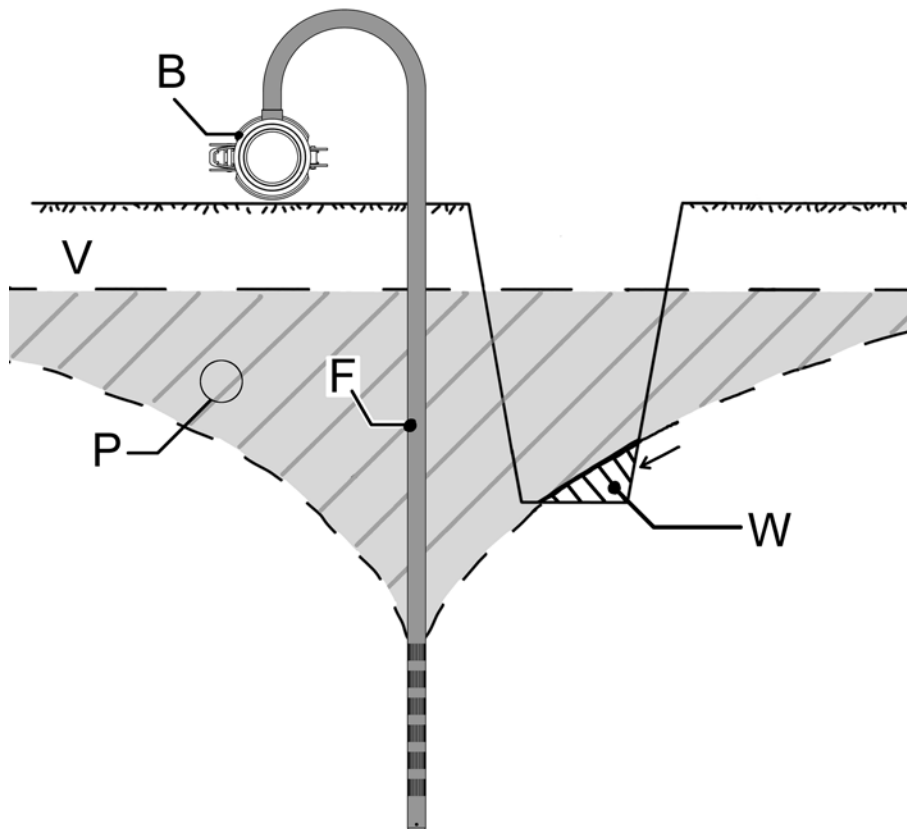
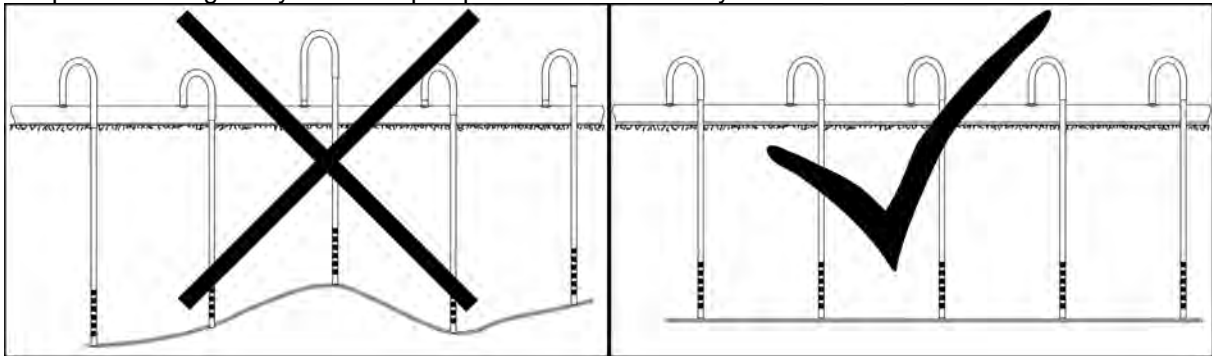
As shown, the water table (groundwater level) forms a cone of depression, until the filter begins to draw air (this line is referred to as the hydraulic gradient). When the filter draws air, the vacuum in the filter will drop, reducing the rate of cone formation until it ultimately stabilises at that level.

The cone's size and shape and the filter's extent (i.e. radius of influence) also depend on the K value (permeability) of the ground.

Instead of placing a filter on one side, it is also possible to place a filter on each side of the trench. The advantage of doing so is that shorter filters can be used. The cone of depression of each filter is then less voluminous, which may also reduce the volume of water that needs to be pumped.

It is important that the filters are placed at the correct depths. If not done correctly and the filter draws air too soon, this can result in the ground being wet at certain places in the trench. This has nothing to do with correct operation of the pump but rather the installation of the dewatering system.

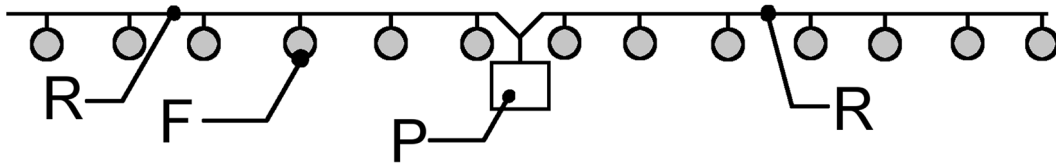
- In the case of wellpoint dewatering, make sure all the filters are at the same height. A filter that is placed too high may allow the pump to draw unnecessary air.



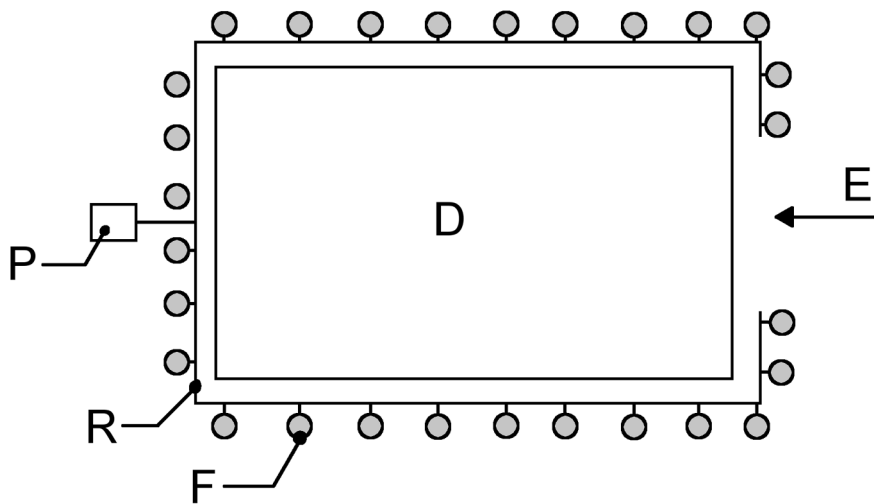
- B. Header pipe
- F. Filter
- P. Cone of depression
- V. Water table
- W. Wash out

## Pumps PT series

It is important that the pump connection to the header pipe is placed as close to the middle of the system as possible. This results in the best possible build-up of vacuum in the header pipe.



Dewatering systems with filters at construction pits must often be arranged around the construction pit (in a U-shape). In this configuration the filters are generally placed at two metre (6.6 ft) intervals. The dewatering system must be 'open' on one side to provide access to the construction pit. The filters at a construction pit must be placed deeper than for dewatering of a trench. This is because hydraulic gradients must be 'flatter' to extend underneath a construction pit. The pump connection for this dewatering application should likewise be placed as close as possible to the middle of the header pipe.



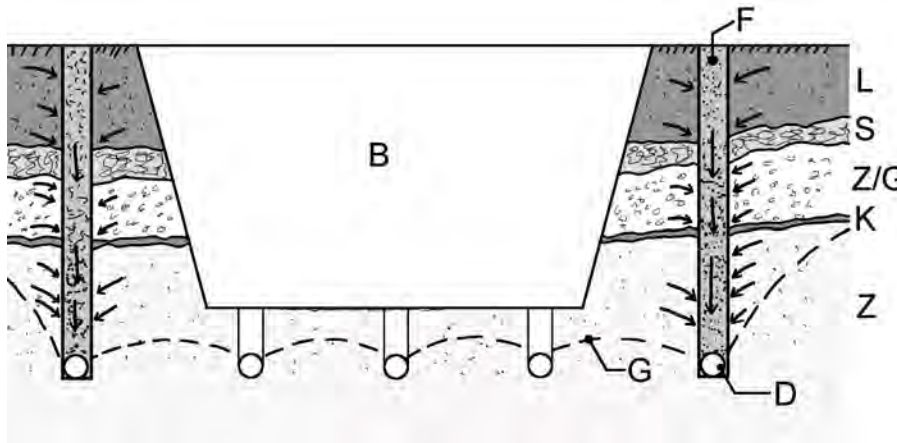
- |                |                     |
|----------------|---------------------|
| F. Filter      | P. Pump             |
| R. Ring main   | D. Construction pit |
| E. Site access |                     |

**Drain dewatering**

Drain dewatering is a relatively quick and inexpensive dewatering technique. When installed and backfilled properly, this system is also suitable for use in many situations.

The required pump capacity determines the length of the drain.

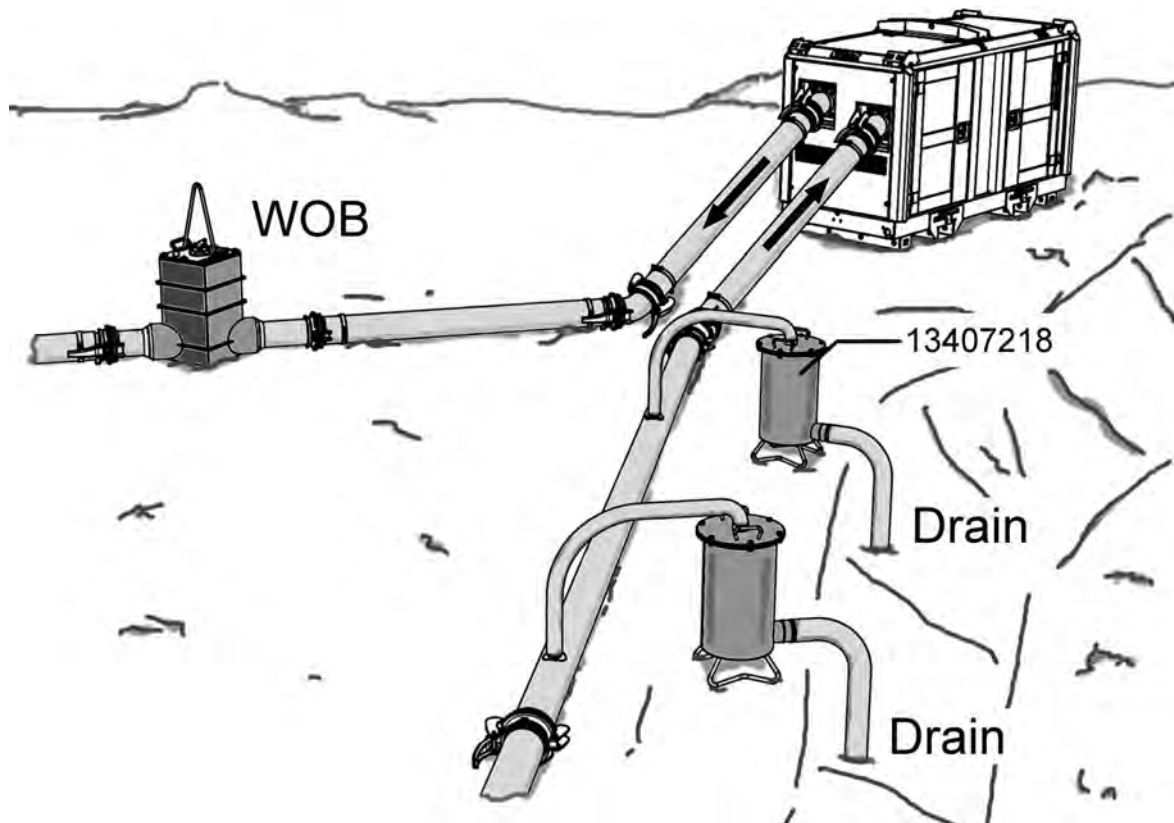
Because the drain can be placed close to or just below a trench, the required lift height is kept to a minimum. Important things to keep in mind are that the drain must be properly sealed at the end and that the drain must be carefully backfilled with filter gravel or coarse sand.



- |                       |                                |                          |
|-----------------------|--------------------------------|--------------------------|
| L. Ground             | B. Construction pit            | F. Gravel or coarse sand |
| K. Clay layer         | S. Layer with low permeability | Z/G. Sand/ Gravel        |
| G. Hydraulic gradient | Z. Sand                        | D. Drain                 |

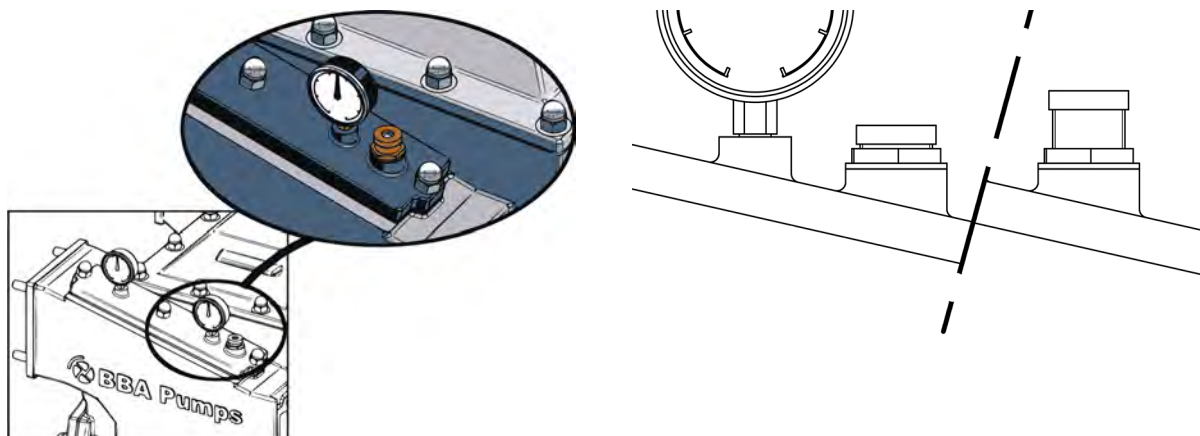
## Pumps PT series

If multiple drains are connected to a piston pump, it is advisable to place a sock flow control unit between the drain and the pump. When a drain produces lots of air, it is mechanically closed off so that the remaining drains remain under vacuum.



### Regulating vacuum on suction line

If it is necessary to reduce the vacuum on the header pipe somewhat, this can be accomplished by slightly readjusting the blow valve on the pump. This results in a bit of air leakage developing in the pump at the stone catcher, which will slightly reduce the total vacuum on the header pipe.

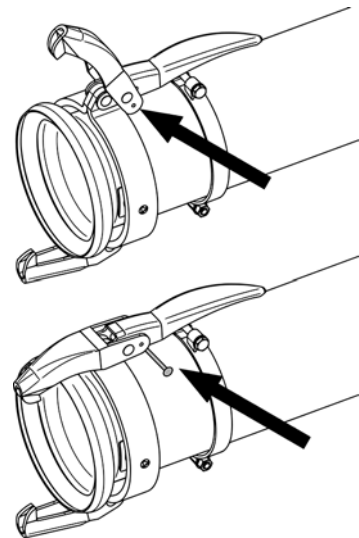


Unscrewing the nipple increases the bleed air from the vacuum regulator valve.

**Locking**

If there is a high risk of lines being disconnected by vandals, the line couplings must be locked. Holes are provided in the handles for insertion of locking pins.

If these are not present, straps must be placed around the handles so they cannot be lifted.

**5.7 Discharge line**

- The designer of the installation is responsible for including the required safeguards, such as protection against overpressure.
- To prevent pipe losses, use the fewest number of bends possible.
- When the discharge line is long or when a non-return valve is used in the discharge line directly after the pump, install a bypass line, fitted with a shut-off valve. Connect the bypass line to the suction pipe or suction point.

**WARNING**

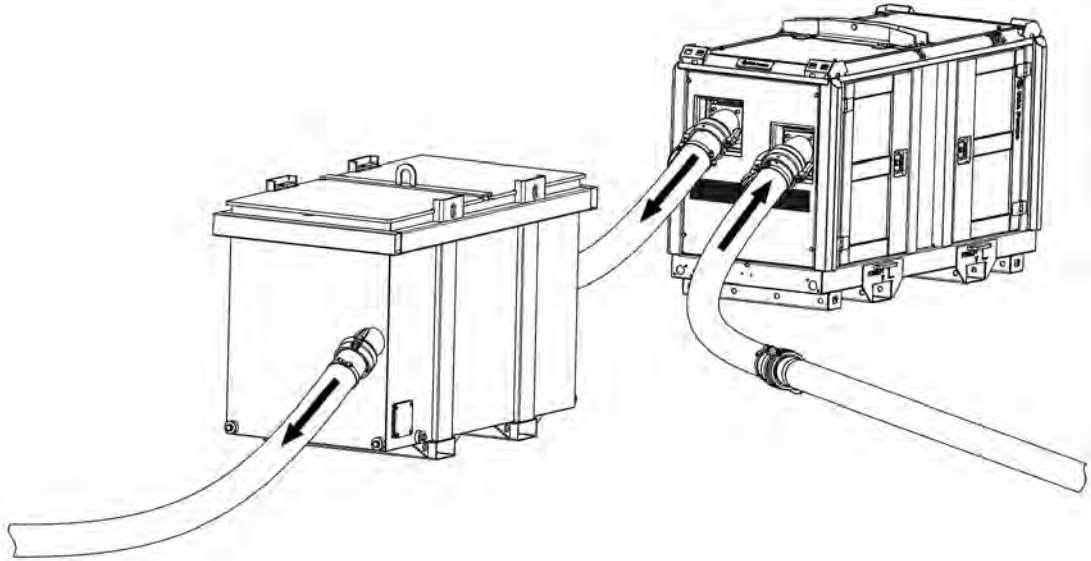
**Prevent sudden closure of the discharge line that would cause water hammer.**

- If there is a danger of water hammer, install a bypass, accumulator or pressure safety valve in the discharge line.
- Ensure that the discharge line is as short as possible.
- Ensure that the discharge line has the correct diameter so it does not cause unnecessary pressure loss.
- Avoid the use of flat rollable hose on the pressure side. This increases the risk of kinking, which results in pressure build-up. Such hoses are also at risk of being flattened during work at a construction site.
- When multiple pumps are connected to a discharge line, make sure that non-return valves are installed; this is necessary to prevent water from flowing back into the construction pit through a pump if it fails.
- Make sure the pump never pumps against a closed pipe; this is a positive displacement pump, and such situations can cause dangerous pressures to develop in the discharge line.
- Before a pressure line is disconnected, make sure the pressure has been relieved from the discharge line.



## Pumps PT series

- If requested or required, use a sand collector, de-aeration unit and/or a flowmeter at the water discharge point.



- Make sure you are up to date on local regulations concerning the discharge of water.
- Make sure the maximum system pressure does not exceed 3 bar (43.5 psi).

## 6 Pump – general

### 6.1 Preparation for starting the pump unit

The PT series pumps are self-priming piston pumps with leather piston cups. When the piston cups are wet they expand against the cylinder sleeve so that the pump can build up vacuum. Therefore the pump housing must be filled with water.

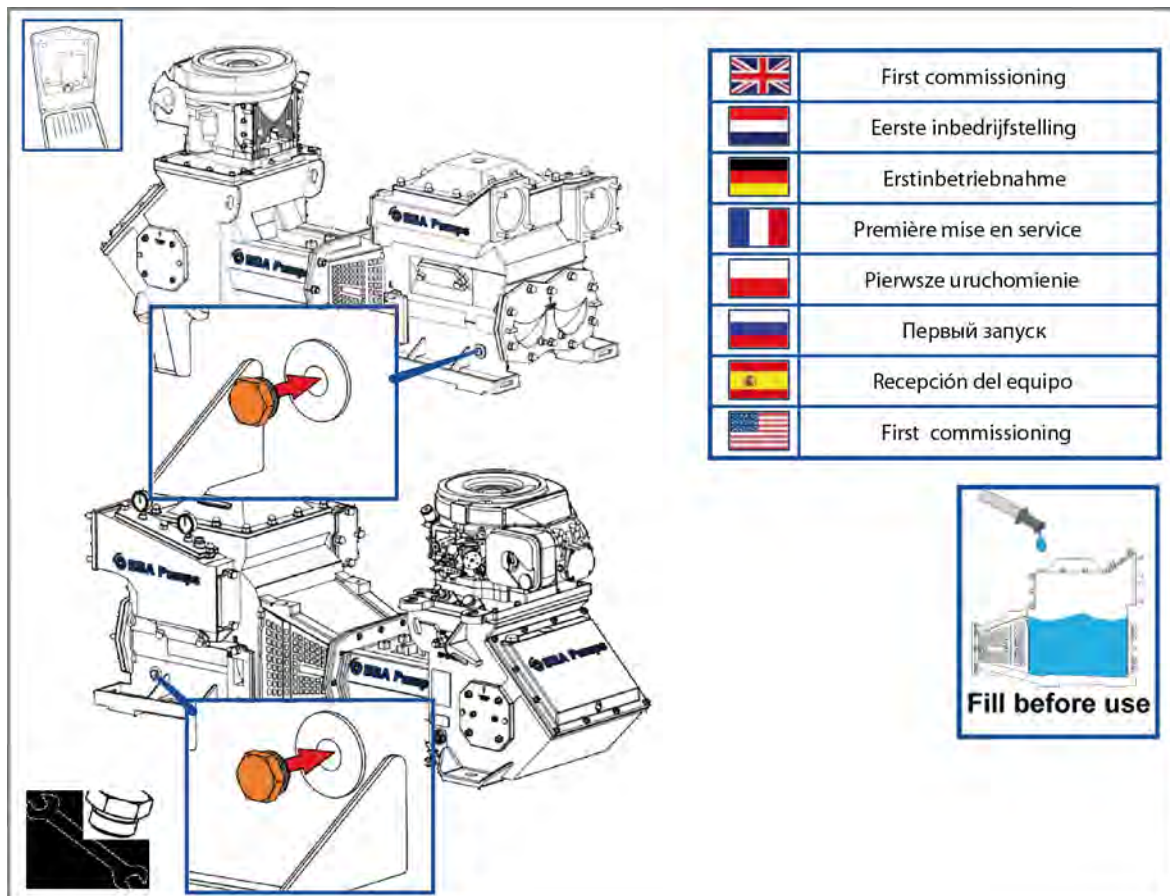
To fill the pump housing with water:

1. Remove the upper cover from the stone catcher.
2. Fill the stone catcher with water.
3. Close the cover.
4. Use the discharge connection to fill the valve housing with water.

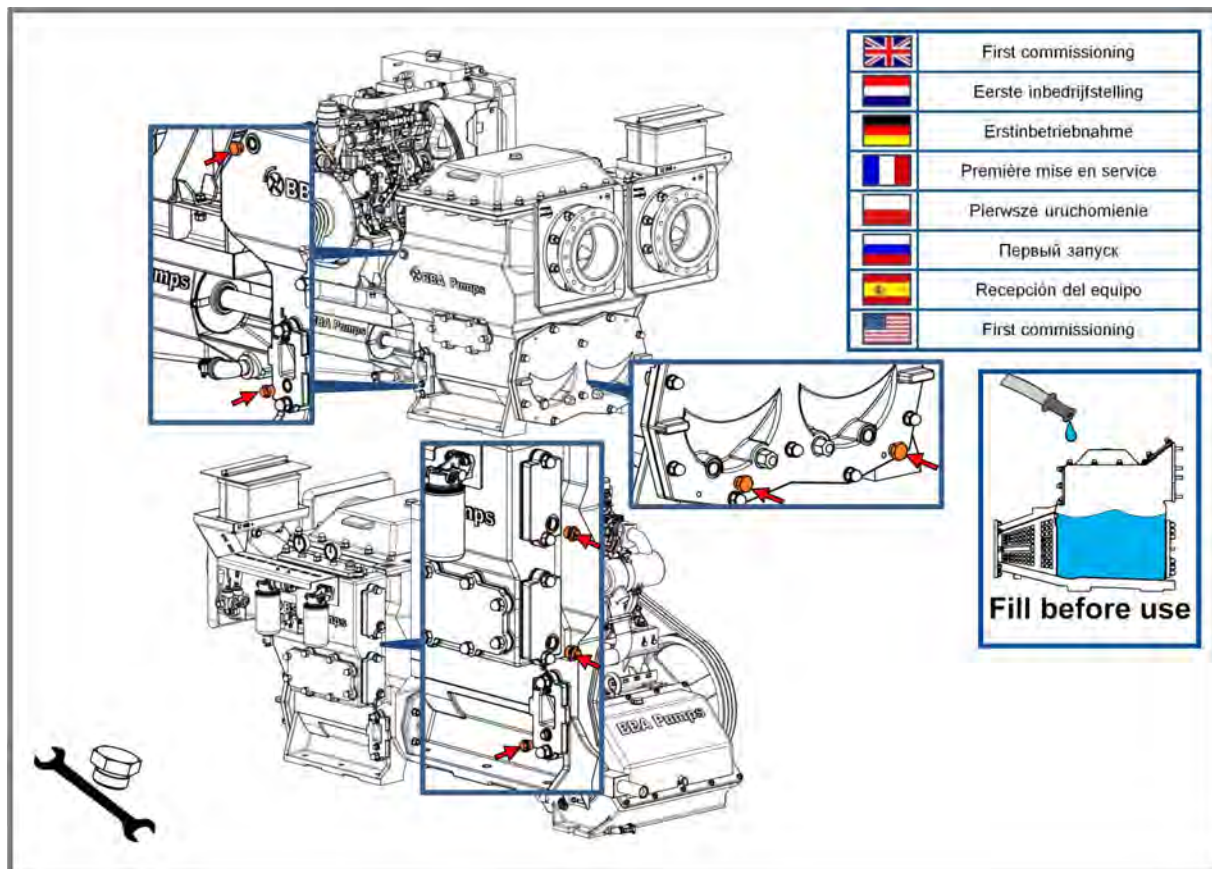
### 6.2 First commissioning

The pump unit is delivered from the factory without the drain plugs installed. This is to prevent possible damage caused by the freezing of residual water during shipping. The plugs must be installed prior to first commissioning (see sticker on the pump unit).

#### PT150



PT200



### 6.3 Preparations for starting

1. Check the oil level in the pump and engine.
2. If applicable, check whether the pump has been preheated to an adequate temperature (whether it is necessary to preheat the pump depends on the pumped liquid and the ambient conditions).
3. Completely open the suction and discharge shut-off valves.
4. In the case of a bypass line, open the shut-off valve in the bypass line.
5. On a non-enclosed pump set, check whether the protection grilles are in place over the piston rods (see 1.2 'Construction of the pump unit').
6. In the case of an electric driven pump, check whether the direction of rotation of the pump matches that of the motor.
7. Check whether all the drain plugs and covers are in place.

## 6.4 Starting

The pump must be at a standstill before starting.



### WARNING

A piston pump is a positive displacement pump. Therefore make sure the pressure that will build up in the pump during starting can escape through the piping system. If the pump cannot discharge the pressure, dangerous situations can develop, resulting in a potential explosion in the pump or piping system.

If the pressure in the piping system is high, ensure that there is a bypass line for use during starting.

If a flat rollable hose is used on the discharge side of the pump, ensure that the hose is not kinked, which would cause pressure build up.

### Note

It is recommended that a diesel unit be allowed to run briefly (5 minutes) to reach operating temperature before the hoses are connected to start the dewatering.

1. Start the pump motor/engine.
2. If the pump is dry, the pump housing must first be filled with water.
3. In the case of a bypass line, close the shut-off valve in the bypass line when the pump builds up pressure.
4. Check whether the piston pump is producing vacuum (i.e. is drawing in the liquid).



### WARNING

If vibration occurs during starting, stop the pump immediately and eliminate the cause before starting again.

5. Check the rpm of the pump.
6. Check the pressure and suction lines for leaks.
7. Check the pump for proper operation.
8. Check whether the gland packing is dripping. It must be adjusted so one drop of water drips every five seconds. Loosen the gland packing a bit if it drips more slowly, and tighten it a bit if it drips more quickly.



### DANGER

Pump must never pump against a closed shut-off valve! Otherwise there is a danger of explosion in the pump or the piping system.



### WARNING

Dewatering activities will have an impact on the surrounding area in which water is being extracted from the ground.

Settling of the ground occurs during groundwater extraction. This can result in grains of sand moving closer together, which will have an impact on the ground. This can cause cracks in buildings and pipes. It can also result in rotting of wooden foundation piles if the groundwater is kept at a low level for an extended period of time.

Before starting a dewatering system, make sure a sound dewatering plan has been prepared and that the impact on the surrounding area is clear.

## 6.5 Monitoring during operation

1. During operation check the pump regularly for correct operation, smooth and vibration-free running, abnormal noises and leaks.
2. If the pump has pumped for a long time without having moved water, the pump housing must be filled with water, because the piston cups shrink after having run dry for a long time. Once the pump housing is filled with water, the piston cups will slowly swell again so they are in contact with the cylinder walls.
3. Check whether the gland packing is leaking; it must be adjusted so one drop of water drips every five seconds. Loosen the gland packing a bit if it drips more slowly, and tighten it a bit if it drips more quickly.
4. The maximum permissible ambient temperature is 40°C (104°F). The temperature of the bearings may not exceed 110°C (230°F).

### Note

Use for higher temperatures is only permitted after consultation with the supplier.



#### WARNING

In the event of a fault or incorrect operation, stop the pump. Determine and correct the cause before restarting the pump.

## 6.6 Switching off

1. Switch off the drive motor. Observe whether the pump unit comes to a gradual, smooth stop.
2. Before the pump is shut down, check whether this has an impact on the dewatering system.
3. Close the shut-off valve (if present).



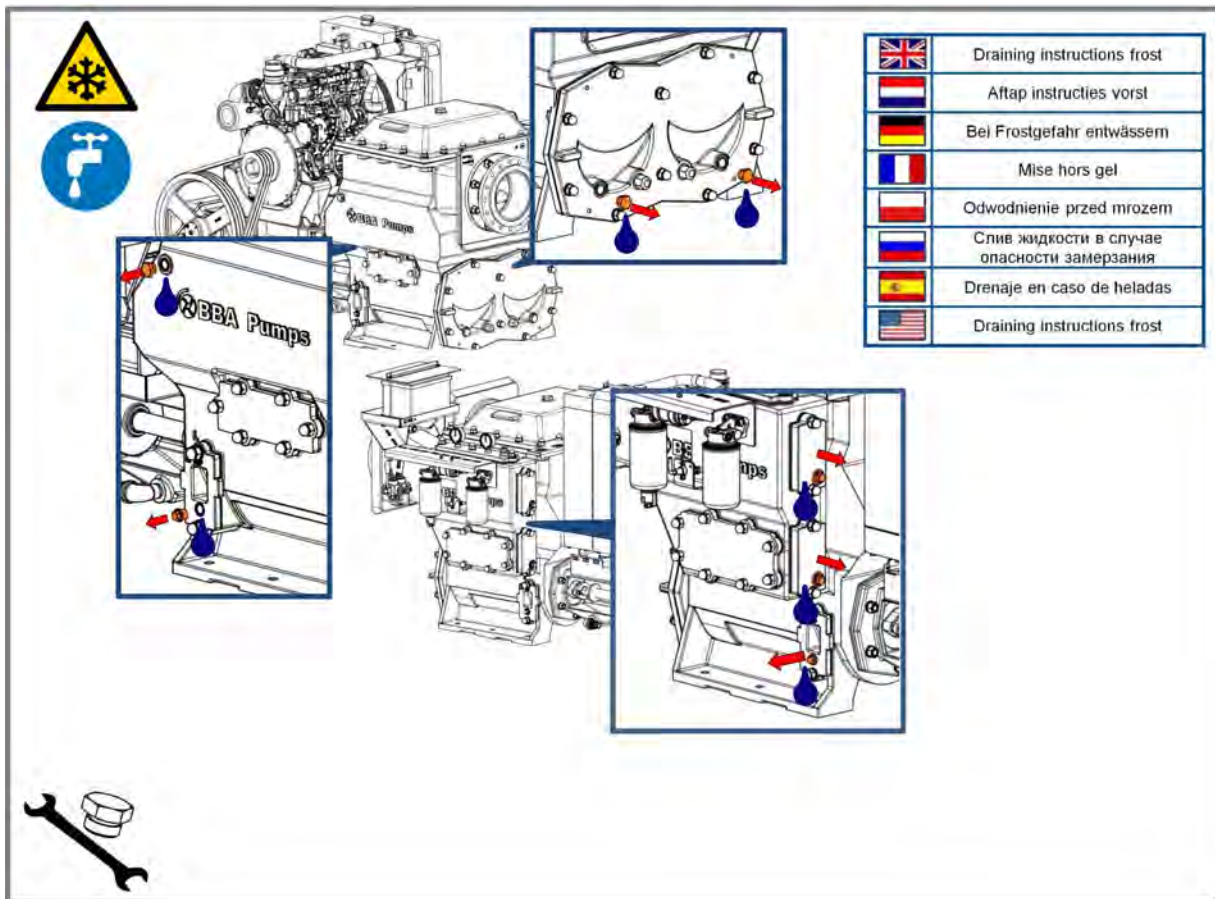
#### WARNING

If there is danger of freezing, drain the pump completely. Drain the liquid from the drip tray, if present.

## 6.7 Draining the pump when there is a danger of freezing

If there is a danger of freezing, a pump used to pump a liquid that may freeze must be drained (while at a standstill).

1. Place drain pans under the drain points.
2. Open the drain valves and remove the necessary drain covers from the pump to drain it completely.



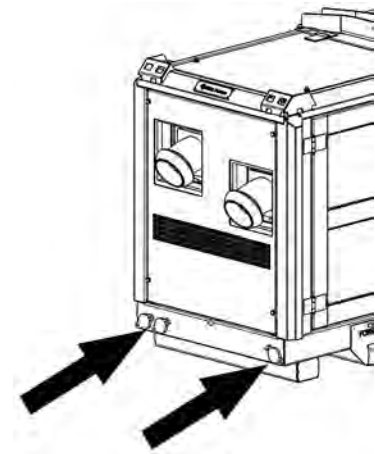
### WARNING

Ensure that all the drained liquid is collected in a proper manner and disposed of in accordance with local regulations.

Do not simply allow the water to drain onto the ground, as this could cause the ground to become slippery.

## Pumps PT series

1. Drain the water.
2. Switch the pump on for about five minutes to purge the water in the suction and discharge valves.
3. Drain the drip tray of the pump unit via the drain covers.
4. Fit the drain covers in the drip tray.



## 7 Pump unit with diesel drive

### 7.1 Safety instructions



#### WARNING

Only use diesel fuels that meet at least the specifications of the European EN 590 standard or similar (always check the original engine owner's manual). Use of fuel that does not meet the aforementioned specifications may cause engine damage.

- Never run the engine in an enclosed space.
- Provide a proper gas-tight discharge for exhaust gases.
- Provide sufficient ventilation.
- Never fill the fuel tank while the engine is running.
- Wear hearing protection while in the vicinity of a running engine.



#### DANGER

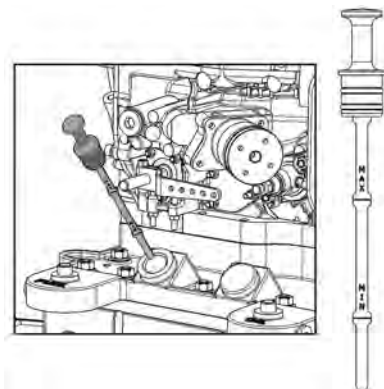
Exhaust gases contain carbon monoxide. Carbon monoxide is a colourless, odourless and deadly gas which, when inhaled, prevents the body from absorbing oxygen, resulting in asphyxiation. Severe carbon monoxide poisoning can result in brain damage or death.

### 7.2 Connection – general

If a pump unit with a combustion engine is being used, the manual provided by the engine supplier must be consulted (see [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com)). Contact BBA Pumps immediately if this manual is not present.

The following instructions supersede any conflicting information found in the combustion engine manual:

- Observe all applicable local safety instructions.
- The starting system must automatically disengage when the engine is started.
- The minimum and maximum engine rpm set by BBA Pumps may not be changed.
- Before starting, check the following:
  - oil level in engine and pump
  - fuel level in tank
  - fuel lines, for leakage
  - external fuel tank
  - whether the earth switch is turned on (PT200)

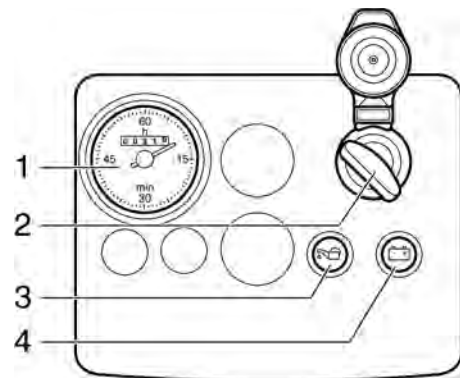




### 7.3 Hatz control panel for the PTclassic and PT130

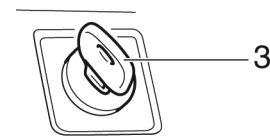
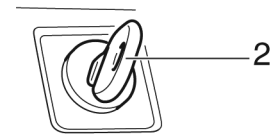
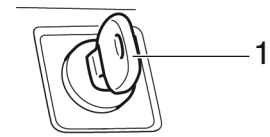
The PTclassic and PT130 pump units are equipped with a standard Hatz control panel.

1. Hour counter
2. Key switch
3. Oil pressure warning light
4. Battery charge warning light



The key switch has three positions:

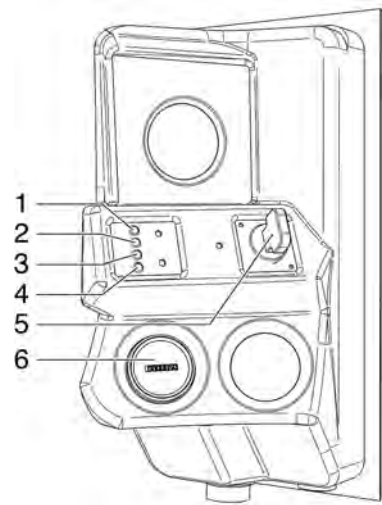
- Position (1): Insert the ignition key into the key switch. The pump unit is off.
- Position (2): Turn the key switch past position (2) to start the pump unit. During operation the key switch is in position (2).
- Position (3): Turn the key switch to position (3) to start the pump unit. Once back in position (1) the ignition key can be removed from the key switch.



## 7.4 LC10 control panel for the PT150

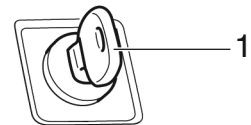
The PT150 pump unit is equipped with an LC10 control panel.

1. Battery LED (green)
2. Particulate filter 50% level LED (yellow)
3. Stop LED (red)
4. Particulate filter 100% level LED (yellow)
5. Key switch
6. Hour counter



The key switch has two positions:

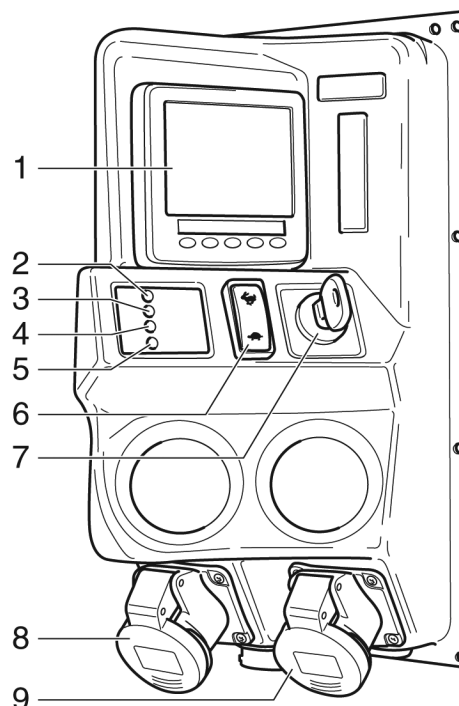
- Position (1): Insert the ignition key into the key switch. The pump unit is off.
- Position (2): Turn the key switch past position (2) to start the pump unit. During operation the key switch is in position (2).



## 7.5 LC30 control panel for the PT200

The PT200 pump unit is equipped with an LC30 control panel.

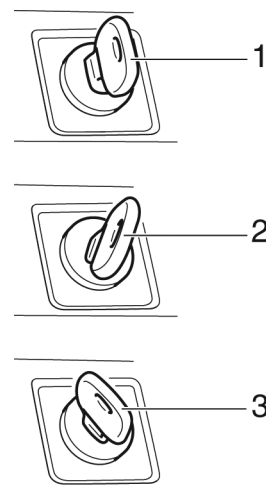
1. LCD screen
2. Auto stand-by LED (green)
3. Glow plug LED (yellow)
4. Stop LED (red)
5. Warning LED (yellow)
6. Button for changing engine speed
7. Key switch
8. Not applicable
9. Not applicable



- If the glow plug LED (yellow) is on, the system is being preheated. When the LED goes out the engine can be started.
- If the stop LED (red) is on, the ECU has stopped the engine due to a fault.
- If the warning LED (yellow) is on, the ECU has issued a warning.

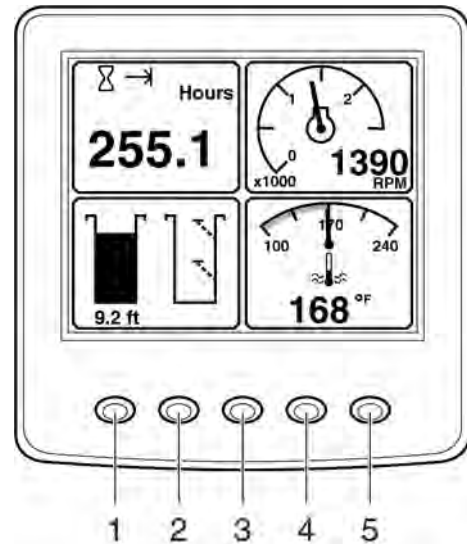
The key switch has three functions:

- Position (1): Insert the ignition key into the key switch. The pump unit is off.
- Position (2): Turn the key switch past position (2) to start the pump unit. During operation the key switch is in position (2).
- Position (3): Not applicable.



Depending on the configuration of the control unit, several gauges are shown on the LED screen.

1. Button for selecting analogue gauges (four pages of analogue gauges, 16 in total).
2. Button for selecting digital gauges (four pages of digital gauges, 16 in total).
3. Button for selecting several analogue gauges (step through all available analogue gauges).
4. Button for selecting the active alarm page. Displays all the active alarm signals, including a description.
5. Button for configuring gauges. Configures the parameters that are shown on the gauge pages.

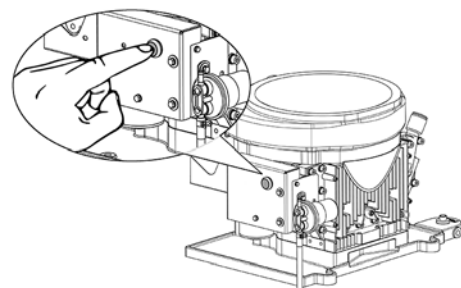


#### Note

The detailed manual for the LCD screen can be downloaded from [www.bbapumps.com/lcd](http://www.bbapumps.com/lcd).

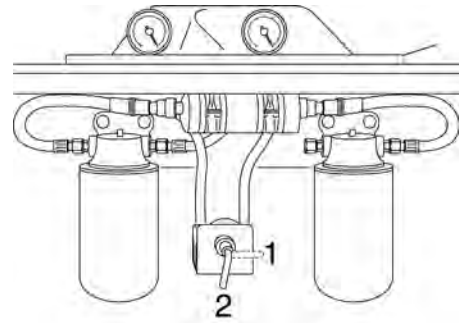
## 7.6 Starting

1. Check the pump type (type plate) and the characteristics of the pump unit, such as: speed, operating pressure, consumed power, operating temperature, direction of rotation, etc.
2. Check whether the pump unit is placed in accordance with the instructions. Pay particular attention to the area around the pump unit. Make sure the pump unit can draw adequate fresh air.
3. Check whether the prescribed safety provisions are in place.
4. Connect the pipes (see chapter 5 'Pump unit installation').
5. Fill the pump (see chapter 6 'Pump unit – general').
6. Perform the general steps for starting the pump (see chapter 6 'Pump unit – general').
7. Perform the daily maintenance.
8. Check whether there is sufficient fuel in the fuel tank.
9. PT150 only: Bleed the fuel system, if necessary, by pressing the button on the electric self-priming fuel pump until the pump no longer ticks. (When the self-priming fuel pump no longer ticks, the fuel system is fully pressurised.)



## Pumps PT series

10. PT200 only: Switch on the earth switch by moving the lever to position (2).

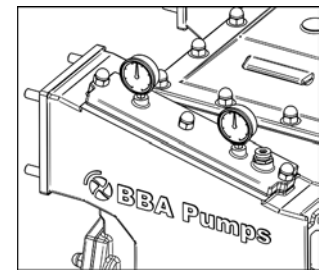


11. Perform the steps described in the manual provided by the engine supplier (see [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com)).

12. Turn the switch on the control panel to position (2).



13. Check whether both vacuum gauges on the stone catcher show the same reading. If the readings differ, the grate in the stone catcher needs to be cleaned.

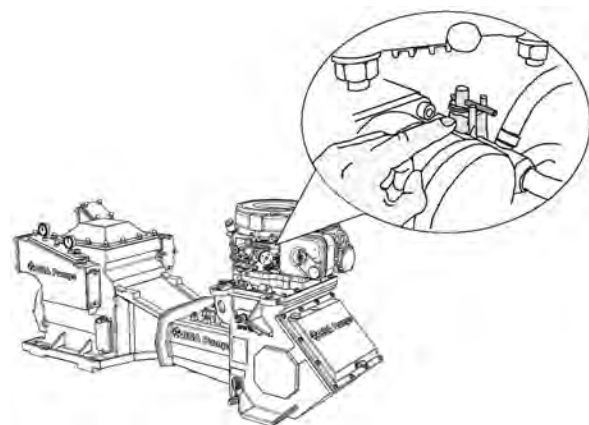


14. Let the engine run for five minutes before the pump is connected to the dewatering system.

15. If the engine does not start, press and hold the red handle on the oil-pressure protection. Start the engine, and release the handle once the engine is running.

### Note

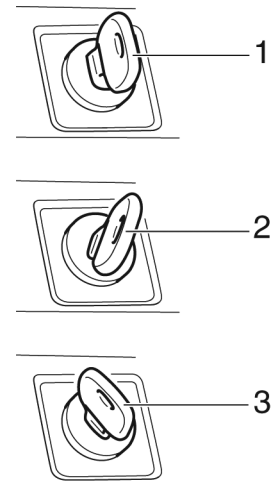
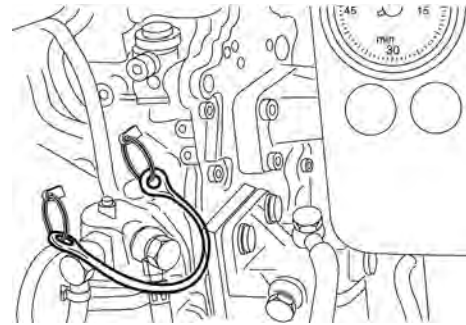
**Not applicable on the PT200.**



## 7.7 Switching off

### General

1. Applicable only to the PTclassic and PT130 models: pull the stop cord to switch off the engine; see illustration.
2. Turn the key switch on the control panel to position (1). For the PTclassic and PT130, the key switch must be set to position (3).
3. Observe whether the installation comes to a gradual, smooth stop.
4. Perform the general steps for shutting down the pump (see chapter 6 'Pump unit – general').
5. Perform the steps described in the manual provided by the engine supplier (see [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com)).



### Automatic electric shutdown

A unit equipped with this option can be recognised by the fact that the indicator lights are lit briefly when the switch is placed in position (2).

### Important!

If the engine shuts down immediately after it has been started or shuts itself down during operation, this may indicate that the protection is responding to one of the automatic shutdown monitoring elements. You can recognise this situation because the indicator light on the control panel will be lit. After the engine stops running the indicator light will remain lit for approx. 12 seconds. Then the electrical system will switch off automatically.

When the switch is returned to position (1) and then immediately turned to position (2) again, this indicator light will light up again.

Before attempting to restart, first determine what is causing the problem (see chapter 10 'Troubleshooting table').

The indicator light goes out the next time the engine is started.

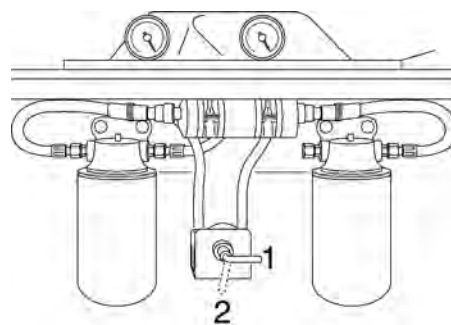
### Note

**Do not trust blindly in the automatic engine shutdown system; check the oil level every 8-15 hours of operation.**

## Pumps PT series

### Earth switch

PT200 only: switch the earth switch on by moving the lever to position (1).



## 8 Pump unit with electric drive

### 8.1 Safety instructions

Before connecting an electric motor to the mains, consult the applicable local regulations of the power supplier and the EN 60204-1 standard.

The electrical system must be equipped with protective measures to ensure that the user can work with the installation safely at all times.

Before the electric pump is started, the pump must be filled with liquid.

Work may only be performed on the installation when it is completely disconnected from electrical power. The installation must be protected against inadvertent starting.



#### **DANGER**

**Electrical devices, connection terminals and parts of control systems can be at mains voltage even during standstill. Contact can result in death, severe bodily injury or irreparable material damage.**



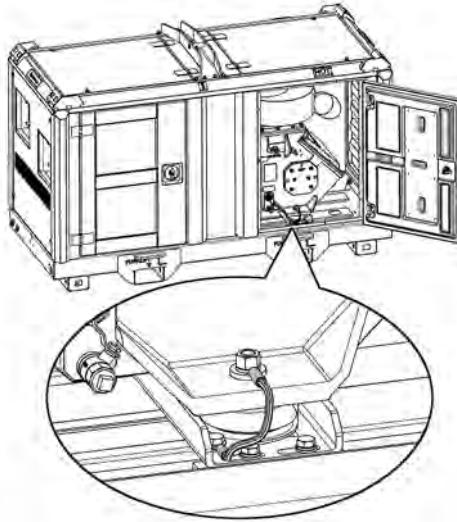
#### **WARNING**

**It is the employer's responsibility to ensure that the pump unit safety measures (such as protection against excessive power consumption) and the resulting actions (such as shutdown of the pump) are included in the safety circuit.**



## 8.2 Connection – general

- Take any necessary measures to ensure that the electrical connections and cables cannot be damaged.
- The voltage and frequency must be checked in advance and must match the motor specifications. This data is shown on the type plate of the motor.
- Use of the motor without an overload protection switch is not permitted.
- Make an earth connection to the pump unit.



- Check whether the motor connection matches the mains voltage. See the type plate for the motor. Check the connections in the terminal box behind the control panel.
- Check the direction of rotation of the pump.

## 8.3 Electrical connection

### Motors up to 3 kW (4 hp)

The type plate is labelled 230V/400V.

This means the winding voltage of the motor may not exceed 230V. The 400V indicates the voltage between the phases. 3x400V is three-phase electric power. This means the motor must be connected in **STAR** configuration.

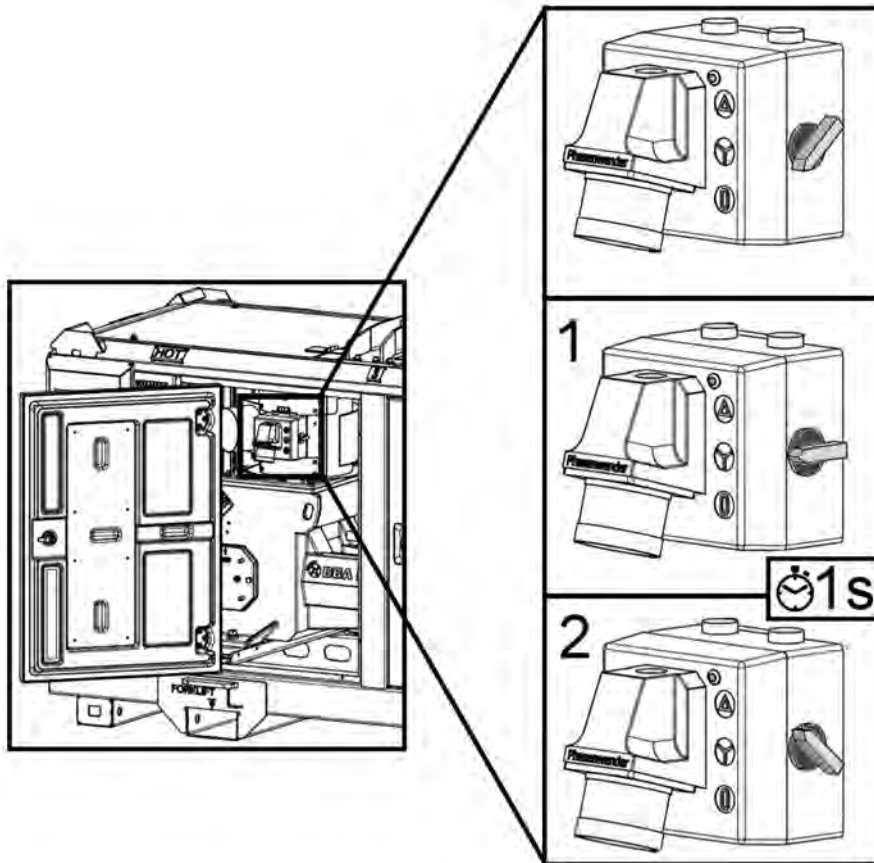
### Motors of 3 kW (4 hp) or more

The type plate is labelled 400V/690V.

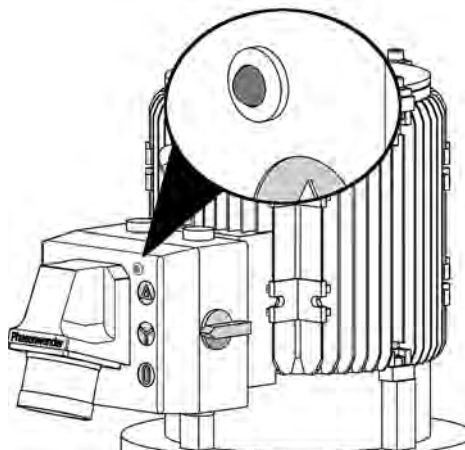
This means the winding voltage of the motor may not exceed 400V. Because the maximum voltage is 400V, this motor must be connected in a **DELTA** configuration.

## 8.4 Control panel

If the PT pump is supplied with a star-delta switch, it has three positions: Neutral, Star (1) and Delta (2).



A phase rotation indicator light is mounted in the star/delta switch box. If the phase is rotating in the wrong direction, the phase rotation indicator light will be lit. When the phase and direction of rotation are correct, the light will be off.





### **WARNING**

Turning the switch too slowly will cause the motor's thermal protection to trip. Return the switch to the neutral position and switch it on again.

## **8.5 Safeguards**

Protect the pump unit with the prescribed and desired protection measures.

Possible protection measures include:

- temperature
- overpressure
- negative pressure
- direction of rotation
- oil level
- overload
- etc.

It is not permitted to use a motor without a motor protection switch.

To protect the motor against overload, a thermal motor protector or thermal/magnetic motor protector must be installed.

Use the nominal power rating of the motor when setting the protector.

## **8.6 Electric motors**

It may be possible to obtain permission for use of the pump unit in a high risk area, by seeking approval from BBA Pumps.

Examples of situations that involve high risk include:

- pumping highly flammable liquids
- dusty environment
- environment with explosive gases in the vicinity

The risk category is defined in accordance with the ATEX Directive. It is very important that the right pump unit is chosen for such situations.

Take measures to ensure that the electrical connections and cables cannot be damaged.

The voltage and frequency must be determined in advance and match the specifications for the winding configuration of the motor.

This data is shown on the type plate of the motor.

For explosion-safe motors the data from the type plate of the motor must match the temperature class of the flammable/explosive gas/liquid.

### **Isolation switch**

In order to carry out work on the pump unit safely, the isolation switch must be placed as close as possible to the pump unit, in the direct line of sight of the technician.

It is recommended that an earth leakage circuit breaker also be installed. The installation must be protected against inadvertent starting. The switching equipment must comply with the local regulations.

## 8.7 Commissioning

Perform the following steps to commission a pump unit with an electric drive:

- Check the pump type (type plate) and the characteristics of the pump unit, such as: speed, operating pressure, consumed power, operating temperature, direction of rotation, etc.
- Check whether the electrical system has been installed in compliance with local regulations. Also check whether the required measures have been taken to completely eliminate danger to the user.
- Check whether the motor connection matches the mains voltage.
- Check the setting of the motor protector.
- Connect the suction and discharge pipes.
- Fill the pump with water.

## 8.8 Checking the direction of rotation



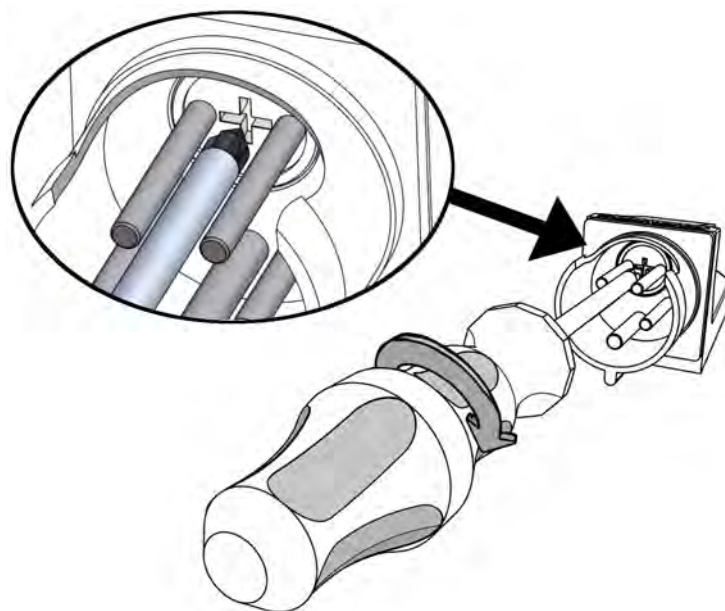
### WARNING

This test may only be performed by authorised personnel with the appropriate training.

Check whether the direction of rotation of the motor matches that of the pump.

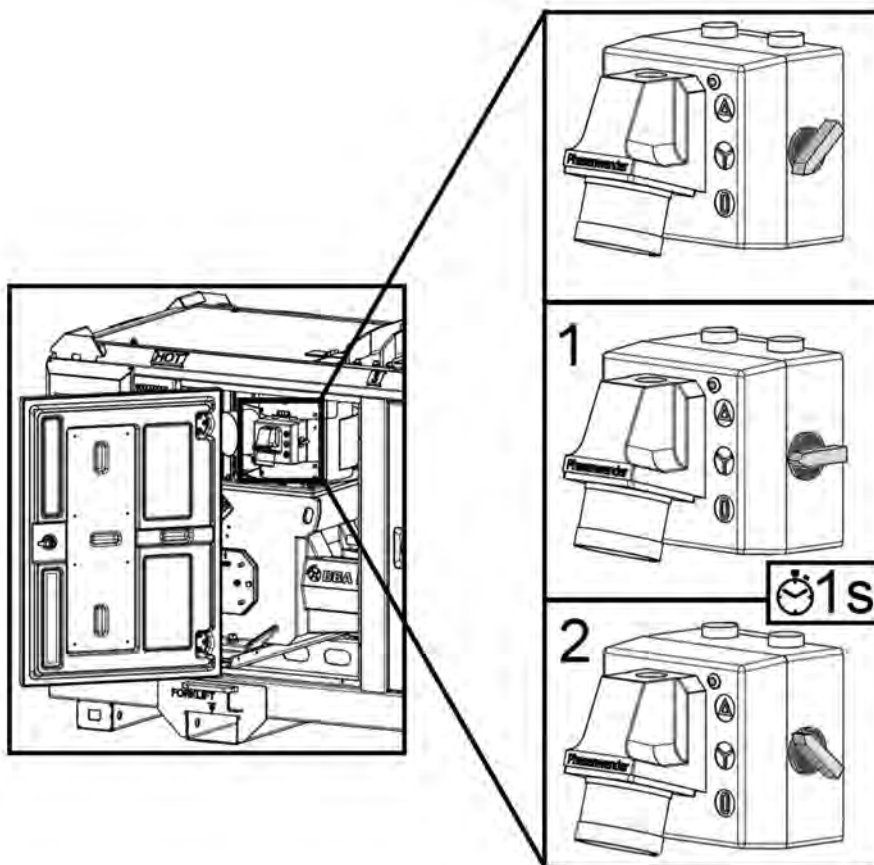
To check the direction of rotation the motor must be switched on briefly. The motor must not be allowed to reach the normal operating speed.

If the direction of rotation is incorrect, the connection on the terminal board must be changed or, if a phase reversal plug is present, the pins of the plug must be reversed.



## 8.9 Starting

To start the motor, the switch must first be turned to the star (1) position, and then turned to the delta (2) position within one second.



### WARNING

Turning the switch too slowly will cause the motor's thermal protection to trip. Return the switch to the neutral position and switch it on again.

## 8.10 Switching off

To stop the motor, the switch must first be turned to the star (1) position, and then turned to the neutral position within one second.

## 9 Maintenance

### 9.1 General

When maintenance is insufficient, incorrect and/or not performed regularly this can lead to malfunctions of the pump unit, danger to the user, high repair costs and lengthy breakdowns. BBA Pumps is not responsible for damage and accidents that result from failure to follow the instructions.

Only the operations described in this manual may be performed. Other operations must be performed by employees of BBA Pumps or authorised maintenance technicians.

To guarantee reliable operation, installed backup pumps must be operated briefly once a week.

For parts, see [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com), or contact the BBA Pumps parts department.

#### Manual for the drive

Depending on which drive motor/engine is used, this user manual may be accompanied by the manual for the drive motor/engine (see [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com)). The manual for the drive motor contains detailed information about the procedures that are to be followed and the associated safety instructions. Read the supplied manual carefully and follow the procedures and safety instructions.

### 9.2 Safety instructions during maintenance, repair and inspection

- Use personal protective equipment when required.
- It is only permitted to work on the pump when it has been put out of operation. To put it out of operation, follow the prescribed procedure.
- Protect the drive motor against unintended and unauthorised activation throughout the duration of the work activities.
- When opening the pump, follow all the instructions for handling the pumped liquid, such as protective clothing, no smoking etc.
- For more information, consult the Material Safety Data Sheet (MSDS) for the pumped liquid.
- Only remove the protective guards when the pump is stationary.
- Maintenance work on the electrical system may only commence after the power supply has been disconnected and may only be performed by personnel who have been trained and authorised to do so.
- When the work is complete, all the protective guards must be installed and the protection system must be activated.
- Use only original parts or parts provided or approved by the pump supplier for repairs.
- Only remove protection blankets from hot parts when the entire the pump unit has cooled.
- Only remove the particulate filter (if present) when the entire unit has cooled.

### 9.3 Protecting electric driven pump unit against unintended activation

- Switch off the isolation switch at the pump.
- Switch off the main switch for the pump.
- Block the main switch, and lock it with a padlock if possible, to prevent unintended activation. Take the key for the lock with you.
- If it is not possible to do this, remove the corresponding fuse from the pump.
- If it is not possible to do this, disconnect the power cable from the pump.
- Place a sign near the main switch or pump fuse holder with the text: 'Do not switch on – work in progress!'

### 9.4 Protecting diesel driven pump unit against unintended activation

- Stop the engine and, if applicable, remove the key from the switch. Take the key with you.
- If applicable, switch off the earth switch for the engine. Take the key for the earth switch with you.
- If it is not possible to do this, disconnect the earth cable from the batteries.
- Place a sign near the earth switch or disconnected battery cable with the text: 'Do not switch on – work in progress!'

### 9.5 Maintenance instructions

- Clean the pump before starting the work. Keep the work area clean.
- Use the correct tools and ensure that they are in good condition. Use them in the proper manner.
- Replace damaged bolts, nuts and/or parts with damaged threads with new parts of the same fastener class.
- Replace used seals or tape. Only replace the flat and filled seals under the plugs with original seals from BBA Pumps.

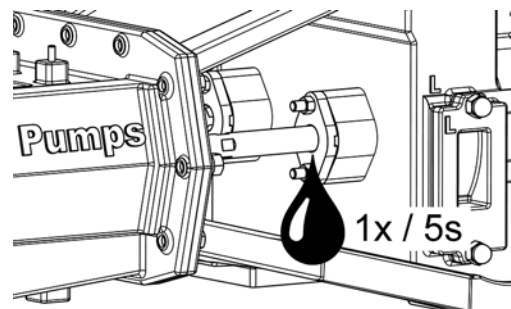
### 9.6 Daily maintenance of the pump

- Check the oil level of the engine and pump.

#### Note

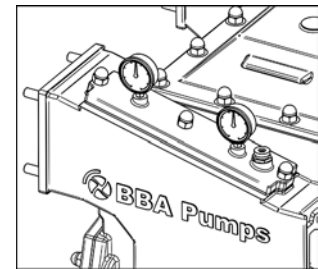
**If the oil in the pump drive has become whitish in colour, replace the oil. The whitish colour may indicate the presence of excessive condensation water in the oil.**

- Check for possible leaks in the oil and fuel hoses.
- Check the dripping of the gland packing on the piston rod; this should not exceed one drop every five seconds. It may be necessary to readjust the gland packing at greater lift heights.



- Check that the dripping water can drain away from the gland packing. The channel must not be plugged on the outside by dirt and sand that have splashed onto the enclosure.

- Check whether the machine is still placed properly on the ground on which it stands, in accordance with the instructions. This is important, because the situation can change as a result of a build-up of sand/soil around the pump unit.
- Check the vacuum above and below the filter in the stone catcher using the two vacuum gauges on the stone catcher. A difference between the two readings indicates restriction of the filter, in which case it must be cleaned.



- If a particulate filter is installed, check whether the indicator light on the control panel is lit. If the light is on, clean the filter. See section 9.13 'Cleaning the particulate filter'.

## 9.7 Other pump maintenance

### Diesel engine

- Replace oil after the first 250 hours of operation of the diesel engine. See the manual provided by the engine supplier at [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com).
- BBA Pumps has developed a unique concept for the diesel driven PT150 pumps called DriveOn®. For the user this means that the engine service interval for the PT150 pumps has been extended to 1500 operating hours (oil and filters).

### Note

**engine oil capacity DriveOn® is 10 litres (10.56 US qt) 10W40 (which differs from the oil change information in the original Hatz 1D90V manual).**

- The engine service interval for the PTclassic, PT130 and PT200 pumps is 500 operating hours as standard.

### Oil sump PT

- Replace oil after the first 250 hours of operation of the pump.
- For the PTclassic, replace oil every 4500 hours, or every 12 months, or if the oil in the pump drive has become whitish in colour. Run the pump until it is at normal operating temperature. Stop the pump and drain the oil.  
Oil type: mineral oil 80W90 GL4 (capacity 8 litres (8.45 US qt)).
- For the PT130, replace oil every 4500 hours, or every 12 months, or if the oil in the pump drive has become whitish in colour. Run the pump until it is at normal operating temperature. Stop the pump and drain the oil.  
Oil type: mineral oil 80W90 GL4 (capacity 4 litres (4.23 US qt)).
- For the PT150, replace oil every 4500 hours, or every 12 months, or if the oil in the pump drive has become whitish in colour. Run the pump until it is at normal operating temperature. Stop the pump and drain the oil.  
Oil type: synthetic oil ISO-VG 320 (capacity 14 litres (14.79 US qt)).
- For the PT200, replace oil every 3000 hours, or every 12 months, or if the oil in the pump drive has become whitish in colour. Run the pump until it is at normal operating temperature. Stop the pump and drain the oil.  
Oil type: mineral oil 80W90 GL4 (capacity 11 litres (11.62 US qt)).

### Note

**The described maintenance activities must be performed every 1500 hours, unless otherwise indicated.**



## Pumps PT series

### Fuel filter

Check the fuel filter for the self-priming fuel pump for clogging.

Use the correct filter upon replacement; the filter must be resistant to the pulsating action of the self-priming fuel pump.

### Self-priming fuel pump

Check the operation of the electric self-priming fuel pump.

It is recommended that the self-priming fuel pump be replaced every 10,000 hours.

### Fuel hoses

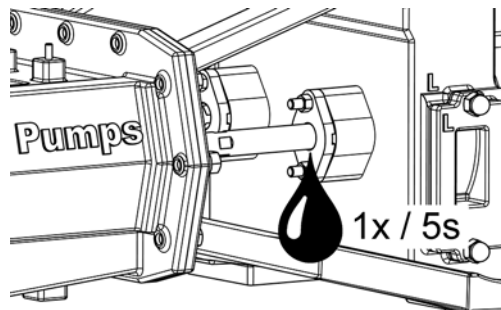
Check the quality of the fuel hoses; look for signs of dry rot, cracks and rubbing damage.

### Gland packing

The gland packing must be replaced at least annually (12 months) or if the gland packing flange is tightened all the way against the pump housing.

Fit five new gland packing rings for each piston rod end.

A special tool is required to replace the gland packing. This can be ordered through the BBA Pumps parts team.



### Piston cups/pistons

If there is a drop in vacuum or capacity, check the pistons and piston cups:

- Remove the pump cover (use two push-off bolts if necessary) and visually inspect the pistons.
- Replace the pistons if they are damaged or deformed.
- When you reinstall the pump cover on the pump housing, check whether the stainless steel push-off bolts press firmly against the stainless steel cylinder sleeves. Make sure that the pump housing cover is installed with the roundings on the inside of the cover face down. The word 'TOP' cast into the front of the cover must be the top of the pump housing.

### Cylinders

Check the wear of the cylinder sleeves; small grooves are considered normal wear.

Grooves up to 0.5 mm (0.0197 inch) deep are no problem; these will be sealed by the swelling of the leather piston cups. If there are deeper grooves, the cylinder liner must be rotated 180°; the grooves usually form at the bottom end of the cylinder sleeve. If desired, the cylinder sleeve can be replaced. A special tool is required to rotate the sleeve. This can be ordered through the BBA Pumps parts team.

### **Valves**

If there is a drop in vacuum or flow, check the suction and discharge valves for flatness and damage. Remove the pump housing cover and visually inspect the valves; they must seal well against the valve seats. The springs must push firmly against the valves. Valves that are not flat or are damaged must be replaced. Damaged valve seats can be trued on a lathe.

Always fit new O-rings on the valve seats.

Remove the pressure valve seats by fitting an M16 bolt in the threaded hole to which the valve bolt is attached.

### **Valve springs**

Valve springs may break over time.

Replace all the valve springs at least annually to avoid breakdowns.

If any valve spring breaks, it is recommended that they all be replaced.

### **Suction valves**

Inspection for contamination can be performed through the inspection covers on the sides of the pump housing. For maintenance, the pump cover, discharge valves and discharge valve seats must be removed. The rest of this inspection is identical to that for the discharge valves.

### **Valve guide bolts**

When inspecting the suction and discharge valves, also check the valve guide bolt; it may be worn 1 mm in diameter.

## Pumps PT series

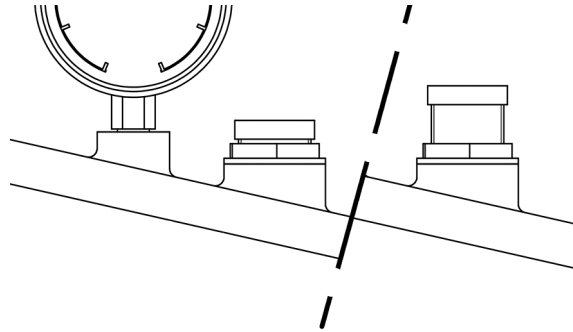
### Vacuum regulator valve

A vacuum regulator valve is provided to enable you to prevent pump cavitation. (When a piston pump cavitates, knocking can be heard from the pump housing.)

The vacuum regulator valve is mounted on the pump's stone catcher. The vacuum regulator valve should normally be adjusted to 8.5 metres (28 ft).

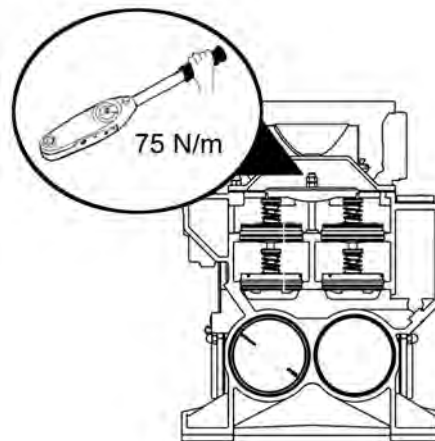
Adjust this by allowing the pump to fill and then closing a shut-off valve on the suction side to the point at which the vacuum gauge beside the blow valve reads 8.5 metres (28 ft) of vacuum.

Secure the vacuum regulator valve in position using the nut provided for this purpose on the valve.



### Bridge

Check the bridge. The bridge must be straight and have no cracks whatsoever.



### Gaskets

Check whether all the gaskets and covers are installed correctly and seal properly.

**Inspection covers**

Make sure the inspection covers on the back side of the pump housing and by the gland packing housing are installed correctly; there are left and right versions.

The letters L and R are cast into the covers and the pump housing.

Make sure to fit the covers so the letter on the cover corresponds to the one on the pump housing. The letter must also be towards the top of the pump housing, and the rounding on the inside of the cover must face the bottom of the pump housing.

**Alternator**

Check whether the alternator is charging adequately. The charging voltage should be 14.2 V.

**Exhaust pipe**

- Inspect the flexible exhaust pipe for leaks.
- Check whether the insulation blanket on the flexible exhaust pipe is in good condition.

**Particulate filter**

If a particulate filter is installed, it must not create too much back pressure.

If the light on the control panel is on or a fault code appears on the LCD screen, the particulate filter is dirty.

See section 9.13 'Cleaning the particulate filter' for more information about this.

**Spark arrestor**

A spark arrestor is available as an option on diesel driven PT pumps. The spark arrestor can be cleaned as follows:

- Stop the diesel engine and allow the exhaust system to cool.
- Unscrew the plug from the particulate filter.
- Start the diesel engine.

**WARNING**

**Make sure the particulates are captured in accordance with prevailing standards. Particulates pose a health hazard.**

**Vibration dampers**

Check the vibration dampers. If the base of the pump is resting on the frame, the rubber is worn out. If the rubber extends beyond the steel shells of the vibration damper, it is wearing and you should consider replacing the vibration dampers.

**Note**

**Damage to pump units, due to vibration for example, mounted on trailers or other components by third parties without written consent from BBA Pumps is not covered by the BBA Pumps factory warranty.**

**Drip tray**

Drain the drip tray. The liquid consists of water with residual oil and diesel fuel.



**WARNING**

Make sure that all the drained liquid is collected in a proper manner and disposed of in accordance with local regulations. Leakage of environmentally harmful liquids can be extremely damaging to the environment. Do everything necessary to prevent this.

**Rain channels for roof panel**

The roof panels are mounted on an upper edge; this upper edge guides water to the front and back of the enclosure. Keep all the channels clean and free of sand and leaves so water can always drain unhindered.

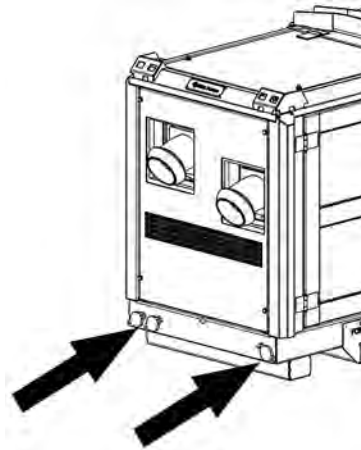
**9.8 Other pump maintenance every 4500 hrs or 1x/year**

**Cleaning the fuel tank**

Flush the fuel tank clean once a year.

First drain the drip tray. Clean the drip tray and remove the cleaning covers from the bottom tray.

Place the pump set at a slight angle. Behind the cover is a plug for the fuel tank. Remove it and then flush the tank.



**WARNING**

Make sure that all the drained liquid is collected in a proper manner and disposed of in accordance with local regulations. Leakage of environmentally harmful liquids can be extremely damaging to the environment. Do everything necessary to prevent this.

## 9.9 Shipping the pump unit

If the pump unit must be sent to the supplier for major maintenance, repair or overhaul, the following conditions must be met:

- The pump unit must be drained and thoroughly cleaned inside.
- All compartments of the drip tray under the pump unit and motor/engine must be drained prior to transport.



### WARNING

Leakage of environmentally harmful liquids can be extremely damaging to the environment. Do everything necessary to prevent this.

- For compliance with the safety and environmental regulations, the shipment must be accompanied by a 'Declaration of no objection'.

## 9.10 Draining the pump unit



### WARNING

Take the necessary precautionary measures in the case of hot, volatile, flammable and hazardous liquids.



### WARNING

Leakage of environmentally harmful liquids can be extremely damaging to the environment. Do everything necessary to prevent this.



### WARNING

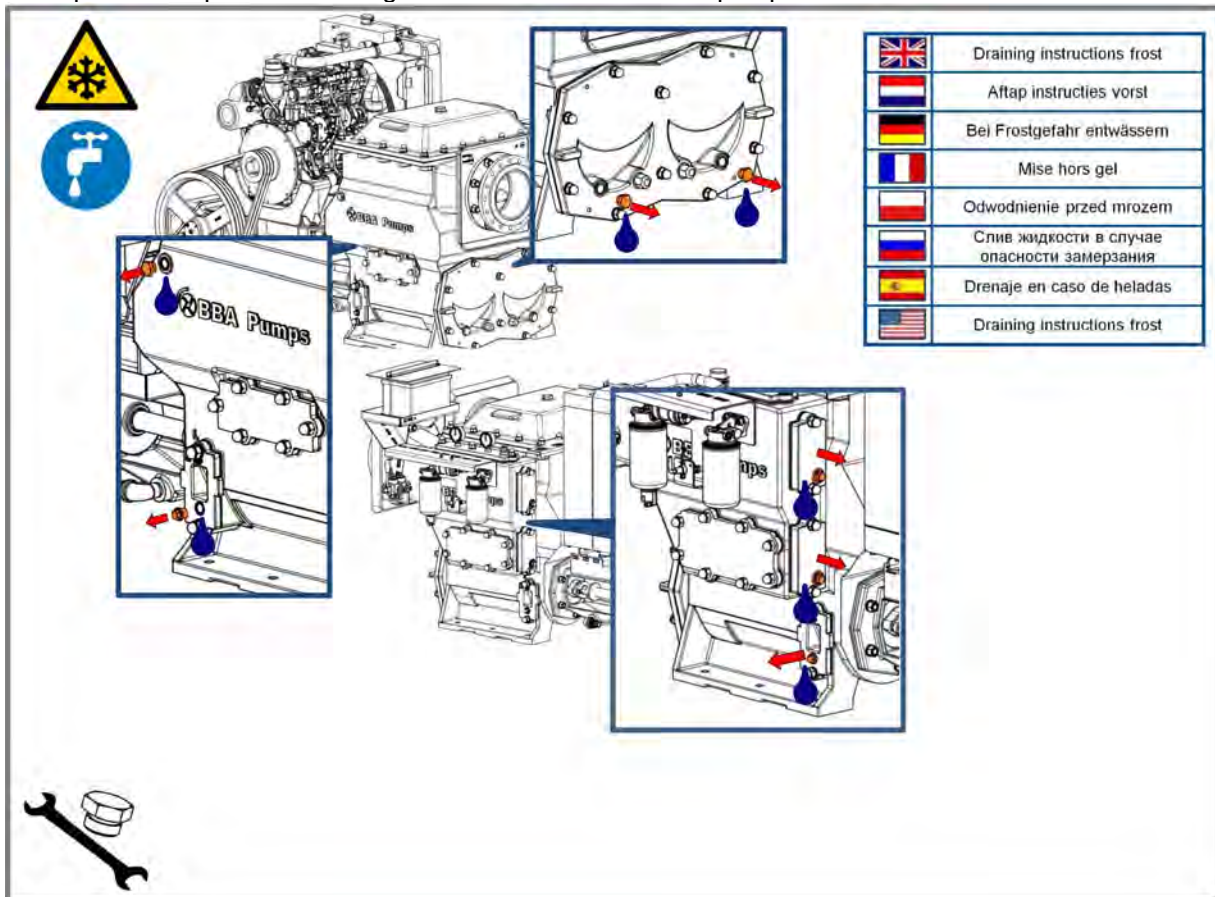
At temperatures below freezing the drained liquid may freeze. Always take all possible measures to prevent liquid from running onto the ground. Otherwise, hazardous situations (danger of slipping) can result.

### Note

For liquids that congeal at temperatures below the operating temperature, close off the suction and discharge lines and drain the pump unit as soon as the pump unit has been stopped.

1. Stop the pump unit.
2. Take measures to prevent unauthorised starting.
3. Allow the pump unit to cool, if the pumped liquid will not congeal.
4. Close off the discharge and suction pipes as close as possible to the pump unit.
5. Place a suitable drain pan under the drain plugs on the outside.
6. Remove the plugs on both sides of the pump unit.

7. Open the inspection/cleaning covers on both side of the pump unit.



1. Dispose of the drained liquid in a responsible manner and in accordance with the local regulations, company regulations and MSDS for the liquid.
2. At temperatures well below freezing, allow the pump to run for five minutes during this draining process to ensure that all the water has been removed from the suction chamber and above the valves.
3. Place new sealing rings on the plugs, and fit the plugs on both sides of the pump.
4. Fit the inspection covers loosely so that water can continue to drain out of the pump housing. Because the pump housing contains many valves, water may continue to drip slowly for 30 minutes.

## 9.11 Internal cleaning of the pump unit



### WARNING

Take the necessary precautionary measures in the case of hot, volatile, flammable and hazardous liquids. Allow the pump unit to cool before cleaning.

1. Drain the pump unit, but do not yet fit new drain plugs (see section 9.10 'Draining the pump unit').
2. Clean the pump unit. Do not use flammable cleansers.
3. Install the drain plugs with new sealing rings.
4. Fit the inspection/cleaning covers.

## 9.12 External cleaning of the pump unit

A pressure washer may be used, but only in accordance with the following instructions:

1. Never clean a pump unit that is in operation.
2. Switch the pump unit off before cleaning.
3. In the case of an electric driven, switch off the main switch of the electrical system.
4. Allow the pump unit to cool before beginning with the cleaning.
5. Maintain distance between the spray nozzle and the part being cleaned.
6. To prevent penetration of water, never spray directly towards bearings or seals.
7. Never spray directly towards connection boxes, connectors, outlets and other electrical connection components.
8. Check the protection rating of the electrical components. Use a cleaning method appropriate to the protection rating.



### **WARNING**

**Failure to follow the guidelines above can lead to dangerous situations and cause damage (possibly severe) to the pump unit.**



### **WARNING**

**Take the necessary personal protective measures during cleaning, such as those concerning protective clothing, safety goggles etc. Also be especially careful in the case of hot, volatile, flammable and hazardous liquids. Adapt the protective measures accordingly.**

## 9.13 Cleaning the particulate filter (if applicable)

The particulate filter is available as an option for the diesel driven PT150 pumps. If a particulate filter is fitted, it is behind the closable cover (see drawing). To clean the particulate filter:



### **WARNING**

**The exhaust system and the particulate filter are hot when the engine has run; the temperature can be as high as 500°C (932°F). Allow the exhaust system and particulate filter to cool before removing them.**



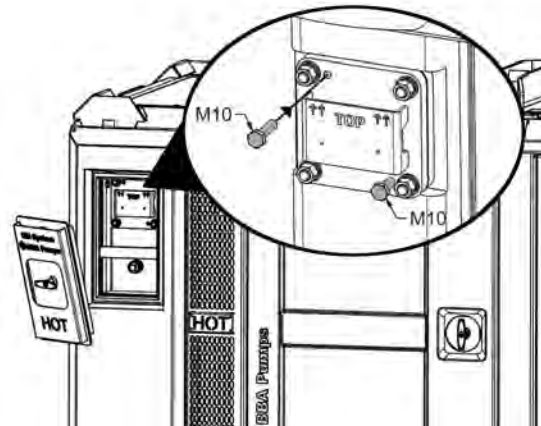
### **WARNING**

**Particulates are hazardous to your health.**



## Pumps PT series

1. Turn the T-latch one turn and remove the cover.
2. Remove the four bolts.
3. Carefully pull the particulate filter out of the frame with two push-off bolts.
4. Clean the particulate filter.
5. Fit a new seal on the particulate filter tube.
6. Slide the particulate filter into the frame.
7. Fit the four bolts.
8. Fit the cover and screw the T-latch closed.



### Note

In Europe, the PT200 is sold with a particulate filter to meet the applicable emission requirements. This is an original Hatz particulate filter. The system regenerates at regular intervals to burn off the particulates before the particulate filter becomes restricted. During regeneration a symbol and message appear on the screen of the control panel. See the Hatz engine manual at [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com) for more information.

## 9.14 Checking the battery

### General

Check the electrolyte level and terminal voltage of the battery once every three months.

Make sure that the battery terminals and cable ends are corrosion-free.

Depending on the type, temperature and relative humidity, filled batteries can be stored for up to three months without maintenance.

During long periods of storage check the specific gravity (s.g.) of the electrolyte regularly. If it is below 1.250 kg/l (10.432 lb/US gal) (1.210 kg/l (10.098 lb/US gal) for 'tropical' battery acid) the batteries should be charged to a specific gravity of 1.280 kg/l (10.682 lb/US gal) (or 1.240 kg/l (10.348 lb/US gal) for 'tropical' battery acid).

The charging current may not exceed 20% of the nominal capacity in Ah/20h.

If necessary, top up the batteries with demineralised water.

### Checking battery electrolyte level

#### Note

When the engine has not been run in a long time or is only run for short periods, the batteries may not fully recharge. Make sure the batteries are kept fully charged to prevent them from freezing. When the batteries are fully charged the ammeter reading is close to zero when the engine is running.



### WARNING

All lead-acid batteries contain sulphuric acid which can burn the skin and clothing. Always wear a face shield and protective clothing when working on or near batteries.

1. Remove the filler caps.
2. Check whether the electrolyte level in the battery is at the 'FULL' mark. If the level is too low, top up with distilled water. If distilled water is not available, use clean water with a low mineral content. Do not use artificially softened water.
3. Check the condition of the electrolyte with a battery tester.
4. Install the caps.
5. If necessary, clean the batteries with:
  - a solution of 0.1 kg (0.22 lb) baking soda and 1 litre (1.056 US qt) of clean water, or
  - a solution of ammonium hydroxide. Thoroughly rinse the battery case with clean water.

### Battery cable connections



#### WARNING

**Batteries can produce explosive gases. Therefore keep them away from naked flame, lit cigarettes and sources of sparks.**

**Protect eyes, skin and clothing from corrosive battery acid. Immediately dilute and rinse off spilled or leaked acid with clean water. Consult a doctor if necessary.**

**Never place tools on a battery.**

**Before working on the electrical system, always disconnect the negative (-) battery cable.**

- The positive (+) and negative (-) battery terminals must not be accidentally interchanged.
- When installing the battery, connect the positive (+) lead first, followed by the negative (-) lead. Negative pole to earth on engine block.
- When removing the battery, disconnect the negative (-) lead first, followed by the positive (+) lead.
- In all circumstances, avoid short circuits and shorts to earth (ground) at live cables.
- If electrical faults occur, first check for good contact at the cable connections.
- Replace a failed indicator light without delay.
- Do not take the key out while the engine is running.
- Never disconnect the battery while the engine is running. Electric voltage peaks can cause damage to electrical components.
- In case of an emergency start in manual mode, leave the battery (which might be discharged) connected to the engine.
- For emergency operation without battery, make sure that the plug-and-socket connector to the switch cabinet is also disconnected before the engine is started.
- Never spray off parts of the electrical system with a water jet or pressure cleaner during engine cleaning.
- When carrying out welding work on the engine or machine, attach the earth clamp of the welder as close to the welding point as possible.

### Lead-acid battery

BBA Pumps installs lead-acid batteries as standard. For good operation and the safety of people and the environment, check the starting battery regularly for correct operation.

This must be an inspection point during inspection and maintenance activities on the pump installation. With the correct test equipment, you can quickly and efficiently check the battery. We recommend affixing a sticker showing when the battery inspection was performed.

### Lead-acid battery maintenance

A modern battery requires little maintenance to provide a long service life. The maintenance can be divided into three categories:

- connection
- electrolyte level
- state of charge

### Connection

The battery terminals provide the connection to the outside world. A desirable circuit, the electrical system, is connected between the terminals, and the contact surface area between the cable ends and terminals should be as large as possible while also preventing undesired contact (short circuit).

### Battery terminals

Current is drawn from a battery via the lead terminals. The connection between the cable ends and the battery terminals forms the 'interface' between battery and electrical system. It is therefore very important that the contact surface area between the two be as large as possible. Build-up of lead sulphate (white powdery substance) around the terminals interferes with this contact and has a negative impact on both charging and discharging. Because lead sulphate is an insulator, it blocks this current flow, which causes a voltage drop during high current draw (the starter motor turns more slowly) and a voltage increase during charging (it is more difficult to get the battery fully charged). The following measures can reduce these problems:

- If lead sulphate is present, thoroughly clean both the terminals and the cable ends with a steel wire brush.
- Coat the terminals with acid-free vaseline. Any pits in which moisture and lead sulphate could collect are filled and excess vaseline is forced out, ensuring good contact.

### Cover

Keep the battery cover clean and dry. Grease on the cover can trap moisture, forming a conductive path between the positive and negative terminals. The consequence is a short circuit, through which the battery is discharged outside the electrical system. The consequence is a lower state of charge of the battery, and therefore a shorter service life.

### Electrolyte level

Even though the water consumption ('gassing') of modern batteries is very low, various external conditions, such as high temperatures and high voltages accelerate this process. A battery will therefore ALWAYS consume water, even if there is no provision for refilling it. Water consumption results in increased concentration of the electrolyte.

Because the quantity of electrolyte is of direct influence on the capacity of the battery, it should be as high as possible. The specific gravity of 1.280 kg/l (10.682 lb/USgal), however, is the highest concentration at which a battery can function without damage: dilute sulphuric acid with a concentration of over 1.300 kg/l (10.849 lb/US gal) is very corrosive for the grids of the positive plates and accelerates the corrosion process. It is therefore important to occasionally check the electrolyte level and top it up with demineralised water if possible.

Make sure that the battery plates are fully immersed in the liquid at all times; the liquid level must be at least 10 mm (0.394 inch) above the plates.

Dry battery plates pose a high risk of explosion!

**State of charge**

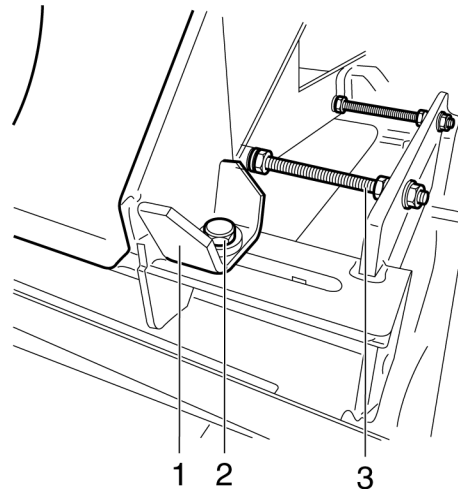
The service life of a lead-acid battery will be longest in the fully charged state. When a battery remains in the discharged (or partially discharged) state for a longer period of time, there is a chance it will become sulphated. This may be part of the reason the battery can no longer be charged and therefore appears to no longer be good. It is therefore advisable to check the state of charge of the battery based on the specific gravity of the electrolyte (acidimeter) and to charge the battery if necessary.

**9.15 Checking the V-belt**

- Check that the belt runs silently while the pump is running.
- Check the shielding.
- Visually inspect the belt for wear and the presence of oil and grease.
- Check the belt tension. When correctly tensioned, you should not be able to press the V-belt more than 2 cm in the middle of the span between the pulleys.

**9.16 Adjusting V-belt tension**

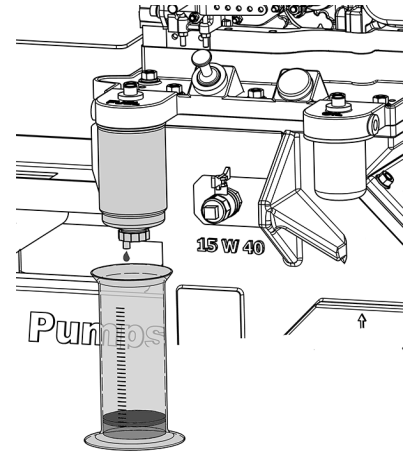
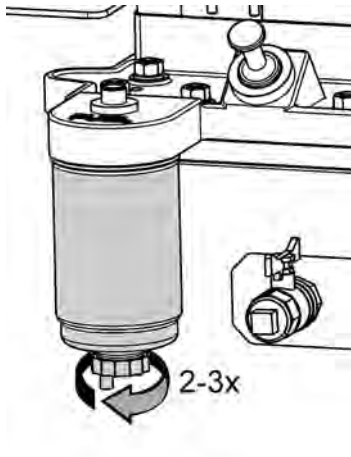
1. Loosen the mounting bolts (2) of the motor mount bracket (1) a few turns.
2. Use the threaded rods (3) to move the motor mount bracket (1) to achieve the desired belt tension. Turn the two threaded rods (3) simultaneously.
3. Check that the pulleys are properly aligned.
4. Tighten the mounting bolts (2). Torque the mounting bolts (2) to 85 Nm.
5. Check that the V-belts are running properly after starting the motor/engine.



## 9.17 Checking the water trap

The intervals at which you should check the water trap depend on the amount of water in the fuel and the care taken when refuelling.

- Unscrew the bottom of the water trap about 2-3 turns.
- Collect the draining fuel in a transparent (glass) container.  
Since water has a greater specific gravity than diesel fuel, the water emerges before the diesel fuel. The two substances separate at a clearly visible line.
- As soon as only diesel emerges from the opening tighten the bottom of the water separator again.



## 9.18 Replacing the grease cartridge (PT150)

1. Remove the union nut (3) from the grease cartridge (2).

**Note**

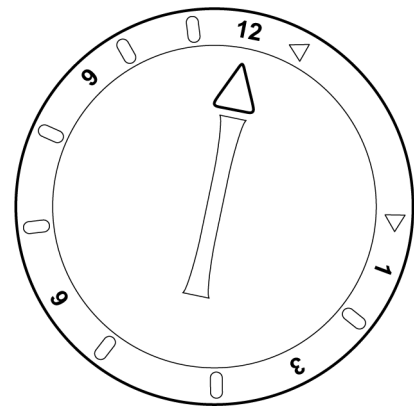
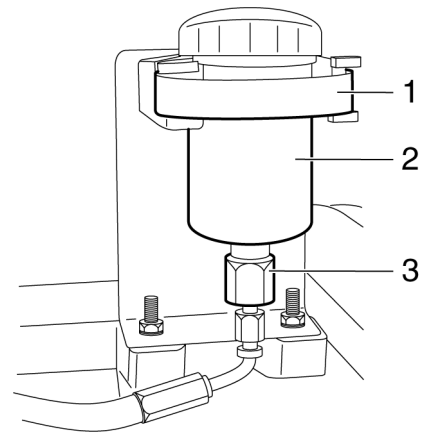
**There may still be residual pressure in the line.**

2. Remove the mounting bracket (1) and take the grease cartridge (2) out of the holder.

**Note**

**Dispose of the grease cartridge in a responsible manner.**

3. Place a new grease cartridge (2) in the holder and reinstall the mounting bracket (1).
4. Attach the line with union nut (3) to the grease cartridge (2).
5. Use a coin to turn the upper cover with the arrow to the number 12.
6. Write the date of installation on the grease cartridge (2) using a waterproof pen.
7. After starting, check that the line is not leaking.



## 10 Troubleshooting table – PT series wellpoint dewatering pumps



**WARNING**

In the event of a malfunction or abnormal operation, shut off the pump immediately to prevent a dangerous situation and/or damage to the unit.

Problem	Possible cause	Solution
No flow while the pump and drive are running.	Wellpoint system is not properly installed or leaking.	Check the wellpoint system and eliminate the leaks.
	The the leather piston cups are dry and have shrunk.	Fill the pump housing with water.
	The leather piston cups are totally worn out.	Replace the leather piston cups.
	Too much iron or lime deposit in the pump housing / in the stone catcher.	Clean the pump and stone catcher.
	Ice build-up around in the pump housing / stone catcher <i>(normally the engine will not start running).</i>	Thaw the pump.
	Vacuum regulator valve on the stone catcher is not set or malfunctioning.	Adjust the valve to max. 8.5 metres on the vacuum gauge. Or replace the valve.

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Insufficient flow while the pump and drive are running.	Wellpoint system is not properly installed or leaking.	Check the wellpoint system and eliminate the leaks.
	The leather piston cups are worn.	Replace the leather piston cups.
	Too much air leaking along the gland packing (stuffing box).	Tighten the gland follower so that one (1) drop of water leaks every five (5) seconds.
	Too much iron or lime deposit in the pump housing / in the stone catcher.	Clean the pump and stone catcher properly.
	Vacuum regulator valve on the stone catcher is not set.	Adjust valve to max. 8.5 metres on the vacuum gauge.
	Pump speed is too low.	Increase diesel engine RPM or motor speed (VFD).
	Incorrect direction of rotation ( <i>only electric driven pumps</i> ).	Reverse direction of rotation ( <i>only electric driven pumps</i> ).

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Thumping noise in the pump.	Vacuum build-up is extremely high (close to full vacuum).	Adjust the vacuum regulator valve on the stone catcher to max. 8.5 metres on the gauge.
<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Pump is demanding abnormal amount of power (drive is overloaded).	Pump speed is too high.	Decrease diesel engine RPM or motor speed (VFD).
	Incorrect direction of rotation ( <i>only electric driven pumps</i> ).	Reverse direction of rotation ( <i>only electric driven pumps</i> ).
<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Diesel engine stops immediately after starting (cold start).	Back pressure in the discharge line.	Disconnect the suction and discharge lines. Start the diesel engine and let it warm up for five (5) minutes. Then try again.



## Pumps PT series

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Diesel engine will not start.	No fuel is reaching the engine.	First check the fuel level in the tank. In addition check the fuel connections / filters.
	Self priming fuel pump is not working.	Check the in-line fuse or replace the fuel pump.
	Mechanical engine oil pressure protection is off (due to running out of fuel or low engine oil pressure).	Activate the mechanical oil pressure shutdown device (red lever) and start the engine.
	Insufficiently charged battery.	Check the battery or contact the service department if necessary.

### **Note**

**For other pump or drive malfunctions, contact the service department of BBA Pumps.**

## 11 Disposal

If the pump unit is scrapped and disassembled at the end-of-life, the regulations for waste disposal in force at the time and location of disassembly must be observed.

The pump unit is constructed of common materials.

At the time of construction there were waste disposal methods available for these materials.

At the time of construction there were no special risks known for persons responsible for the disassembly work after careful cleaning of the pump unit.

Observe the environmental regulations in force at the time of disassembly to prevent environmental pollution.

Prior to beginning disassembly, complete the following tasks:

- Drain the pump unit and clean it internally (see chapter 9 'Maintenance').
- For a diesel driven pump unit, follow the guidelines provided by the manufacturer of the diesel engine (see [www.bbapumps.com](http://www.bbapumps.com) or for North America [www.bbapumpsusa.com](http://www.bbapumpsusa.com)).
- Remove the fuel from the fuel tank.
- Drain the coolant.
- Keep the liquids separate and submit them to a collection centre authorised for their disposal.

## 12 CE Declaration

IIA Certificate:

### Declaration of Conformity

as defined by EC Machinery Directive 06/42/EC, Annex IIA.

Manufacturer: **B.B.A. Pumps BV, Zutphensestraat 242, 7325 WV Apeldoorn**

Product: **PT series pump**

We hereby declare that all the pumps listed above are in conformity with the provisions of:

- the Machinery Directive (2006/42/EC, as last amended)
- the Low Voltage Directive (directive 2006/95/EEC, as last amended) - if equipped with an electric motor
- the EMC Directive (2004/108/EC, as last amended) - if equipped with an electric motor

The pumps comply with the harmonised standards:

- NEN-EN 809:1998+A1:2009/C1:2010 'Pumps and pump units for liquids - Common safety requirements'
- NEN 1010:2007+C1: 2008
- NEN-EN-IEC 61439-1/2: 2009
- NEN-EN-IEC 60204-1+A1+C11: 2006
- NEN-EN\_ISO 12100-1 Safety of machinery: Basic concepts, general principles for design
- NEN-EN\_ISO 12100-2 Safety of machinery: Basic concepts, technical principles

**NOTE: This declaration is only valid if the pump or pump unit is installed in accordance with the operating guidelines and associated technical specifications.**

J. Bruin  
BBA Pumps BV



General Manager







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