Pressure Booster System

Installation/Operating Manual

Hydro-Unit Base Line

Hydro-Unit Base Line MVP

Legal information/Copyright

Original operating manual Hydro-Unit Base Line

Contents

Glossary

Accumulator

Pressure losses may occur in the piping downstream of the pressure booster system as a result of losses due to leakage. The accumulator serves to compensate for pressure losses and minimises the frequency of starts of the pressure booster system.

Certificate of decontamination

A certificate of decontamination is enclosed by the customer when returning the product to the manufacturer to certify that the product has been properly drained to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

Dry running protection

Dry running protection devices prevent the pump from being operated without the fluid to be handled, which would result in pump damage.

IE3

Efficiency class to IEC 60034-30: 3 = Premium Efficiency (IE = International Efficiency)

Switchgear and controlgear assembly

Control cabinet with one or several control units / switchgears and electrical equipment.

1 General

1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series, the main operating data and the serial number. The serial number uniquely describes the product and is used as identification in all further business processes.

In the event of damage, immediately contact your nearest DP service facility to maintain the right to claim under warranty.

1.2 Software changes

The software has been specially created for this product and thoroughly tested.
Making changes or additions to the software or parts of the software is prohibited. This does not, however, apply to software updates by DP .

1.3 Installation of partly completed machinery

To install partly completed machinery supplied by DP refer to the sub-sections under Servicing/Maintenance.

1.4 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. [⇨ Section 2.3, Page 9]

1.5 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Sub-supplier product literature	Operating manuals, circuit diagram and other product literature describing accessories and integrated machinery components

1.6 Symbols

Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇨	Result of an action
⇨	Cross-references
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

1.7 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
DANGER	**DANGER** This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
WARNING	**WARNING** This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
CAUTION	**CAUTION** This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	**General hazard** In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	**Electrical hazard** In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	**Machine damage** In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

2 Safety

DANGER

All the information contained in this section refers to hazardous situations.

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
  - Arrow indicating the direction of rotation
  - Markings for connections
  - Name plate
- The operator is responsible for ensuring compliance with all local regulations not taken into account.

2.2 Intended use

- The pressure booster system must only be operated within the operating limits described in the other applicable documents.
- Only operate pressure booster systems which are in perfect technical condition.
- Do not operate partially assembled pressure booster systems.
- The pressure booster system must only handle the fluids described in the product literature of the respective design variant.
- Never operate the pressure booster system without the fluid to be handled.
- Observe the information on minimum flow rates specified in the product literature (to prevent overheating, bearing damage, etc).
- Observe the maximum flow rates indicated in the data sheet or product literature (to prevent overheating, cavitation damage, bearing damage, etc).
- Do not throttle the flow rate on the suction side of the pressure booster system (to prevent cavitation damage).
- Consult the manufacturer about any other modes of operation not described in the product literature.

2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding temperature, etc.
- Observe all safety information and instructions in this manual.

2.3 Personnel qualification and personnel training

- All personnel involved must be fully qualified to install, operate, maintain and inspect the product this manual refers to.
- The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.
- Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.
- Training on the pressure booster system must always be supervised by specialist technical personnel.

2.4 Consequences and risks caused by non-compliance with this manual

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
  - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
  - Failure of important product functions
  - Failure of prescribed maintenance and servicing practices
  - Hazard to the environment due to leakage of hazardous substances

2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

2.6 Safety information for the operator/user

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)
- If stopping the pump does not increase potential risk, fit an emergency-stop control device in the immediate vicinity of the pump (set) during pump set installation.

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pressure booster system are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the pressure booster system during standstill only.
- The pump casing must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pressure booster system out of service always adhere to the procedure described in the manual.
- Decontaminate pressure booster systems which handle fluids posing a health hazard.
- As soon as the work has been completed, re-install and/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning.
- Make sure the pressure booster system cannot be accessed by unauthorised persons (e.g. children).
- Prior to opening the device, pull the mains plug and wait for at least 10 minutes.

2.8 Unauthorised modes of operation

Always observe the limits stated in the product literature.

The warranty relating to the operating reliability and safety of the pressure booster system supplied is only valid if the equipment is used in accordance with its intended use.
[⇨ Section 2.2, Page 8]

2.9 Electromagnetic compatibility (EMC)

2.9.1 Interference emission requirements

The EN 61800-3 EMC product standard is relevant for electric variable speed drives/control systems. It specifies all pertinent requirements and refers to the relevant generic standards for complying with the EMC Directive.

Frequency inverters are commonly used by operators as a part of a system, plant or machine assembly. It should be noted that the operator bears all responsibility for the final EMC properties of the equipment, plant or installation.

A prerequisite or requirement for complying with the relevant standards or the limit values and inspection/test levels referenced by them is that all information and descriptions regarding EMC-compliant installation be observed and followed.

In accordance with the EMC product standard, the EMC requirements to be met depend on the purpose or intended use of the frequency inverter. Four categories are defined in the EMC product standard:

Table 4: Categories of intended use

Category	Definition	Limits to EN 55011
C1	Frequency inverters with a supply voltage under 1000 V installed in the first environment (residential and office areas).	Class B
C2	Frequency inverters with a supply voltage under 1000 V installed in the first environment (residential and office areas) that are neither ready to be plugged in/ connected nor are mobile and must be installed and commissioned by specialist personnel.	Class A, Group 1
C3	Frequency inverters with a supply voltage under 1000 V installed in the second environment (industrial environments).	Class A, Group 2
C4	Frequency inverters with a supply voltage over 1000 V and a nominal current over 400 A installed in the second environment (industrial environments) or that are envisaged for use in complex systems.	No borderline/ boundary[1)]

The following limit values and inspection/test levels must be complied with if the generic standard on interference emissions applies:

Table 5: Classification of installation environment

Environment	Generic standard	Limits to EN 55011
First environment (residential and office areas)	EN/IEC 61000-6-3 for private, business and commercial environments	Class B
Second environment (industrial environments)	EN/IEC 61000-6-4 for industrial environments	Class A, Group 1

The frequency inverter meets the following requirements:

Table 6: EMC properties of the frequency inverter

Power [kW]	Cable length [m]	Category to EN 61800-3	Limits to EN 55011
≤ 11	≤ 5	C1	Class B

The EN 61800-3 standard requires that the following warning be provided for drive systems that do not comply with category C1 specifications:
This product can produce high-frequency interference emissions that may necessitate targeted interference suppression measures in a residential or office environment.

2.9.2 Line harmonics requirements

The product is a device for professional applications as defined by EN 61000-3-2. The following generic standards apply when establishing a connection to the public power grid:

- EN 61000-3-2
  for symmetric, three-phase devices (professional devices with a total power of up to 1 kW)
- EN 61000-3-12
  for devices with a phase current of between 16 A and 75 A and professional devices from 1 kW up to a phase current of 16 A.

2.9.3 Interference immunity requirements

In general, the interference immunity requirements for a frequency inverter hinge on the specific environment in which the inverter is installed.

The requirements for industrial environments are therefore higher than those for residential and office environments.

The frequency inverter is designed such that the immunity requirements for industrial environments and, thus, the lower-level requirements for residential and office environments, are met and fulfilled.

1 An EMC plan must be devised.

The following relevant generic standards are used for the interference immunity test:

- EN 61000-4-2: Electromagnetic compatibility (EMC)
  - Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
- EN 61000-4-3: Electromagnetic compatibility (EMC)
  - Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
- EN 61000-4-4: Electromagnetic compatibility (EMC)
  - Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test
- EN 61000-4-5: Electromagnetic compatibility (EMC)
  - Part 4-5: Testing and measurement techniques – Surge immunity test
- EN 61000-4-6: Electromagnetic compatibility (EMC)
  - Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify DP or the supplying dealer and the insurer about the damage in writing immediately.

3.2 Transport

⚠ DANGER

Pressure booster system tipping over

Danger to life from falling pressure booster system!

- ▹ Never suspend the pressure booster system by its power cable.
- ▹ Do not lift the pressure booster system by its manifold.
- ▹ Observe the applicable local accident prevention regulations.
- ▹ Observe the information on weights, centre of gravity and fastening points.
- ▹ Use suitable and permitted transport equipment, e.g. crane, forklift or pallet jack.

✓ Transport equipment / lifting equipment suitable for the corresponding weight has been selected and is on hand.

1. Remove the packaging. Remove the caps from the connection openings.
2. Check for any in-transit damage.
3. Transport the pressure booster system to the place of installation.
4. Detach the pressure booster system from the pallet using a suitable tool.
5. Separate the pressure booster system from the wooden skids with a suitable tool. Lift the pressure booster system off. Dispose of the wooden skids.
6. Carefully place down the pressure booster system at the site of installation.

3.3 Storage/preservation

CAUTION

Damage during storage due to frost, moisture, dirt, UV radiation or vermin

Corrosion/contamination of pressure booster system!

- ▹ Store the pressure booster system in a frost-proof room. Do not store outdoors.

CAUTION

Wet, contaminated or damaged openings and connections

Leakage or damage of the pressure booster system!

- ▹ Only open the openings of the pressure booster system at the time of installation.

NOTE

Rotate the shaft by hand every three months, e.g. via the motor fan.

If commissioning is to take place some time after delivery, the following measures are recommended when storing the pressure booster system:

Store the pressure booster system in a dry, protected room where the atmospheric humidity is as constant as possible.

Table 7: Ambient conditions for storage

Ambient condition	Value
Relative humidity	50 % maximum
Ambient temperature	0 °C to +40 °C

- Frost-free
- Well-ventilated

3.4 Return to supplier

1. Drain the pressure booster system as per operating instructions.
2. Always flush and clean the pressure booster system, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the pressure booster system has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the pressure booster system must also be neutralised, and anhydrous inert gas must be blown through the pressure booster system to ensure drying.
4. Always complete and enclose a certificate of decontamination when returning the pressure booster system. [⇨ Section 12, Page 51]
   Always indicate any safety and decontamination measures taken.

NOTE

If required, a blank certificate of decontamination can be downloaded from the following web site: www.dp.nl/certificates-of-decontamination

3.5 Disposal

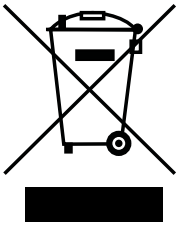
⚠ WARNING

Fluids handled, consumables and supplies which are hot and/or pose a health hazard

Hazard to persons and the environment!

- ▷ Collect and properly dispose of flushing fluid and any fluid residues.
- ▷ Wear safety clothing and a protective mask if required.
- ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

1. Dismantle the pressure booster system.
   Collect greases and other lubricants during dismantling.
2. Separate and sort the pump materials, e.g. by:
   - Metals
   - Plastics
   - Electronic waste
   - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.



Electrical or electronic equipment marked with the adjacent symbol must not be disposed of in household waste at the end of its service life.

Contact your local waste disposal partner for returns.

If the used electrical or electronic equipment contains personal data, the operator is responsible for deleting it before the equipment is returned.

4 Description

4.1 General description

– Pressure booster system

4.2 Product information as per Regulation No. 1907/2006 (REACH)

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see http://www.dp.nl/reach.

4.3 Designation

Example: HU3 Base Line DPV 10/4 B MVP

Table 8: Designation key

Code	Description	
HU	Hydro-Unit	
3	Number of pumps	
Base Line	Type series	
DPV 10	Size	
	DPV 10	
4 B	Number of stages	
MVP	Design	
	MVP	Variable speed pressure booster system

4.4 Name plate

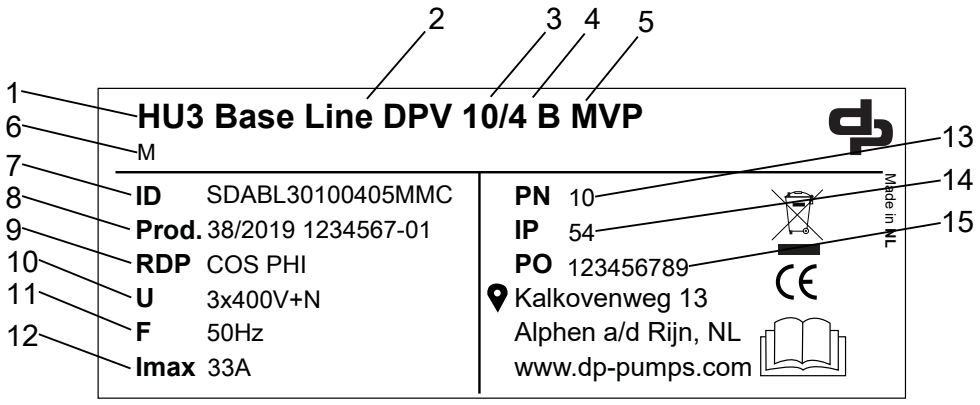


Fig. 1: Name plate (example)

1	Number of pumps	9	Dry running protection
2	Type series	10	Power supply voltage
3	Size	11	Power supply frequency
4	Number of stages	12	Maximum current input
5	Design	13	Max. operating pressure

6	Inlet conditions[2)]	14	Enclosure
7	Serial number	15	Order number
8	Month of production / year of production, consecutive number		

4.5 Design details

Design

- Fully automatic pressure booster system
- Variable speed operation
- Baseplate-mounted
- Hydraulic components made of stainless steel / brass
- Check valve per pump
- Shut-off valve for each pump
- Discharge-side, direct-flow membrane-type accumulator, approved for drinking water
- Pressure gauge
- Integrated dry running protection
- Pressure transmitter on the discharge side

Installation

- Stationary dry installation

Drive

- Electric motor
- Efficiency class IE3 to IEC 60034-30
- Enclosure IP55

Automation

- One frequency inverter per pump
- Setting the pressure via buttons or via bluetooth using an app
- Motor protection switch per pump
- Control unit (IP54 enclosure)
- Fault message signalling contact per pump
- Operation signalling contact per pump

2 M = Inlet side of pressure booster system connected to the municipal water supply, suction head operation, F = Pressure booster system with break tank arranged on same level as pump, suction head operation, L = Pressure booster system with break tank arranged at a lower level, suction lift operation

4.6 Configuration and function

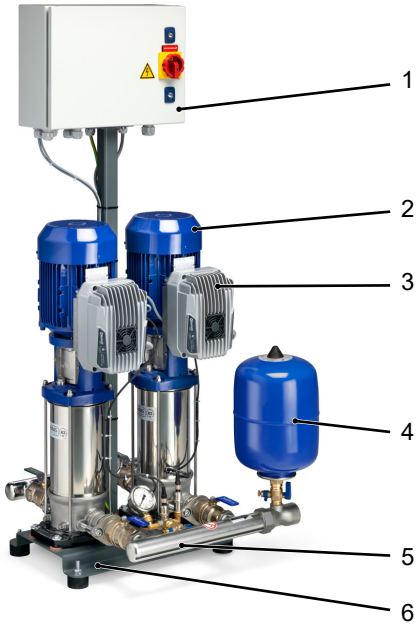


Fig. 2: Illustration of pressure booster system

1	Control cabinet
2	Pump
3	Control unit
4	Membrane-type accumulator
5	Manifold
6	Baseplate

Design

The fully automatic pressure booster system is equipped with one or more vertical high-pressure pumps (2) (all of which are speed-controlled) for pumping the fluid handled to the consumer installations in the set pressure range.

Function
Automatic mode

One or more pumps (2) are controlled and monitored by motor-mounted frequency inverters. As the demand increases or decreases, the pumps are started and stopped automatically. As soon as the demand increases again after one pump has been stopped, another pump which has not been in operation before is started up.
The stand-by pump is also included in the alternating cycle.[3)]
The standard setting is for the pressure booster system to start automatically as a function of pressure; the actual pressure is measured by an analog pressure measuring device (pressure transmitter).
As long as the pressure booster system is in operation, the pumps are started and stopped as a function of demand (standard setting). In this way it is ensured that the individual pumps operate only in line with actual demand. The use of variable speed pumps reduces wear as well as the frequency of pump starts in parallel operation.
If a duty pump fails, the next pump is started up immediately. A fault is output, which can be reported via volt-free contacts (e.g. to the control station).
If the demand drops towards 0, the pressure booster system slowly runs down to the stop point and stops

As standard, one of the pumps is on stand-by. The control unit defines each of the pumps as stand-by pump in alternation. This prevents stagnation of water in any of the pumps.

The pressure booster system is designed with dry running protection.

If the pump has not been in operation for 24 hours, a test run is initiated.

3 Multiple pump systems only

Function
Manual mode

In manual mode, a minimum flow is required to protect the pump against overheating.

4.7 Noise characteristics

The pressure booster system is available with different numbers and sizes of pumps. For the noise characteristics refer to the operating manual of the pump set. To calculate the expected total sound pressure level, add a defined value to the individual pump set's expected sound pressure level.

Table 9: Values for calculating the total expected sound pressure level

Number of pump sets	Value
	dB(A)
2	+ 3
3	+ 4,5
4	+ 6
5	+ 7
6	+ 7,5

Example

Pressure booster system with 4 pump sets (value: + 6 dB(A))

Single pump = 48 dB(A)

48 dB(A) + 6 dB(A) = 54 dB(A)

The expected total sound pressure level of 54 dB(A) may develop when all 4 pump sets are running under full-load conditions.

4.8 Scope of supply

Depending on the model, the following items are included in the scope of supply:

- Up to three vertical high-pressure centrifugal pumps with oval flange
- Powder-coated / epoxy resin-coated steel baseplate
- Check valve per pump
- Discharge-side gate valve per pump
- Suction side ball valve or shut-off butterfly valve per pump
- Suction-side manifold and discharge-side manifold made of stainless steel
- Pressure transmitter on the discharge side
- Pressure gauge
- Pressure transmitter on the inlet side for dry running protection
- Discharge-side, direct-flow membrane-type accumulator, approved for drinking water
- Control unit (IP54 enclosure)
  - Sheet steel housing: colour RAL 7035
  - LEDs signalling the operating status
  - Lockable master switch (repair switch)
  - Motor protection switch per pump
  - One frequency inverter per pump

4.8.1 Inlet conditions, version M

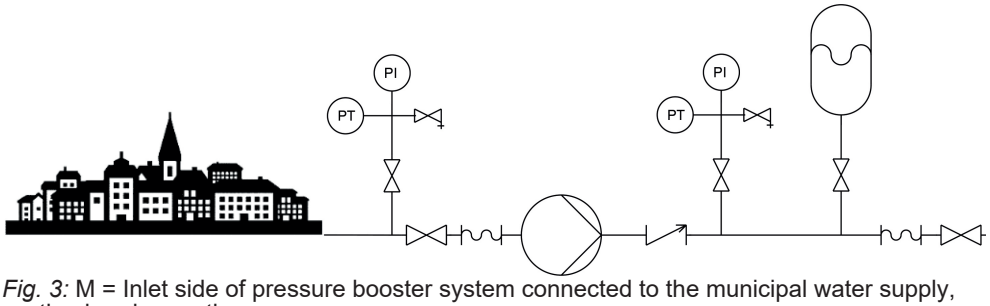


Fig. 3: M = Inlet side of pressure booster system connected to the municipal water supply, suction head operation

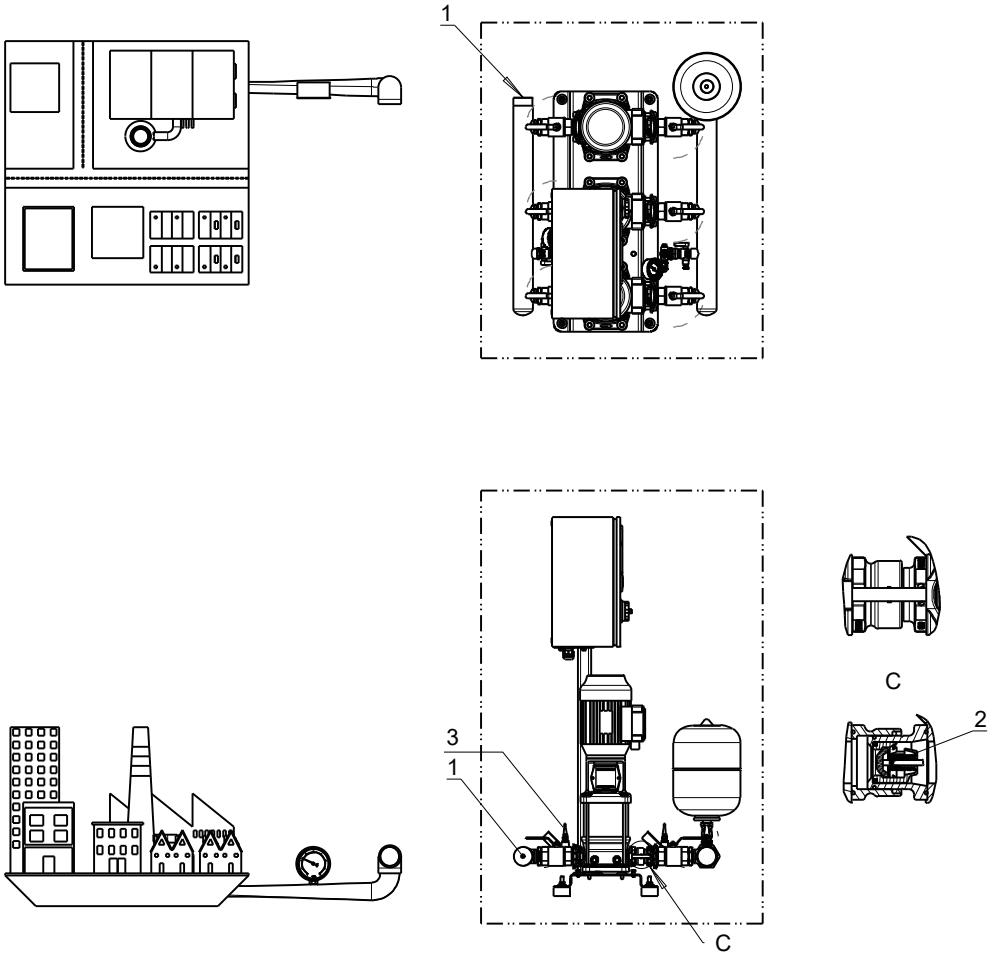


Fig. 4: Scope of supply for version M

1	Suction line (included in DP's scope of supply)
2	Lift check valve (included in DP's scope of supply)
3	Dry running protection (included in DP's scope of supply)

4.8.2 Inlet conditions, version F

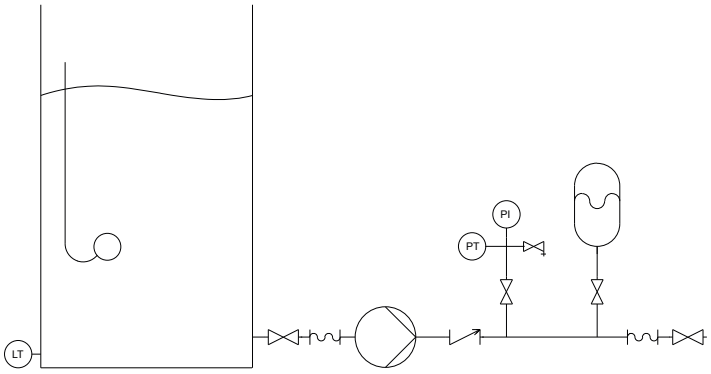


Fig. 5: F = Pressure booster system with break tank arranged on same level as pump, suction head operation

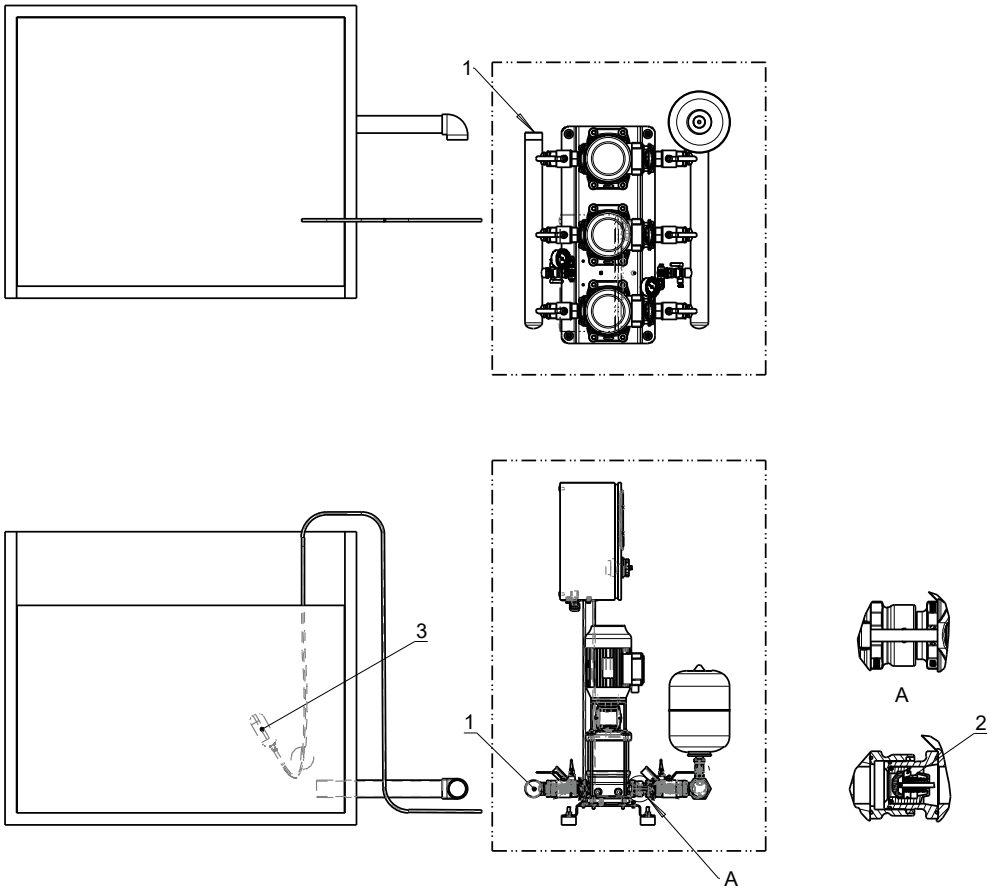


Fig. 6: Scope of supply, version F

1	Suction line (included in DP's scope of supply)
2	Lift check valve (included in DP's scope of supply)
3	Dry running protection (not included in DP's scope of supply)

4.8.3 Inlet conditions, version L

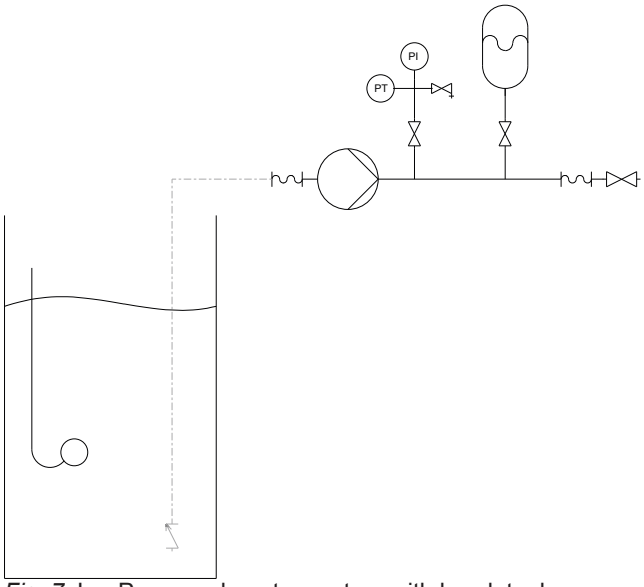


Fig. 7: L = Pressure booster system with break tank arranged at a lower level, suction lift operation

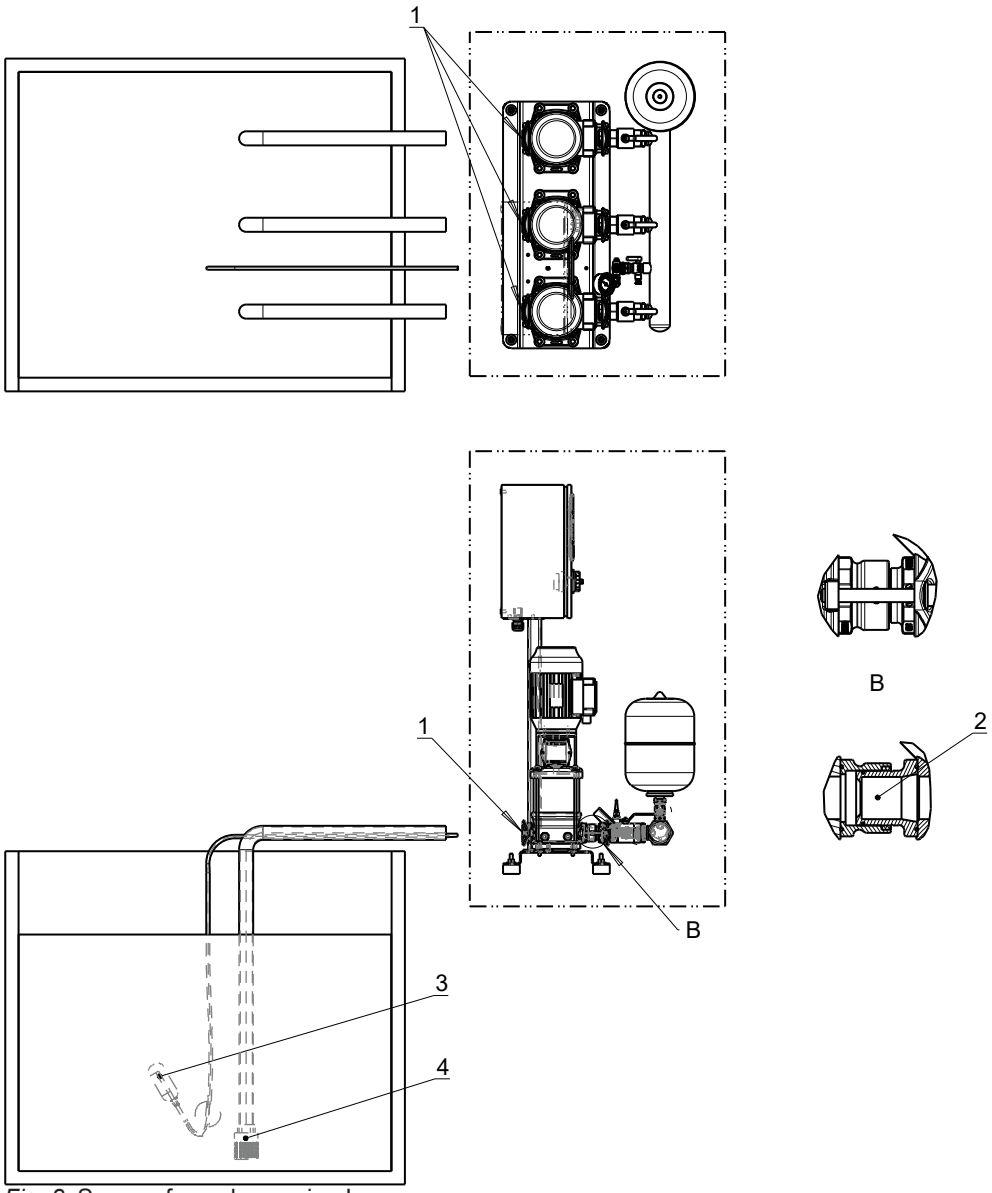


Fig. 8: Scope of supply, version L

1	Suction line (not included in DP's scope of supply)
2	Lift check valve (not included in DP's scope of supply)
3	Dry running protection (not included in DP's scope of supply)
4	Foot valve (not included in DP's scope of supply)

4.9 Dimensions

For dimensions refer to the outline drawings of the pressure booster system.

4.10 Terminal wiring diagram

For the terminal assignment refer to the circuit diagram.

4.11 Potential equalisation

A terminal marked with the earth symbol is provided at the power connection for connecting a PE conductor.

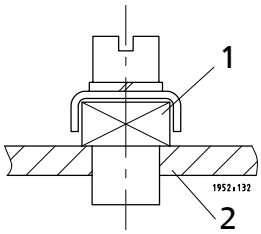


Fig. 9: PE connection

1	Earthing terminal	2	Location of power connection

5 Installation at Site

5.1 Checks to be carried out prior to installation

⚠ WARNING

Installation on a mounting surface which is unsecured and cannot support the load

Personal injury and damage to property!

- ▷ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class X0 to EN 206 .
- ▷ The mounting surface must be set, even, and level.
- ▷ Observe the weights indicated.

NOTE

The anti-vibration mounts of the pressure booster system provide adequate insulation against solid-borne noise.
Thanks to level-adjustable feet (KSB accessory) the pressure booster system can also be installed in a horizontal position on uneven floors.

For pressure booster systems with DPV 2, 4, 6, 10, 15, level-adjustable feet are available as accessories.

NOTE

Do not install pressure booster systems next to sleeping or living quarters.

NOTE

The installation room must provide for suitable drainage.

Before beginning with the installation check the following:

- All structural work required has been checked and prepared in accordance with the dimensions in the outline drawing.
- The data on the name plate of the pressure booster system has been checked. The pressure booster system must be suitable for operation on the available power supply network.
- The place of installation is frost-free.
- The place of installation can be locked.
- The place of installation is well-ventilated.
- A suitably dimensioned drain connection (e.g. leading to a sewer) is available.
- If expansion joints are used, take note of their creep resistance. Expansion joints must be easily replaceable.

The pressure booster system is designed for a maximum ambient temperature of 0 °C to +40 °C at a relative humidity of 60 %.

5.2 Installing the pressure booster system

⚠ WARNING

Top-heavy pressure booster system

Risk of personal injury by pressure booster system tipping over!

- ▷ Pressure booster systems awaiting final installation must be secured against tipping over.
- ▷ Firmly anchor the pressure booster system.

NOTE

To prevent the transmission of piping forces and solid-borne noise, installing expansion joints with length-limiters is recommended.

- ✓ The pressure booster system's packaging has been removed.
- ✓ A suitable installation site has been selected that meets the requirements.
- ✓ Sufficient clearance in all directions is provided for servicing work.

1. Make sure that there is sufficient space for the pressure booster system.
2. Place the pressure booster system in its correct installation position.

5.3 Connecting the piping

CAUTION

Air pockets in suction line

Pressure booster system cannot prime!

- ▷ Lay the pipe with a continuously rising slope.

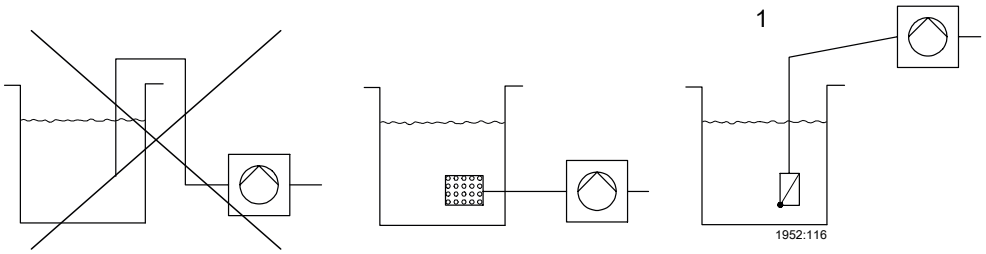


Fig. 10: Correct piping connection

1	Suction lift operation

1. Mechanically support the suction head line on site to provide for absorption of mechanical forces.
2. Install the piping without transmitting any stresses and strains.
3. Connect the piping to the distribution lines on the inlet side and discharge side.

5.3.1 Fitting an expansion joint (optional)

⚠ DANGER

Sparks and radiant heat

Fire hazard!

- ▷ Take suitable precautions to protect the expansion joint if any welding work is carried out.

CAUTION

Leaking expansion joint

Flooding of installation room!

- ▷ Never use the expansion joint to compensate for misalignment or mismatch of the piping.
- ▷ Do not apply any paint to the expansion joint.
- ▷ Keep the expansion joint clean.
- ▷ Regularly check for cracks or blisters, exposed fabric or other defects.

✓ Sufficient clearance in all directions is provided for checking the expansion joint.

✓ The expansion joint is not insulated along with the pipeline insulation.

1. Sufficient clearance in all directions is provided for checking the expansion joint.
2. Install the expansion joint in the piping free of twist or distortion.
3. Evenly tighten the bolts crosswise. The ends of the bolts must not protrude from the flange.

5.3.2 Fitting the pressure reducer (optional)

NOTE

A pipe length of approximately 600 mm must be provided on the inlet side to accommodate a pressure reducer, if necessary.

NOTE

A pressure reducer must be installed if the inlet pressure fluctuation is too high for the pressure booster system to operate as intended or if the total pressure (inlet pressure and shut-off head) exceeds the design pressure.

The inlet pressure (p_{inl}) varies between 4 and 8 bar. A minimum pressure gradient of 5 m is required for the pressure reducer to function properly. This means that the pressure reducer must be mounted 5 m higher than the pressure booster system. The pressure drops by about 0.1 bar per metre of height difference. Alternatively, the pressure reducer can be subjected to a pressure of 0.5 bar.

Example

p_{inl} = 4 bar

Minimum pressure gradient = 5 m ≙ 0.5 bar

Downstream pressure: 4 bar - 0.5 bar = 3.5 bar.

✓ A minimum pressure gradient of 5 m is available.

1. Install the pressure reducer in the pipe on the inlet side.

5.4 Mounting the accumulator

CAUTION

Dirt in the pressure booster system

Damage to the pump sets!

- ▷ Clean the accumulator before filling it.

✓ The original operating manual of the pressure booster system is on hand.

1. Mechanically and electrically connect the accumulator in accordance with the original operating manual supplied.

5.5 Connecting the dry running protection device

✓ The original operating manual of the dry running protection device is on hand.

1. Fit the dry running protection device in accordance with the supplied original operating manual. Connect it in the control unit in accordance with the supplied original operating manual.

5.6 Electrical connection

⚠ DANGER

Electrical connection work by unqualified personnel

Danger of death from electric shock!

- ▷ Always have the electrical connections installed by a trained and qualified electrician.
- ▷ Observe regulations IEC 60364 .

⚠ WARNING

Incorrect connection to the mains

Damage to the power supply network, short circuit!

- ▷ Observe the technical specifications of the local energy supply companies.

NOTE

Installing a motor protection device is recommended.

NOTE

If a residual current device is installed, observe the operating manual for the frequency inverter.

Lightning protection

– Electrical installations must be protected against overvoltage (binding since 14 December 2018) (see DIN VDE 0100-443 (IEC 60364-4-44:2007/A1:2015, modified) and DIN VDE 0100-534 (IEC 60364-5-53:2001/A2:2015, modified)). Whenever modifications are made to existing installations, retrofitting a surge protective device (SPD) in accordance with VDE is mandatory.

– A maximum cable length of 10 metres should not be exceeded between the surge protective device (usually type 1, internal lightning protection) installed at the service entrance and the equipment to be protected. For longer cables, additional surge protective devices (type 2) must be provided in the sub-distribution board upstream of the equipment to be protected or directly in the equipment itself.

– The associated lightning protection concept must be provided by the operator or by a suitable provider commissioned by the operator. Surge protective devices can be offered for the control units on request.

Wiring diagram

The wiring diagrams are located in the control cabinet, which is where they must be stored. The product literature of the switchgear and controlgear assembly supplied with the system includes a list of the electrical components installed. When ordering spare parts for electrical components, always indicate the number of the wiring diagram.

Terminal assignment

For the terminal assignment refer to the wiring diagram.

5.6.1 Sizing the power cable

Determine the cross-section of the power cable based on the total rated power required.

5.6.2 Connecting the pressure booster system

✓ The pressure booster system can be operated on the power supply network in accordance with the data on the name plate.

✓ The wiring diagram is available.

1. Connect terminals L1, L2, L3 and PE in accordance with the wiring plan.
2. Connect the potential equalisation conductor on the baseplate to the terminal with the earthing symbol.

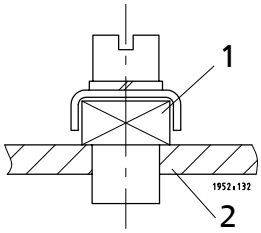


Fig. 11: Connecting the potential equalisation conductor

1	Earthing terminal	2	Baseplate

For accessories and/or integrated machinery components, observe the relevant manufacturer's product literature.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

CAUTION

Pump set running dry

Damage to the pump set/pressure booster system!

▷ Use dry running protection. If the dry running protection terminal is disabled by means of a bridge, the operator shall assume responsibility for any dry running that might occur.

Ensure that the following requirements are met prior to commissioning/start-up :

– The pressure booster system has been flushed and disinfected in accordance with local requirements.

– The pressure booster system has been properly connected to the electric power supply and is equipped with all protection devices.

– All relevant VDE standards and/or regulations applicable in the country of use are complied with.

– The dry running protection device has been installed. [⇨ Section 5.5, Page 28]

6.1.2 Dry running protection

Pressure booster systems are fitted with a dry running protection device.

A float switch whose volt-free contact closes the circuit in upper float position can be connected to the control system as dry running protection. Follow the float switch manufacturer's instructions on how to set the float switch levels.

6.1.3 Commissioning/start-up of pressure booster system

NOTE

Prior to its delivery, the pressure booster system will be tested hydraulically with water and then drained again. For technical reasons the presence of some residual water is unavoidable.

Prior to commissioning/start-up observe EN 806. After prolonged standstill periods, flushing or professional disinfection is recommended. For extensive or branched piping systems, flushing the pressure booster system can be restricted to a limited area.

Commissioning should be carried out by specialist staff.

CAUTION

Foreign matter in the piping

Damage to the pump / pressure booster system!

▷ Before commissioning/starting up or functional check running the pressure booster system, make sure that there is no foreign matter in the pressure booster system or piping.

NOTE

Commissioning of the pressure booster system - even test running - shall only be carried out in full compliance with all pertinent VDE (German Association of Electrical Engineers) regulations.

CAUTION

Operation without the fluid to be handled

Damage to the pump sets!

- ▷ Prime the pressure booster system with the fluid to be handled.

- ✓ The pipe unions between the pump and the piping have been re-tightened.
- ✓ Flange connections have been firmly tightened.
- ✓ The cooling air inlet and outlet openings on the motor are unobstructed.
- ✓ All shut-off valves are open.
- ✓ The pre-charge pressure of the membrane-type accumulator has been checked. [⇨ Section 8.2.3, Page 40]

1. Set the master switch to "0"; unlock all motor protection switches (if applicable).
2. Provide connection to power supply.
3. Open/loosen the vent plugs on the pumps (refer to the pump's installation/operating manual).
4. Slowly open the inlet-side shut-off element and prime the pressure booster system until the fluid to be handled escapes through all vent holes.
5. Close and slightly tighten the pump vent plugs.
6. Set the manual-0-automatic selector switch (if any) to Automatic.
7. Switch on the master switch.
8. Open the discharge-side shut-off element.
9. When all pump sets have been run once, loosen the vent plugs again to let any remaining air escape while the pump is switched off.
10. Tighten the vent plug firmly.
11. Verify that the pump is running smoothly.
12. Close the discharge-side shut-off element for a short period and verify that the pumps reach the shut-off head.
13. Close the discharge-side shut-off element, causing the pump to stop.

NOTE

Minor leakage of the mechanical seals during commissioning is normal and will cease after a short period of operation.

6.2 Switching on the pressure booster system

Plug in the mains plug or set the master switch to I to energise the pump.
Readiness for operation is signalled by a permanently lit red LED and a flashing green LED.

6.3 Checklist for commissioning/start-up

Table 10: Checklist

Steps to be carried out	Action	Done
1	Read the operating manual.	
2	Compare the power supply data against the name plate data.	
3	Check the earthing system/take measurements.	
4	Check the mechanical connection to the water mains. Re-tighten the flange and pipe unions.	
5	Prime and vent the pressure booster system from the inlet side.	
6	Check the inlet pressure.	
7	Check whether all cables are firmly connected to the terminals inside the control unit.	
8	Compare the settings of the motor protection switches with the name plate data and re-adjust if necessary.	
9	Check the start-up pressure and the stop pressure; re-adjust if necessary.	
10	Test the proper function of the dry running protection equipment. If not fitted, make a relevant note in the commissioning report.	
11	After the pump sets have been running for 5 to 10 minutes, vent them again.	
12	Set all switches to automatic.	
13	Check the pre-charge pressure.	
14	Enter any deviations from the name plate or order documentation in the commissioning report.	
15	Complete the commissioning report together with the operator/user and instruct the operator/user as to the function of the unit.	

6.4 Shutdown

6.4.1 Shutdown

Standard design

1. Set the master switch to 0.

Additional instruments

1. Set manual-0-automatic selector switch to 0.

6.4.2 Measures to be taken for shutdown

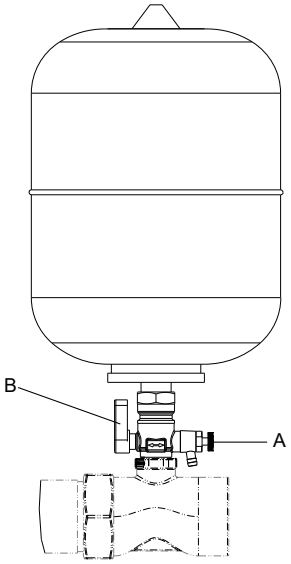


Fig. 12: Venting and draining the accumulator

A	Vent plug
B	Ball valve lever

✓ The pressure booster system has been switched off. [⇨ Section 6.4.1, Page 32]

1. Turn the ball valve lever B by 45 degrees.
2. Open vent plug A at the accumulator.
   ⇨ The pressure booster system is being vented and drained.
3. Close vent plug A at the accumulator.
4. Turn the ball valve lever B back into open position (upwards).

7 Operating the Pressure Booster System

CAUTION

Incorrect operation

Water supply is not assured!

- ▷ Make sure to comply with all local regulations, particularly the EC Machinery Directive and the EC Directive on Low-Voltage Equipment.

7.1 Design of the frequency inverter

NOTE

An app for connecting with the drive is available to specially trained service staff. The app may be installed via Google Play or App Store.

The frequency inverter is motor-mounted and self-cooling. Its display and control panel feature the following:

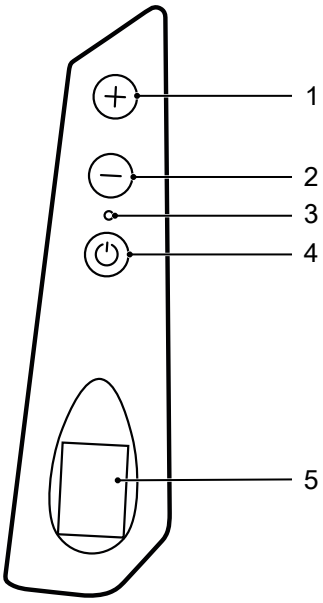


Fig. 13: Buttons and display at the frequency inverter

1	**Scrolling through parameters / Adjusting parameter values:** The ⊕ button can be used to increase the set value or set frequency. To be able to adjust the set value the ⊕ or ⊖button has to be pressed for more than 5 seconds until the setting value to be changed starts flashing. To confirm the set value wait for 5 seconds or press the Start/stop button ⏻ .
2	**Scrolling through parameters / Adjusting parameter values:** The ⊖button can be used to decrease the set value or set frequency. To be able to adjust the set value the ⊕ or ⊖button has to be pressed for more than 5 seconds until the setting value to be changed starts flashing. To confirm the set value wait for 5 seconds or press the Start/stop button ⏻ .
3	**Signal LEDs:** Red: The frequency inverter is supplied with the correct supply voltage and is on stand-by. Green: Motor running. Flashing yellow: Alarm condition
4	**Start/stop button** ⏻: Motor start/stop
5	**Display:** **Activating the Start/stop button lock function:** Press the Start/stop button ⏻ for at least 5 seconds. When the Start/stop button lock function is activated, the buttons ⊕ and ⊖ can be used to scroll through and display the operating parameters. The motor cannot be started or stopped when the Start/stop button lock function is activated. **Deactivating the Start/stop button lock function:** Press the Start/stop button ⏻ for at least 5 seconds. **Turning the display by 180°:** Press the buttons ⊕ and ⊖ for at least 5 seconds.

7.1.1 Display of the frequency inverter, start view

When the frequency inverter is started up, the control firmware version (LCD=X.XX), the power firmware version (INV =X.XX) and the hardware version (HW =X.XX) are displayed. The start view opens.

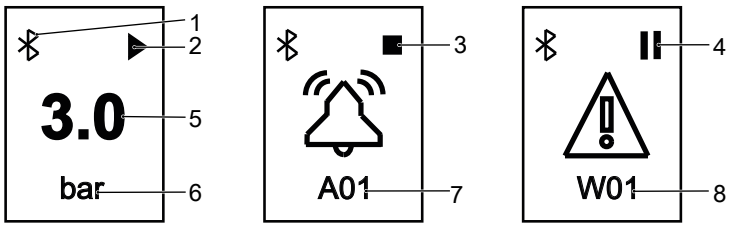


Fig. 14: Display of the frequency inverter, start view

1	Bluetooth active, flashing during communication
2	Motor running
3	Motor stopped
4	Stand-by
5	Read value
6	Measurement unit
7	Alarm
8	Warning

Table 11: Parameterisation

Parameterisation	Description
XX.X [bar]	Measured pressure value
XXX.X [Hz]	Frequency the inverter drives the motor with
XXX [VAC]	Supply voltage of the inverter. This only occurs when the motor is OFF. In ON condition the current input of the motor is shown instead of the supply voltage.
XX.X [A]	Current input of the motor
X.XX [cosø]	Cosine of phase offset ø between voltage and current, also referred to as motor power factor
XX.X [kW]	Estimated effective power absorbed by the motor.
X [INV]	Device address if Combo functionality is activated.
AXX	Alarm XX
WXX	Warning XX

7.2 Pressure booster systems with configured frequency inverter drives

Drives supplied as part of the pressure booster system are already configured for operation. The information on default settings is provided for information only; it is only required if the drive needs replacing.

Table 12: Nastec Mida VFD technical data

Model	V_{In}	Maximum V_{Out}	Maximum I_{In}	Maximum I_{Out}	Motor power P_2
	[VAC]	[V]	[A]	[A]	[kW]
MIDA 203	1~230 +/-15 %	3~230	5	3	0,55
MIDA 205	1~230 +/-15 %	3~230	8	5	1,1
MIDA 207	1~230 +/-15 %	3~230	11	7,5	2,0
MIDA 404	3~380 - 460	3 × V_{In}	3,7	4	1,1
MIDA 406	3~380 - 460	3 × V_{In}	5,4	6	2,2
MIDA 409	3~380 - 460	3 × V_{In}	8	9	4

7.3 Programming

The signal LED lights up in red when the pressure booster system is energised.

Press the Start/stop button ⏻ to start up the pump. When the selected setpoint has been reached, the signal LED lights up continuously in green.

Press the Start/stop button ⏻ to stop the pump. The signal LED changes from green to red (stand-by status).

Adjusting the pressure

A pressure gauge is fitted in the discharge line. Slightly opening one of the consumer installations facilitates pressure adjustment.

Adjusting the pressure

1. Press the Start/stop button ⏻ .
   ⇨ The pump starts up.
2. **When the Start/stop button lock function is activated:** Press the Start/stop button ⏻ for at least 5 seconds.
3. When the Start/stop button lock function is activated, the buttons ⊕ and ⊖ serve to scroll through the operating parameters for the pressure.
4. To be able to adjust the pressure press the ⊕ or ⊖ button for more than 5 seconds until the setting value to be changed starts flashing.
5. Press the ⊕ or ⊖ button to adjust the pressure.
6. **Confirm the set value:** Wait for 5 seconds or press the Start/stop button ⏻ .

8 Servicing/Maintenance

8.1 General information/Safety regulations

⚠ DANGER

Unintentional start-up of pressure booster system

Danger to life!

- ▷ De-energise the pressure booster system for any repair work or servicing work.
- ▷ Ensure that the pressure booster system cannot be re-energised unintentionally.

⚠ DANGER

Voltage at the pressure booster system

Danger to life!

- ▷ Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.

⚠ WARNING

Improper lifting/moving of heavy assemblies or components

Personal injury and damage to property!

- ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

⚠ WARNING

Unintentional start-up of pressure booster system

Risk of injury by moving parts!

- ▷ Make sure the pressure booster system has been de-energised before commencing work on the pressure booster system.
- ▷ Make sure that the pressure booster system cannot be started up unintentionally.

⚠ WARNING

Unqualified personnel performing work on the pressure booster system

Risk of personal injury!

- ▷ Always have repair and maintenance work performed by specially trained, qualified personnel.

CAUTION

Incorrectly serviced pressure booster system

Function of pressure booster system not guaranteed!

- ▷ Regularly service the pressure booster system.
- ▷ Prepare a maintenance schedule for the pressure booster system, with special emphasis on lubricants, shaft seals and pump couplings.

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

- Observe the safety instructions and information.
- For any work on the pump (set) observe the operating manual of the pump (set).
- In the event of damage you can always contact DP Service.
- A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation with a minimum of maintenance expenditure and work.
- Never use force when dismantling and reassembling the equipment.

8.1.1 Inspection contract

For inspection work and servicing work we recommend the DP inspection contract. Contact your service partner for details.

8.2 Servicing/inspection

8.2.1 Supervision of operation

CAUTION

Increased wear due to dry running

Damage to the pump set!

- ▷ Never operate the pump set without liquid fill.
- ▷ Never close the shut-off element in the suction line and/or supply line during pump operation.

CAUTION

Impermissibly high temperature of fluid handled

Damage to the pump!

- ▷ Prolonged operation against a closed shut-off element is not permitted (heating up of the fluid).
- ▷ Observe the temperature limits in the data sheet and in the section on operating limits.

While the pump is in operation, observe and check the following:

- If activated, check the functional check run.
- Measure the actual start-up pressure and stop pressure of the pump sets with a pressure gauge. Compare the values with the specifications on the name plate.
- Compare the pre-charge pressure of the accumulator with the recommended data. [⇨ Section 8.2.3, Page 40]
- Check the rolling element bearings for running noises.
  Vibrations, noise and an increase in current input occurring during unchanged operating conditions indicate wear.
- Monitor the functions of auxiliary connections, if any.

8.2.2 Maintenance schedule

Table 13: Overview of maintenance work

Maintenance interval	Servicing/maintenance work
At least once a year	Check the pump sets for smooth running and the mechanical seal for integrity.
	Check the shut-off elements, drain valves and check valves for proper functioning and tightness.

Maintenance interval	Servicing/maintenance work
	If fitted, clean the strainer in the pressure reducer.
	If fitted, check the expansion joints for any wear.
	Verify the pre-charge pressure. Check the accumulator for integrity. [⇨ Section 8.2.3, Page 40]
	Check the automatic switching functionality.
	Check the cut-in levels and cut-out levels.
	Check the inflow, inlet pressure, dry running protection, flow monitoring and pressure reducer.

8.2.3 Setting the pre-charge pressure

⚠ WARNING

Wrong gas

Danger of poisoning!

- ▷ Use only nitrogen as cushion gas of the membrane-type accumulator.

CAUTION

Pre-charge pressure too high

Damage to the accumulator!

- ▷ Observe the manufacturer's product literature (see name plate or operating manual of the accumulator).

The accumulator's pre-charge pressure (p) must be lower than the set start-up pressure (p_E) of the pressure booster system.

The best storage volumes are achieved with the following settings (mean value):

- Value 0.9 at start-up pressure > 3 bar
- Value 0.8 at start-up pressure < 3 bar

Example 1 p_E = 5 bar

5 bar × 0.9 = 4.5 bar

With a start-up pressure of 5 bar the pre-charge pressure of the accumulator must be 4.5 bar.

Example 2 p_E = 2 bar

2 bar × 0.8 = 1.6 bar

With a start-up pressure of 2 bar the pre-charge pressure of the accumulator must be 1.6 bar.

Checking the pre-charge pressure

1. Close the shut-off elements fitted underneath the membrane-type accumulator.
2. Drain the membrane-type accumulator via the drain valve.
3. Remove and store the protective cap of the membrane-type accumulator valve.
4. Check the pre-charge pressure using suitable equipment (e.g. tyre pressure gauge).
5. Fit the protective cap of the membrane-type accumulator valve.

Filling the membrane-type accumulator

1. Remove and store the protective cap of the membrane-type accumulator valve.
2. Add nitrogen through the valve.
3. Fit the protective cap of the membrane-type accumulator valve.

8.2.4 Replacing the non-return valve

⚠ DANGER

Voltage at the pressure booster system

Danger to life!

- ▹ Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.

1. De-energise the pump set and secure it against unintentional start-up. Comply with the local regulations.
2. Close the shut-off valve of the pump.
3. Place a suitable container under the drain connection.
4. Open the drain connections. To do so, observe the pump's operating manual.

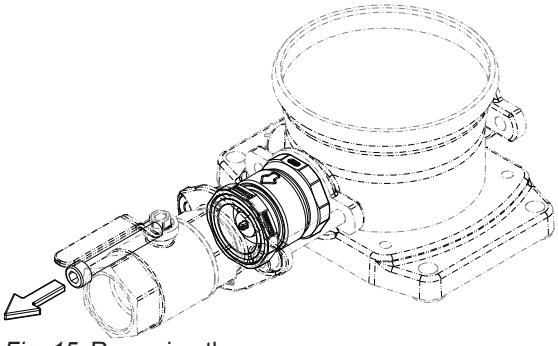


Fig. 15: Removing the screw

5. Remove the screw.

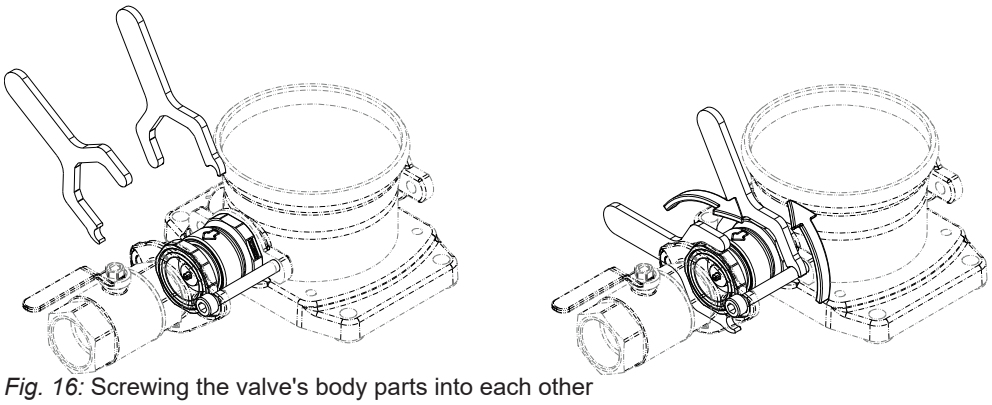


Fig. 16: Screwing the valve's body parts into each other

6. Use a suitable tool to screw the body parts of the non-return valve into each other to shorten the length of the body.

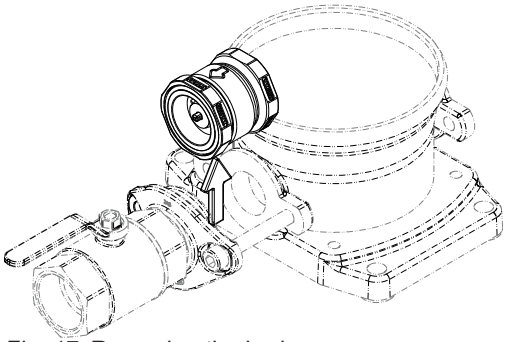


Fig. 17: Removing the body

7. Remove the body of the non-return valve.
8. Remove the insert check valve including O-rings.

9. Remove excessive contamination or deposits with a clean cloth.
10. Re-insert the insert check valve into the body. Apply lubricant to new O-rings. See table below.

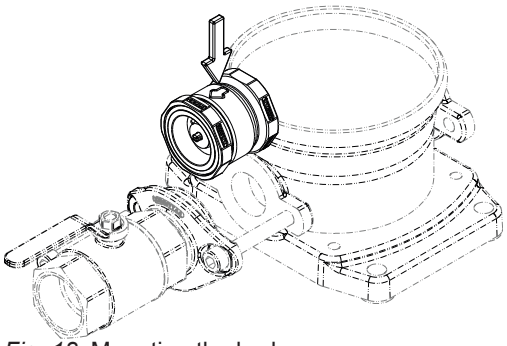


Fig. 18: Mounting the body

11. Mount the body of the non-return valve.

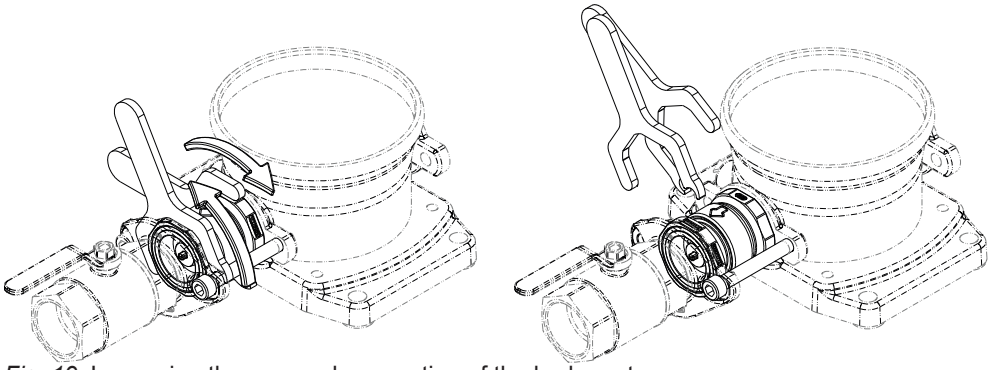


Fig. 19: Loosening the screwed connection of the body parts

12. Use a suitable tool to loosen the screwed connection of the body parts of the non-return valve to extend the body length.

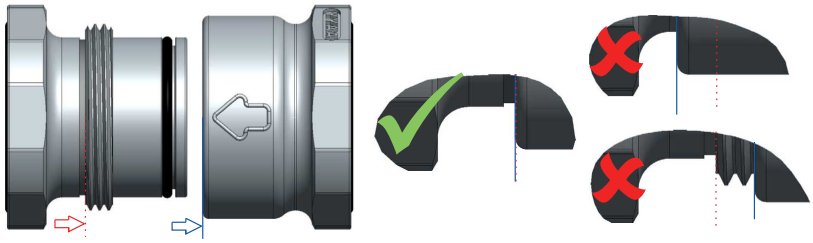


Fig. 20: Verifying the alignment

13. Verify the correct alignment.

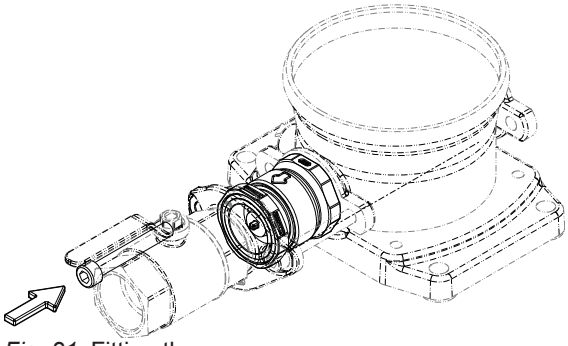


Fig. 21: Fitting the screw

14. Fit and tighten the screw.
15. Close the drain plugs of the pump. Properly dispose of the fluid collected.
16. Slowly open the shut-off valve and check for any leakage.

Table 14: Spare parts for servicing non-return valves, per pump

Material number	Description	Non-return valve	O-rings	O-ring lubricant (non-water soluble)
71630405	ER non-return valve DN 32	Watts Industries IN 032 DN 32	1x Eriks 12711456	Molykote ® G-5511[4)]
			2x Eriks 12711457	
71630410	ER non-return valve DN 50	Watts Industries IN 050 DN 50	1x Eriks 12192264	
			2x Eriks 12711459	

8.2.5 Mounting the manifold in a mirrored position

⚠ DANGER

Voltage at the pressure booster system

Danger to life!

▷ Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.

1. De-energise the pump set and secure it against unintentional start-up. Comply with the local regulations.
2. Close the shut-off valves in the discharge line and suction line of the pressure booster system.
3. Place a suitable container under the drain connections.
4. Open the drain connections. To do so, observe the pump's operating manual.

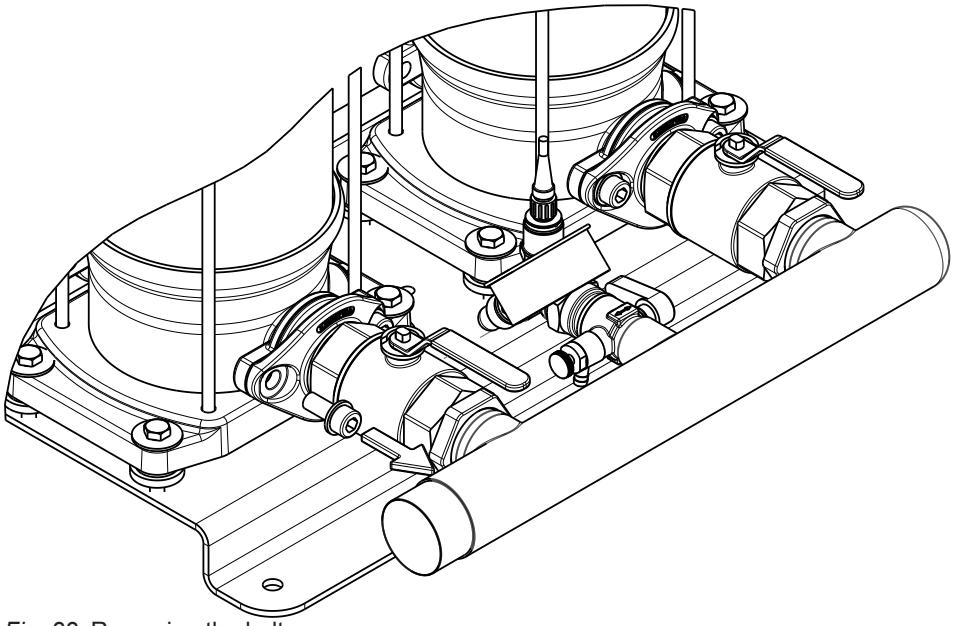


Fig. 22: Removing the bolts

5. Remove the tie bolts between the two oval flanges and the pumps.

4 Sealant for taps

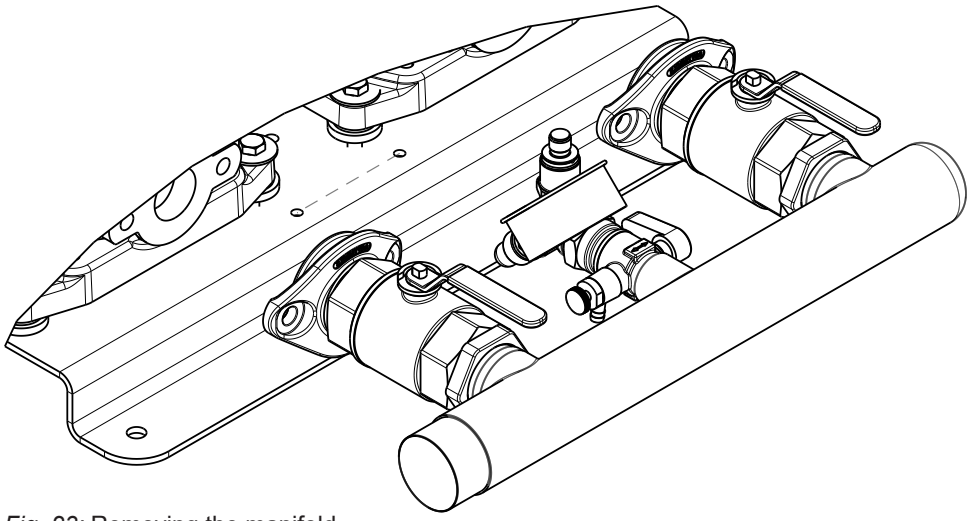


Fig. 23: Removing the manifold

6. Remove the entire manifold (with shut-off valves).

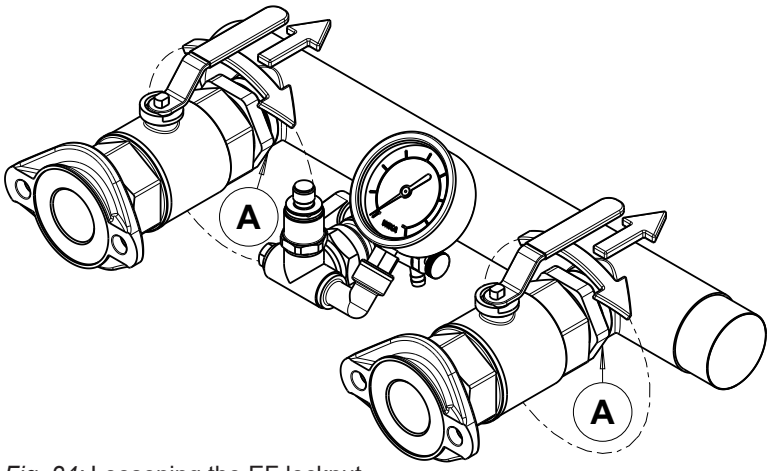


Fig. 24: Loosening the EF locknut

A	EF locknut

7. Undo the EF locknut at both shut-off valves by half a turn. The O-ring is now exposed.

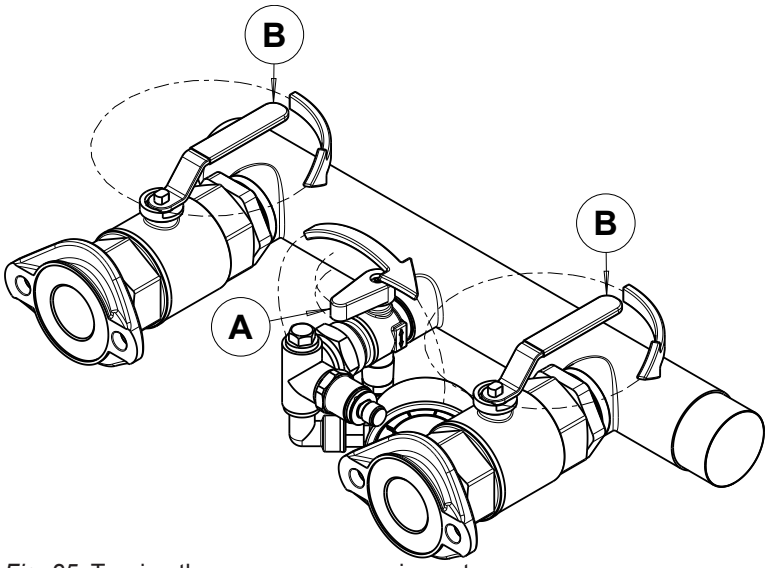


Fig. 25: Turning the pressure measuring set

A	Pressure measuring set
B	Lever of the shut-off valve

8. Close the lever of the shut-off valve about half way to enable the 180° turn required in the next step.
9. Turn the pressure measuring set by 90°.

NOTE

For some variants, the pressure gauge or a pressure sensor need to be removed to be able to turn the pressure measuring set.

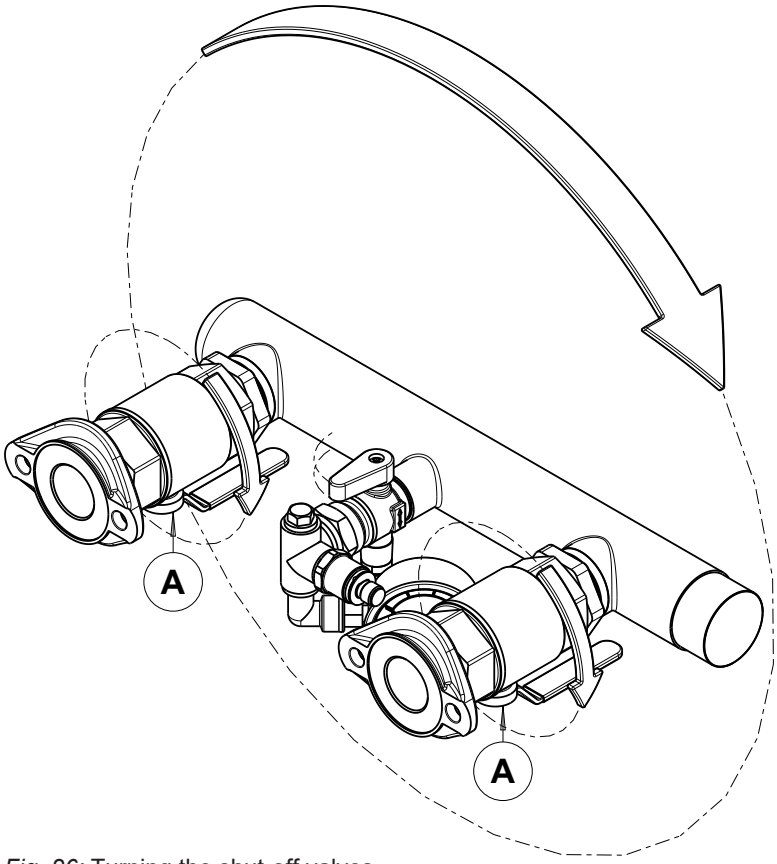


Fig. 26: Turning the shut-off valves

A	Shut-off valve

10. Turn the shut-off valves by 180°. Then turn the manifold with shut-off valves by 180°.

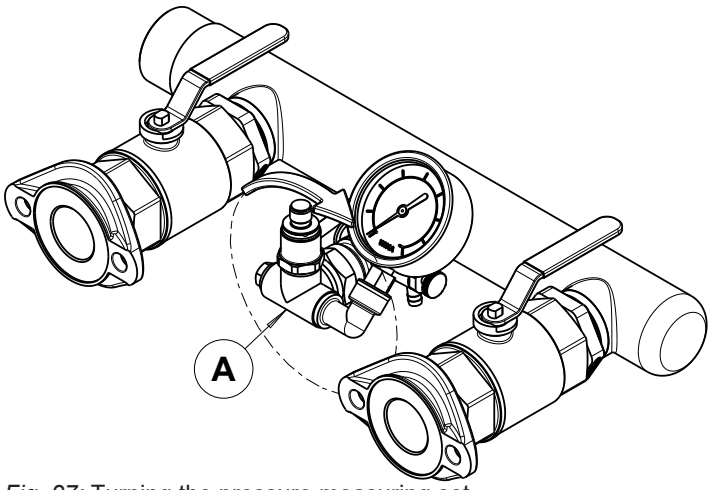


Fig. 27: Turning the pressure measuring set

A	Pressure measuring set

11. Turn the pressure measuring set by a last 90°.
12. If the pressure gauge and/or pressure sensors have been removed, connect them again.
    ⇨ The manifold is now fitted in a mirrored position.
13. Tighten the EF locknuts of the shut-off valves again.

9 Trouble-shooting

NOTE

Please contact DP Service before carrying out any work on the pump's internal parts during the warranty period. Non-compliance will lead to forfeiture of warranty cover and of any and all rights to claims for damages.

Table 15: Pump faults

Fault	Possible cause	Remedy	Action
Leakage along the shaft	Worn shaft seal	Replace the shaft seal.	Check the pump for impurities.
	Pump has been operated without water.	Replace the shaft seal.	
Pump does not run smoothly (noise and vibrations).	No water in the pump		Prime and vent the pump.
	No water supply	Re-establish water supply.	Check supply lines for clogging.
	Bearings of pump and/or motor defective	Have bearings replaced by certified company.	
	Hydraulic pump components defective	Replace hydraulic pump components.	
	Wrong direction of rotation of the pump	Interchange two phases of the power supply between frequency inverter and motor. **Caution:** Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.	
System/pump does not start.	No voltage at the terminals	Check power supply.	
	Dry running protection has tripped.	Re-establish water supply. Reset system.	Check that the supply tank is filled with water and that the supply line to the pressure booster system is not clogged.
	Wrong setting of pressure setpoint	Adjust pressure setpoint.	
	Drive fault	Reset drive and note down error code.	
Insufficient flow rate and/or pressure of the system/ pump	Air inside the pump	Vent the pump.	
	Wrong direction of rotation of the pump	Interchange two phases of the power supply between frequency inverter and motor. **Caution:** Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.	
	Flow rate of water meter in suction line too low	Increase flow rate of water meter.	
	System-side filter clogged	Clean filter or check filter for obstruction. If required, replace filter.	
	Shut-off valve in outlet and/ or inlet closed	Open both shut-off valves.	
Pumps start and stop too frequently.	Accumulator leakage or wrong pressure setting		Have system checked by the manufacturer.
Pump 1 not running, pump 2 running.	Pump 1 has been stopped, and pump 2 has assumed the master function.	Disconnect the system from the power supply. Then re-connect it.	

The yellow alarm LED indicates different alarm messages by flashing at different frequencies followed by a 3-second pause.

Table 16: Error codes of the frequency inverter

Flashing frequency	Description	System re-start
1x	Lack of water. Automatic re-start after 5-10-20-40-80 minutes. The alarm signal starts after the last re-start attempt.	De-energise the system (pull the mains plug or set the master switch to 0). Only after the system has been de-energised can it be re-started.
2x	The maximum motor current is higher than the set limit.	
3x	Sensor alarm (sensor not connected or incorrectly connected, or output current below 2 mA)	
4x	Overheating alarm (temperature at NTC thermistor exceeds 70 °C)	
5x	Frequency inverter alarm (current too high)	De-energise the system (pull the mains plug or set the master switch to 0). Only after the system has been de-energised can it be re-started.
6x	Communication error between master and slaves (check the DIP switch position). **Caution:** After switching off the frequency inverter, wait 10 minutes until dangerous voltages have discharged.	
7x	The alarm value for the maximum pressure has been reached. (Determine the cause of the maximum pressure exceeding the alarm value).	
8x	The alarm value for minimum pressure has been reached. (Determine the cause of the minimum pressure falling below the alarm value).	
Rapid flashing without any pauses	The digital inputs have been disconnected.	

10 Related Documents

10.1 General assembly drawings/exploded views with list of components

10.1.1 Hydro-Unit Base Line MVP

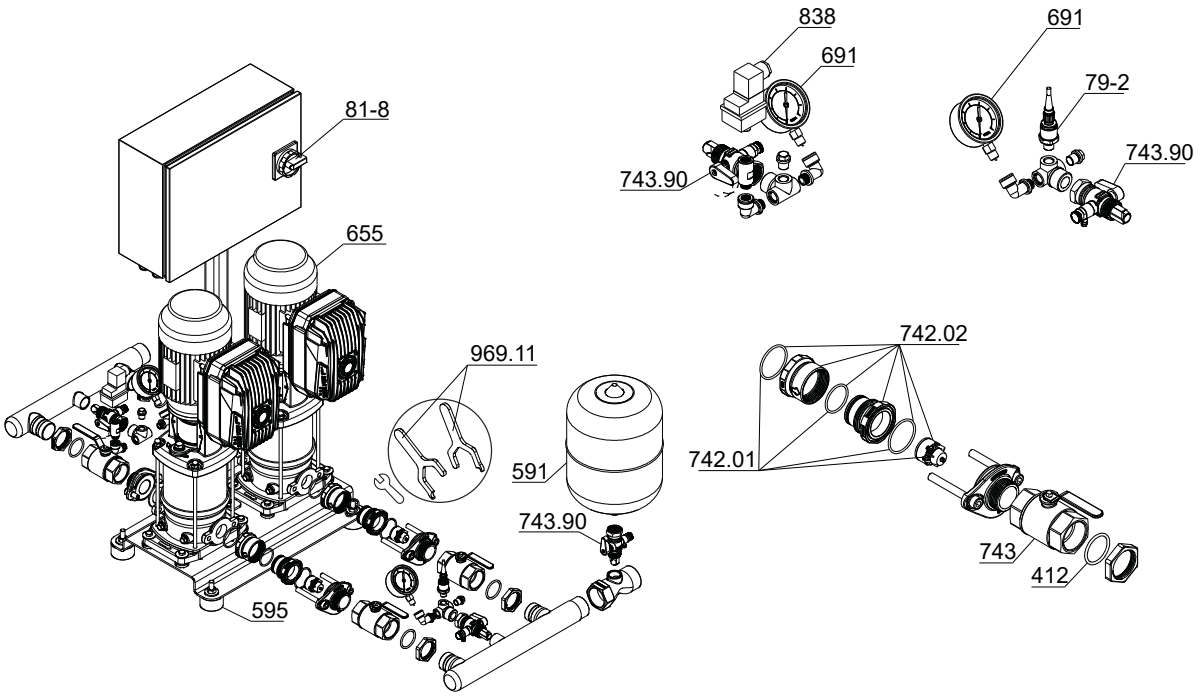


Fig. 28: Base Line MVP

Table 17: List of components

Part No.	Description	Part No.	Description
79-2	Measuring transducer	691	Pressure gauge
81-8	Kit-Master switch	742.01/.02	Lift check valve
412	O-ring	743/743.90	Ball valve
591	Membrane-type accumulator	838	Pressure switch for dry running protection
595	Anti-vibration pad	969.11	Tool
655	Pump		

The individual parts of the pump set are shown in the product literature of the pump set.

11 EU Declaration of Conformity

Manufacturer:

Duijvelaar Pompen
DP Pumps
Kalkovenweg 13

2401 LJ Alphen aan den Rijn (The Netherlands)

This EU Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer herewith declares that **the product**:

Hydro-Unit Base Line MVP

From type number:45/2022 1000000-1

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
  - Pump set: 2006/42/EC Machinery Directive
  - Electrical components[5)]: 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
  - 2014/30/EU: Electromagnetic Compatibility (EMC)

The manufacturer also declares that

- the following harmonised international standards have been applied:
  - ISO 12100
  - EN 809
  - EN 60204-1
  - EN 806-2

Person authorised to compile the technical file:

Ron Bijman
Manager Competence Centre Products
Duijvelaar Pompen B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn (The Netherlands)

The EU Declaration of Conformity was issued in/on:

Alphen aan den Rijn, 1 July 2022

Ron Bijman

Manager Competence Centre Products

Duijvelaar Pompen B.V.
Kalkovenweg 13

2401 LJ Alphen aan den Rijn (The Netherlands)

5 Where applicable

12 Certificate of Decontamination

Type: .....

Order number /

Order item number[6)]: .....

Delivery date: .....

Application: .....

Fluid handled[6)]: .....

Please tick where applicable[6)]:

☐ Corrosive

☐ Oxidising

☐ Flammable

☐ Explosive

☐ Hazardous to health

☐ Seriously hazardous to health

☐ Toxic

☐ Radioactive

☐ Bio-hazardous

☐ Safe

Reason for return:[6)]: .....

Comments: .....

.....

The product / accessories have been carefully drained, cleaned and decontaminated inside and outside prior to dispatch / placing at your disposal.

We herewith declare that this product is free from hazardous chemicals and biological and radioactive substances.

For mag-drive pumps, the inner rotor unit (impeller, casing cover, bearing ring carrier, plain bearing, inner rotor) has been removed from the pump and cleaned. In cases of containment shroud leakage, the outer rotor, bearing bracket lantern, leakage barrier and bearing bracket or intermediate piece have also been cleaned.

For canned motor pumps, the rotor and plain bearing have been removed from the pump for cleaning. In cases of leakage at the stator can, the stator space has been examined for fluid leakage; if fluid handled has penetrated the stator space, it has been removed.

☐ No special safety precautions are required for further handling.

☐ The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....

.....

We confirm that the above data and information are correct and complete and that dispatch is effected in accordance with the relevant legal provisions.

.....	.....	.....
Place, date and signature	Address	Company stamp

6 Required field

13 Commissioning Report

The pressure booster system specified below has been commissioned today by the undersigned, authorised DP Service who created this report.

Pressure booster system details

Type series .....

Size .....

Serial number .....

Order No. .....

Purchaser/place of installation

Purchaser		**Place of installation**
Name	.....	.....
Address	.....	.....
	.....	.....

Operating data For further data refer to the wiring diagram.

Start-up pressure	p_E bar	.....
Inlet pressure monitoring p_{inl} - x (setting of inlet pressure switch)		.....
Stop pressure	p_A bar	.....
Inlet pressure	p_{inl} [bar]	.....
Pre-charge pressure of accumulator	$p_{pre\text{-}charge}$ [bar]	.....

The operator or operator's representative herewith confirms to have received instructions on how to operate and service the pressure booster system. The relevant circuit diagrams and operating instructions have been handed over.

Non-conformities found during commissioning	**Deadline for remedial action**
Non-conformity 1.....	.....
.....	.....
.....	.....
.....	.....

Name of DP representative	Name of purchaser or representative
.....	.....
Place	Date
.....	.....

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dp pumps

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2023-05-26

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