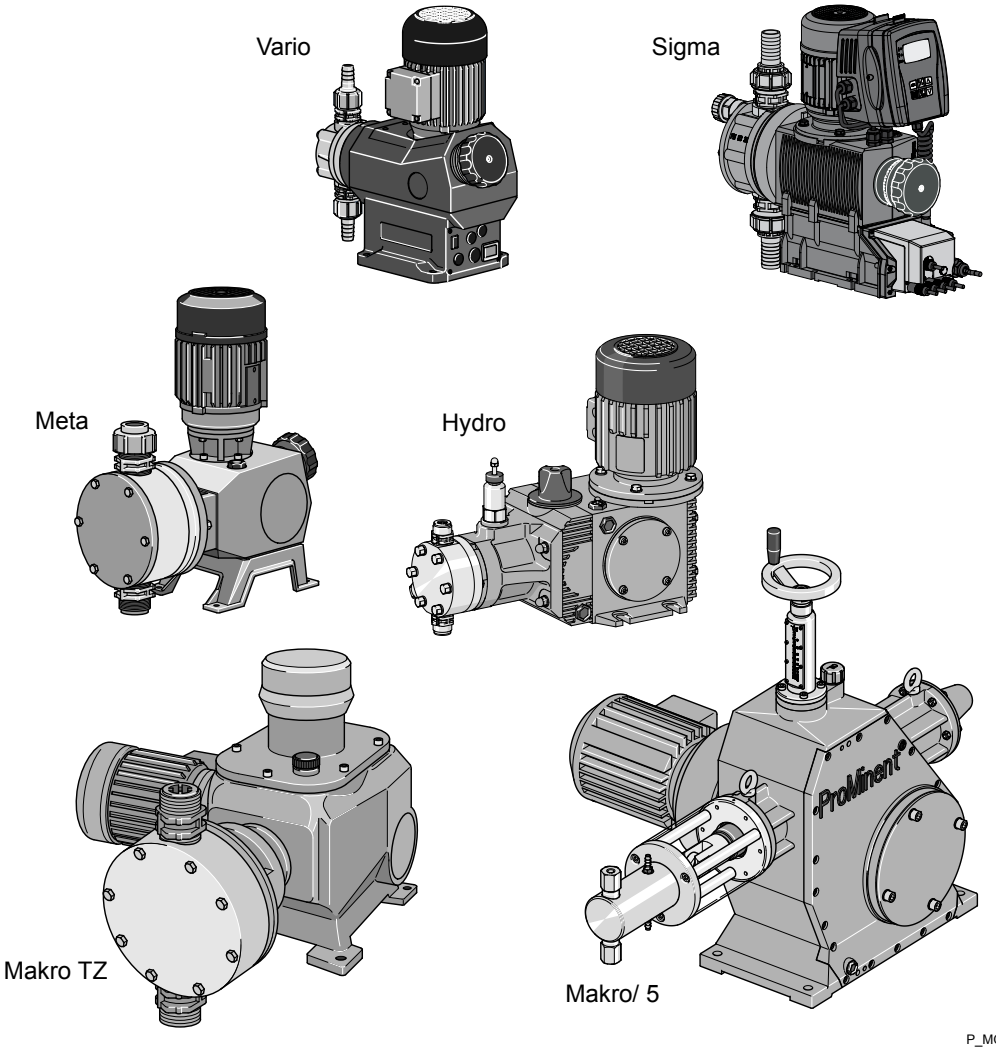
General handling guidelines

ProMinent motor-driven metering pumps and hydraulic equipment

EN



Part no. 987702

Version: BA MOZ 027 10/22 EN

Supplementary information



Fig. 1: Please read!

Read the following supplementary information in its entirety! You will benefit more from the operating instructions should you already know this information.

The following are highlighted separately in the document:

- Enumerated lists

→ Instructions

⇨ Outcome of the instructions

↳ *'State the identity code and serial number' on page 2*: Links to points in this chapter

- refer to ... : References to points in this document or another document

[Keys]

Information

This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Safety information

Safety information is identified by pictograms - see "Safety" chapter.

Validity

These operating instructions conform to current EU regulations applicable at the time of publication.

State the identity code and serial number

Please state the identity code and serial number, which you can find on the nameplate, when you contact us or order spare parts. This enables us to clearly identify the unit type and material versions.

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

Table of contents

1 Intended use of the motor-driven metering pumps 4
2 Basic principles: Assembly 5
3 Installation, hydraulic 6
3.1 Important note 6
3.2 Installing lines 7
3.3 Standard installation 8
3.4 General installation instructions 9
3.5 Information on the suction-side installation 10
3.6 Information on the discharge-side installation 13
3.7 How it should not be installed 15
3.8 Special installation instructions 16
4 Notes: Installation, electrical - supplementary 19
5 Notes: Start up 22
6 Notes: Maintenance 24
7 Notes: Hydraulic accessories 25
7.1 Overview and Information on Accessories 25
7.2 Back pressure/relief valve 27
7.3 Pulsation damper 28
8 Installation details 30
9 Installation diagram 31

1 Intended use of the motor-driven metering pumps

- Motor-driven metering pumps and accessories are intended to be used solely for metering liquids!
- In potentially explosive areas in zone 1, device category II 2G of explosion group II C, the pump must only be operated in accordance with the relevant nameplate (and the respective EC Declaration of Conformity) for pumps for potentially explosive areas in accordance with the European guidelines. The explosion group, category and degree of protection specified on the label must correspond to or be better than the conditions in the intended application.
- Any other use or modification of the system is prohibited.
- Pumps without the relevant nameplate and relevant EU Declaration of Conformity for pumps for potentially explosive areas must never be operated in potentially explosive areas.
- Motor-driven metering pumps and accessories are not intended to be used for metering gases and solids.
- The technical data for the motor-driven metering pump used should be taken from the product-specific operating instructions and the product catalogue.
- Special attention should be paid to the following criteria in order to ensure correct use:
  - Pump explosion protection.
  - Resistance of parts coming into contact with the medium.
  - Pressure and temperature of the feed chemical.

2 Basic principles: Assembly

Base

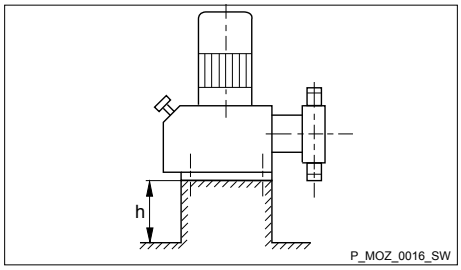


Fig. 2: Base

The pump can break through the base or slide off it

- Ensure that the base is horizontal, flat and permanently load-bearing.

Dosing rate too low

- Vibrations can disturb the valves of the liquid end.
- Do not allow the base to vibrate.

Space requirement

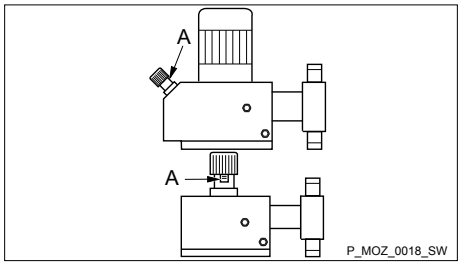


Fig. 3

Position the pump so that control elements, such as the stroke length adjustment knob, indicating dial A or the oil inspection windows, are easily accessible.

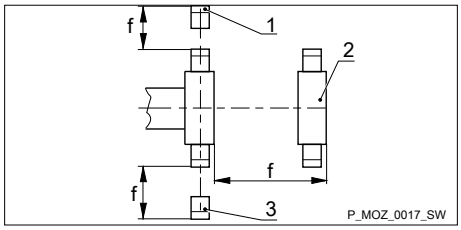


Fig. 4

Ensure that there is sufficient clearance to carry out an oil change, e.g. vent screws, oil drain plugs, oil trough, etc.

Ensure that there is sufficient clearance (f) around the dosing head as well as the suction and discharge valve so that maintenance and repair work can be carried out on these components.

Alignment

Dosing rate too low

- The liquid end valves cannot close correctly if they are not upright.
- Ensure that the discharge valve is upright.

Fastening

Dosing rate too low

- The liquid end valves can be disturbed by vibrations.
- Secure the metering pump to prevent vibrations occurring.

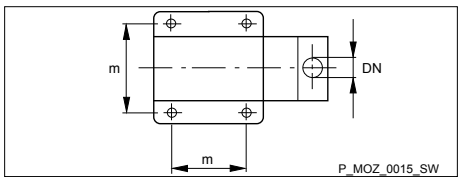


Fig. 5

Take the dimensions (m) for the fastening holes from the appropriate dimensional or data sheets.

Use appropriate screws to fix the pump base to the foundation.

3 Installation, hydraulic

3.1 Important note

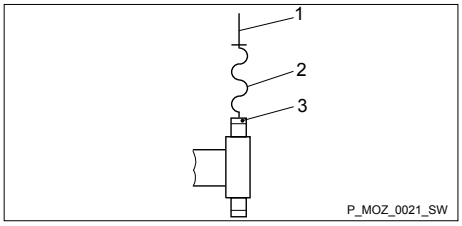


Fig. 6: Connect the steel pipes to the plastic pump body as shown

1 Steel pipeline
2 Flexible pipe section
3 Plastic valve body

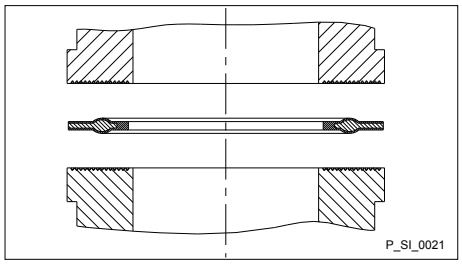


Fig. 7: Moulded composite seals with grooved insert

Information regarding leaks

- Leaks can occur at the pump connector depending on the insert used.
- The pump is supplied with PTFE moulded composite seals with a flare, which are used for the pump connectors, and which seal the connectors between grooved pump valves and ProMinent grooved inserts - see .
- However, an elastomer flat seal must be used in the event that a smooth insert is used (e.g. third party part) - see .

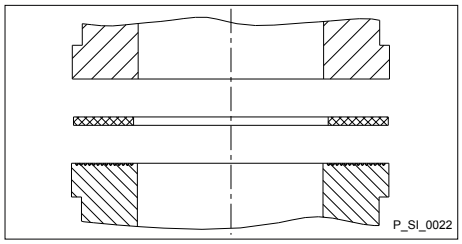


Fig. 8: Elastomer flat seal with a smooth insert

Information regarding spraying feed chemical

- PTFE seals, which have already been used / compressed, can no longer reliably seal a hydraulic connection.
- Always use new and unused PTFE seals.

Information regarding incorrect use of the safety relief valve

- The safety relief valve can only protect the motor and the gear, only against illegal positive pressure that is monitored by the metering pump itself. The safety relief valve cannot protect the system from excess pressure.
- Use other mechanisms to protect the motor and gear from impermissible excess pressure from the system.
- Use other mechanisms to protect the system from impermissible excess pressure.
- Precise metering is only possible when the back pressure is maintained above 1 bar at all times.
- If metering with a free outlet, a back pressure valve should be used to create a back pressure of approx. 1.5 bar.
- The valves may no longer close properly with feed chemicals with a particle size of greater than 0.3 mm.
- Install an appropriate filter in the suction line.

Diaphragm rupture sensor

Information regarding unnoticed diaphragm rupture

- The electric diaphragm rupture sensor must be able to indicate a diaphragm rupture.
- Screw the enclosed diaphragm rupture sensor into the liquid end - do not forget the seal.

Information regarding unnoticed diaphragm rupture

- A signal is only generated above approximately 2 bar system back pressure in the event of diaphragm rupture.
- Only rely on the diaphragm rupture sensor with back pressures of greater than 2 bar.

3.2 Installing lines

Installing hose lines - PP, NP, PV, TT designs

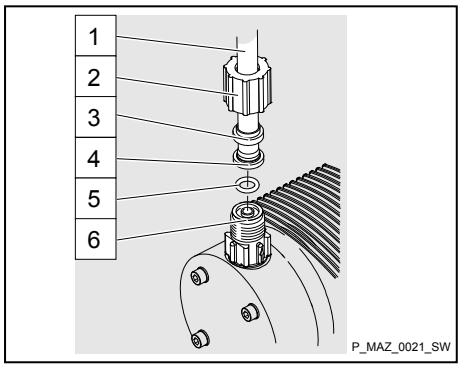
1. Cut off the ends of the hoses at right angles.
2. Pull the union nut (2) and clamp ring (3) over the hose (1) - see .
3. Push the hose end (1) up to the stop over the nozzle (4) and widen, if necessary.

   Ensure that the O-ring or the flat seal (5) is sitting properly in the valve (6).

   Never re-use used PTFE seals. An installation sealed in this way is not leak-tight.

   This type of seal is permanently distorted when subjected to pressure.

   The FPM flat seal PV design has a dot to distinguish it from the EPDM flat seal.
4. Place the hose (1) with the nozzle (4) onto the valve (6).
5. Clamp the hose connector: tighten the union nut (2) while simultaneously pressing on the hose (1).
6. Re-tighten the hose connector: Pull on the hose (1) briefly, which is fastened to the dosing head and then tighten the union nut (2) once more.



1 Hose
2 Union nut
3 Clamp ring
4 Nozzle
5 O-ring or flat seal
6 Valve

Fig. 9: PP, NP, PV and TT designs

Installing stainless steel pipe - SS designs

1. Push the union nut (2) and clamp rings (3, 4) over the pipe (1) with approx. 10 mm overhang - see .
2. Insert the pipe (1) up to the stop in the valve (5).
3. Tighten the union nut (2).

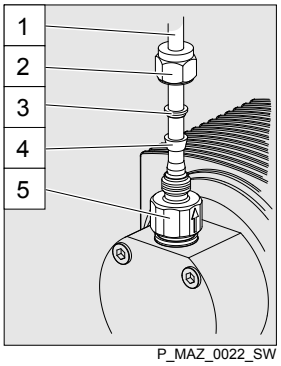


Fig. 10: SS design

1 Pipe
2 Union nut
3 Rear clamp ring
4 Front clamp ring
5 Valve

Installing hose lines - SS version

Information regarding spraying feed chemical

- Connections can come loose in the event that hose lines are installed incorrectly on stainless steel valves.
- Only use PE or PTFE hose lines.
- In addition, insert a stainless steel support insert into the hose line.

3.3 Standard installation

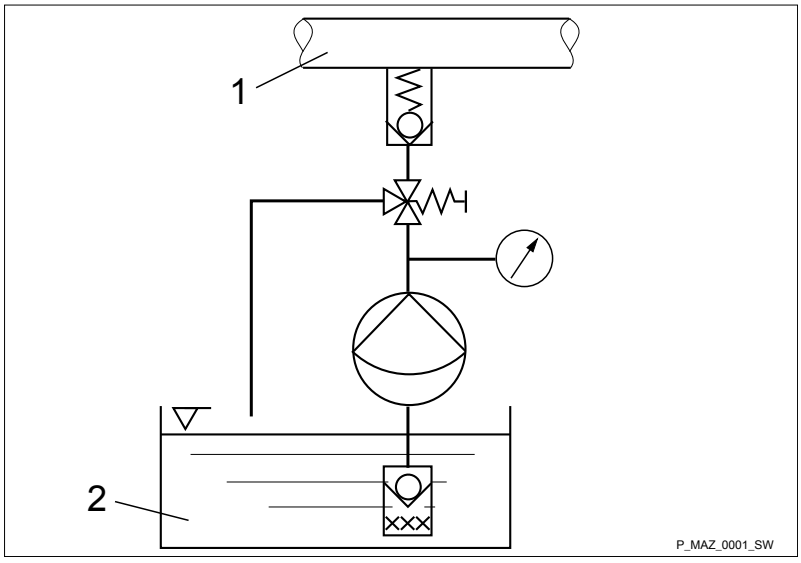


Fig. 11: Standard installation

1 Main line
2 Supply tank

Key for all hydraulic diagrams

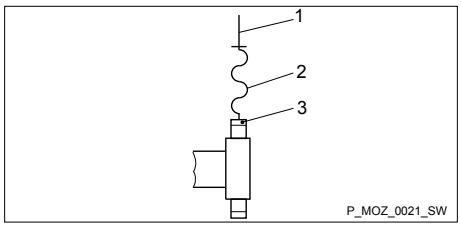
Symbol	Explanation	Symbol	Explanation
	Metering pump		Foot valve with filter mesh
	Injection valve		Filter insert
	Adjustable back pressure valve (also used as a relief valve)		Intermediate tank with float valve
	Multifunctional valve		Level switch
	Shut-off valve		Manometer
	Solenoid valve		Filling device
	Ball non-return valve		Siphon vessel

3.4 General installation instructions

Information regarding backflow

- A back pressure valve, spring-loaded injection valve, foot valve or liquid end valves are not completely sealed shut-off elements.
- Use a shut-off valve, a solenoid valve or a vacuum breaker for this purpose.

Connect the pipelines to the pump in such a way that no residual forces act on the pump, e.g. due to the offsetting, weight or expansion of the line. Only connect steel /stainless steel pipes to the plastic dosing head via a flexible pipe section.



1 Steel / stainless steel pipework
2 Flexible pipe section
3 Plastic dosing head valve

Fig. 12

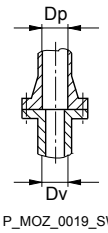
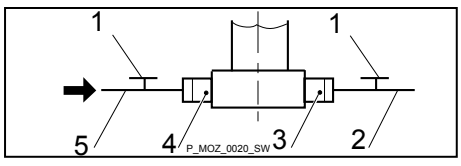


Fig. 13: Dv: Valve diameter, Dp: Pipe diameter

Design the nominal widths of the pipework and built-in fittings so that they are commensurate with or greater than the nominal widths of the pump valves and suction and discharge valves.

To check the pressure conditions in the pipework system, we recommend providing connection options for a manometer close to the suction and pressure nozzle.



1 Manometer sleeve
2 Discharge Line
3 Discharge valve
4 Suction valve
5 Suction line

Fig. 14

3.5 Information on the suction-side installation

Wall thickness

- Only use hoses with sufficient wall thickness.

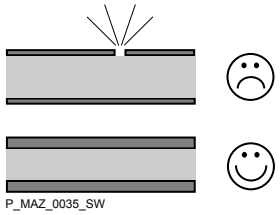


Fig. 15: Wall thickness

Bends

- Always use bends to curve lines - never angles.

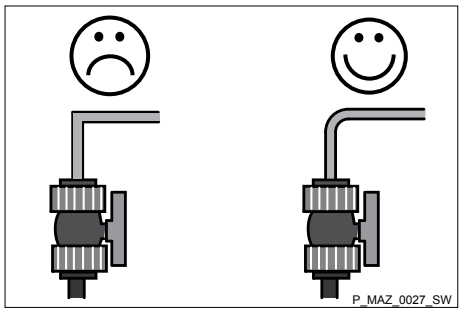


Fig. 16: Bends

Length of suction line

- Keep the suction line as short as possible.
- For longer suction lines, take into account acceleration pressures. ProMinent can perform the calculations for you.

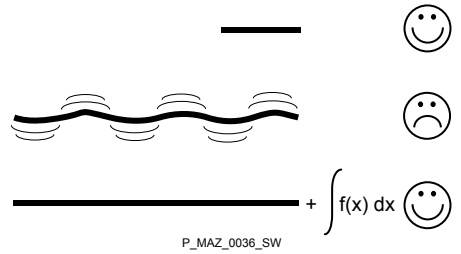


Fig. 17: Length of suction line

Height difference, suction side

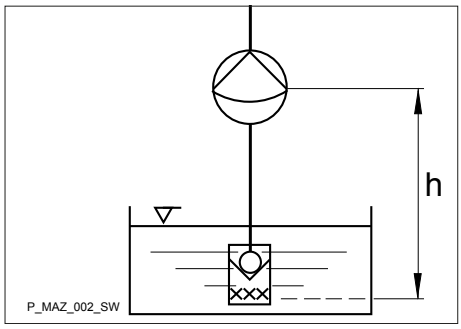


Fig. 18: Height difference, suction side

- Ensure that the height h (see figure) is only smaller than or equal to the suction lift of the pump P divided by the density rho of the feed chemical:

  $h \text{ (in m)} \leq P \text{ (in mWS)} / \text{rho (in g/cm}^3\text{)}$

- Dimension the height h - see figure - and the cross-section of the suction line in such a way that the negative pressure created during the suction process cannot reach the vapour pressure of the feed chemical being metered (cavitation!).

  This can be seen in extreme cases by a drop of the fluid level or by an incomplete reciprocal stroke.

In the case of dirt or impurities in the feed chemical

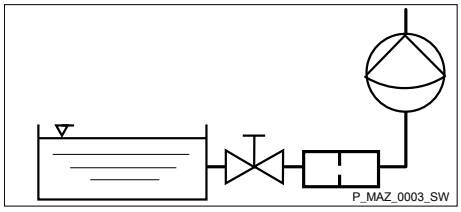


Fig. 19: In the case of dirt or impurities in the feed chemical

- fit a filter insert (mesh width 100–400 µm depending on the feed chemical and type of metering pump) for example.
- Always connect the suction line somewhat above the tank base or any sediment accumulated.
- With feed chemicals containing impurities or sediment, suspend the foot valve at a sufficient distance above the tank base or any sediment that has accumulated - see Fig. 18.

With slightly gaseous feed chemicals (hydrogen peroxide, sodium-calcium hypochlorite, etc.)

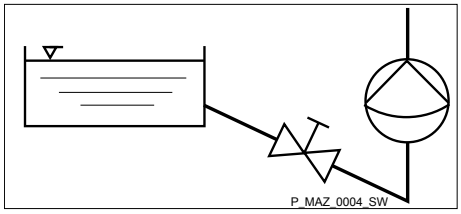


Fig. 20: gaseous feed chemicals

- The suction line should preferably be routed with a falling rather than a rising gradient to prevent the priming of gas bubbles.
- Install the pump with the feed on the suction side.

Prevent the suction line from running dry

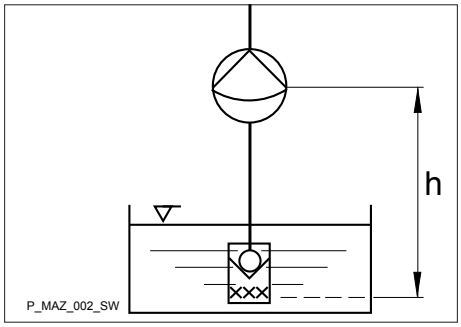


Fig. 21: Dry running of suction line

- Install a foot valve at the end of the suction line if the pump is higher than the maximum fluid level in the supply tank.
- Shorten the free end of the suction line only until the foot valve is suspended just above the base of the tank.

Prime without connecting options at the tank base

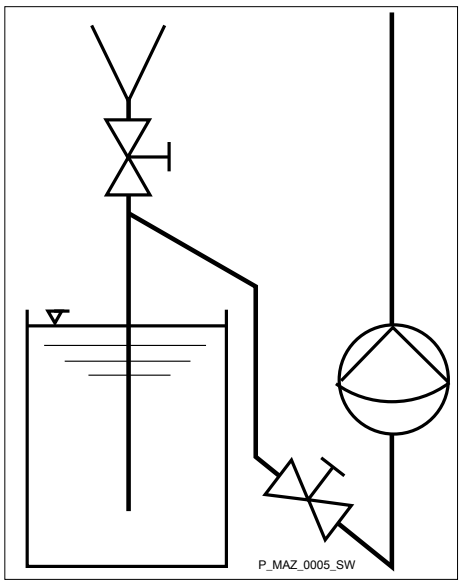


Fig. 22: Priming without connecting option

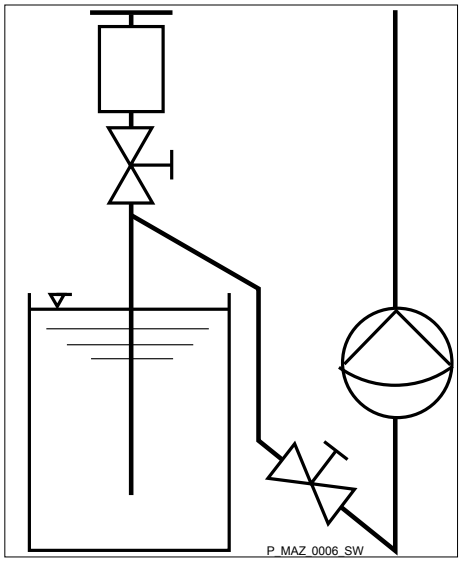


Fig. 23: Priming without connecting option

- With high storage tanks without a connecting option at the tank base, prime using a siphon line.
  Install a filling device (Fig. 22) or siphon vessel (Fig. 23) for the siphon line (suction line).

3.6 Information on the discharge-side installation

With return from the main line

- Install a vacuum breaker if the feed chemical may not press through the metering pump. A metering pump is not a fully leak-tight shut-off device.
- Install an injection valve at the injection point to prevent unwanted mixing of water and feed chemical in the pressure line.

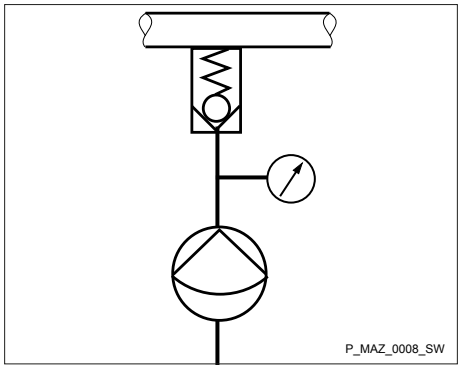


Fig. 24: Return from the main line

Avoid exceeding the maximum permissible operating pressure

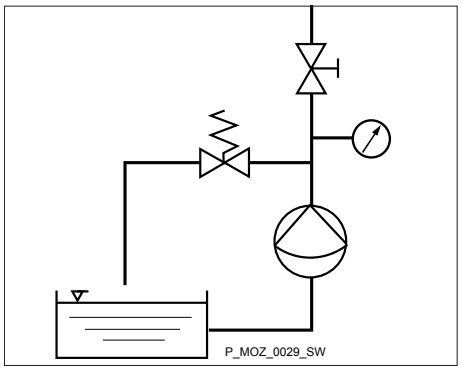


Fig. 25: Maximum permissible operating pressure

- A relief valve with a return into the supply tank is useful as overload protection for the pressure line, for example install a ProMinent® DHV-U.
- Use a pulsation damper to dampen pressure peaks with a metering stroke with long pressure lines or increase the pipe cross-section.

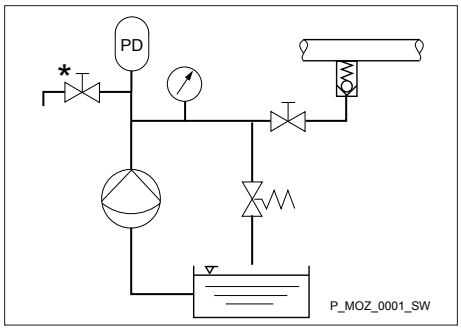


Fig. 26: Maximum permissible operating pressure

* Ventilation line with pressure vessels
PD Pulsation damper

With pulsations caused by acceleration inertial forces

- Dampen the pulsations with a pulsation damper in order to avoid metering errors, premature wear and tear and damage to the pump and metering system.

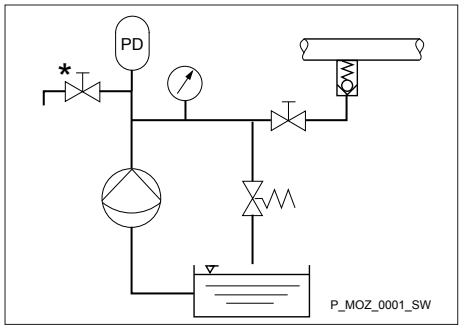


Fig. 27: At pressure line

* Ventilation line with pressure vessels
PD Pulsation damper

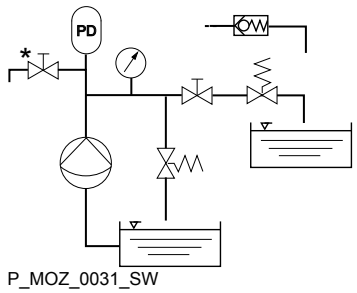


Fig. 28: At free outlet

* Ventilation line with pressure vessels
PD Pulsation damper

Install a back pressure valve or injection valve at the end of the metering line.

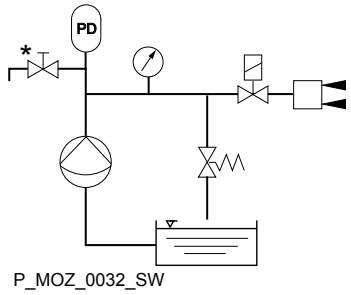


Fig. 29: Without post-rinse (e.g. when atomising)

* Ventilation line with pressure vessels
PD Pulsation damper

Install a solenoid valve at the end of the metering line. Lock the solenoid valve electrically with the metering pump power supply.

3.7 How it should not be installed

Fault description	Cause	Remedy
The suction line cannot be bled.	There is a pocket of air (arrow) in the suction line.	Prevent the air pocket or install as shown in *'With high suction-side pressure 1' on page 16*.

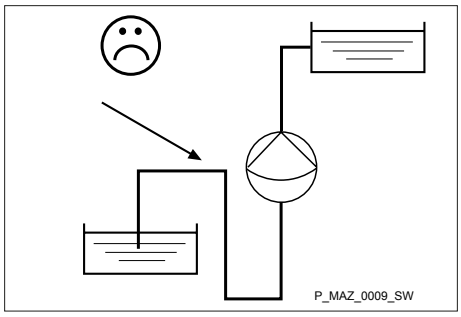


Fig. 30: The suction line cannot be bled.

Fault description	Cause	Remedy
Feed chemical flows uncontrolled when the line is filled.	Siphoning by the pressure line dropping too deeply.	Interrupt the discharge line, as in *'With high suction-side pressure 2' on page 16*

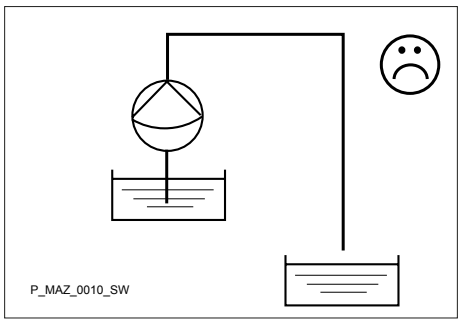


Fig. 31: Feed chemical flows uncontrolled when the line is filled.

Fault description	Cause	Remedy
Feed chemical presses through the liquid end.	The suction-side priming pressure is too high due to the negative pressure difference between the discharge and suction side.	Install as shown in *'With high suction-side pressure 3' on page 17* or *'With high suction-side pressure 3' on page 17*.

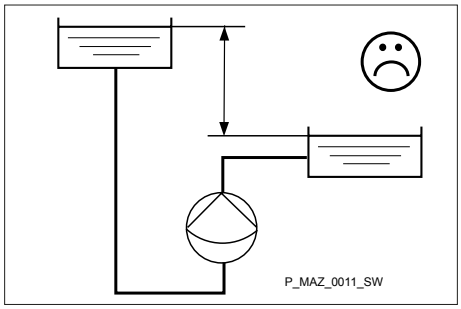


Fig. 32: Feed chemical presses through the liquid end.

Fault description	Cause	Remedy
The suction line may tear off.	The overflow line is routed back into the suction line, which may be secured or blocked with a foot valve.	Install as in .
The metering pump meters the feed chemical in a cycle.	The overflow line is routed back into the suction line, meaning that it is possible that the multifunctional valve no longer closes after being opened.	Install as in .

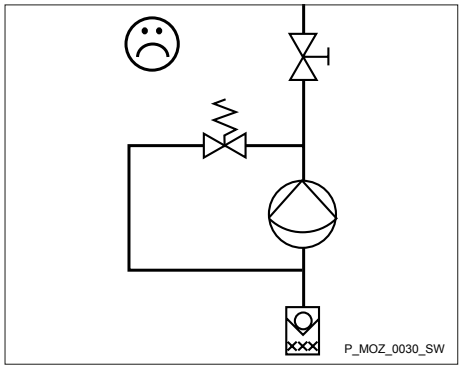


Fig. 33: The metering pump meters the feed chemical in a cycle.

3.8 Special installation instructions

With high suction-side pressure 1

- Position the end of the pressure line higher than the fluid level in the supply tank to avoid overstraining.

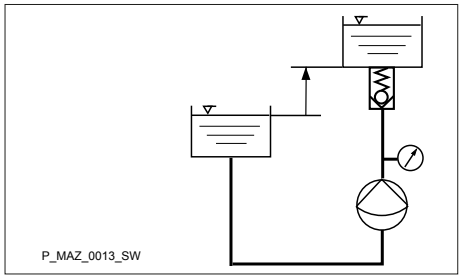


Fig. 34: With high suction-side pressure 1

With high suction-side pressure 2

- Position the drain of the pressure line higher than the fluid level in the supply tank.

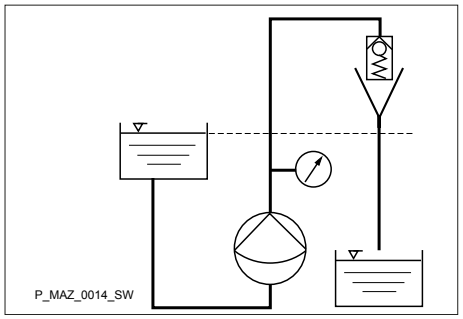


Fig. 35: With high suction-side pressure 2

With high suction-side pressure 3

- Install an adjustable back pressure valve in the pressure line and install a shut-off valve in the suction line, which must close when the pump is at a standstill, preferably a solenoid valve.

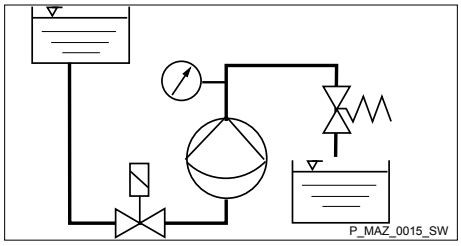


Fig. 36: With high suction-side pressure 3

With fluctuating suction-side pressure 1

- If the system is primed from lines with fluctuating pressure, use an intermediate tank with a float valve to ensure a regular delivery flow.

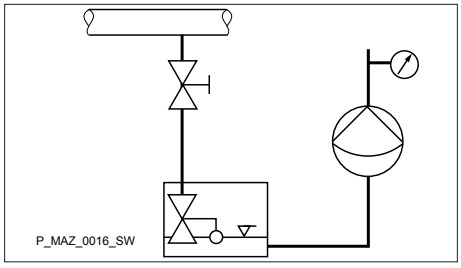


Fig. 37: With fluctuating suction-side pressure 1

With fluctuating suction-side pressure 2

- If the system is primed from a high feed level with fluctuating pressure, use an intermediate tank with a float valve to ensure a regular delivery flow.

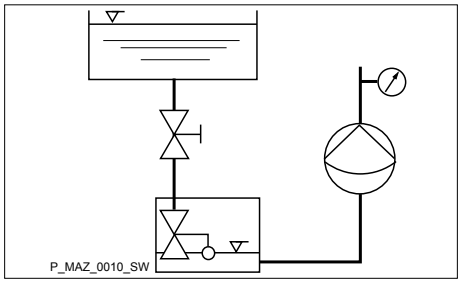


Fig. 38: With fluctuating suction-side pressure 2

With negative pressure in the main line

- When metering into a main line in which there is negative pressure, install a multifunctional valve, a back pressure valve (DHV-RM) or an injection valve in the pressure line to ensure that the feed chemical is not drawn through by suction.

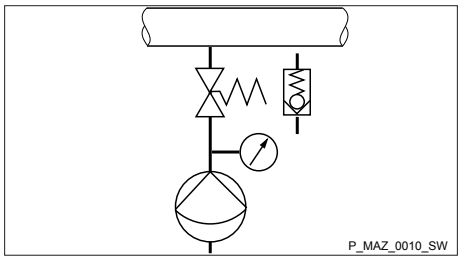
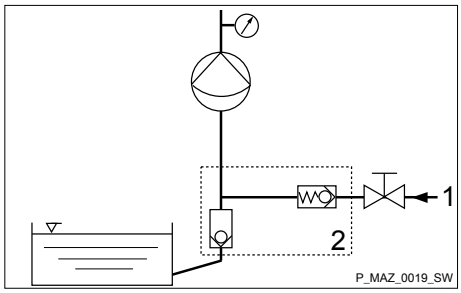


Fig. 39: With negative pressure in the main line

With danger of deposits in the liquid end

- When metering suspensions, use flushing equipment (see Product Catalogue Chapter 1.8) to prevent deposits in the liquid end.



1 Rinsing water
2 Flushing assembly

Fig. 40: Manual flushing equipment

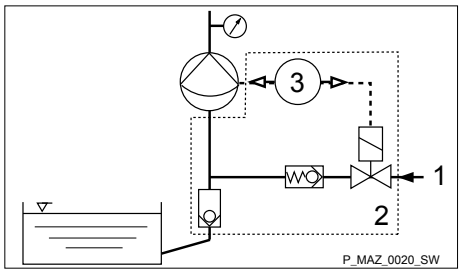


Fig. 41: Automatic flushing equipment

There are 2 types of flushing equipment:

- Manual flushing equipment
- Automatic flushing equipment

There are 2 flushing principles:

- Flushing when metering is interrupted (intermittent flushing)
- Flushing when metering is finished.

- Problems may arise if flushing cannot be performed correctly.
- Ensure that the metering pump is idle during flushing.
- Do not exceed the maximum permitted flushing pressure of 2 bar!

4 Notes: Installation, electrical - supplementary

Important note

This chapter provides additional tips for the chapter "Installation, electrical" for the product-specific operating instructions.

Provide appropriate motor protection devices (e.g. motor protection switch with thermal overcurrent trip) to protect the motor from overloading. Fuses do not provide motor protection.

Electrocution

- Improper installation can lead to electric shocks.
- Crimp cable end sleeves onto all stripped cable cores.
- Make sure that only technically trained personnel are authorised to undertake the electrical installation of the unit.
- Disconnect the housing of the motor or electrical ancillaries from the mains/power supply as quickly and safely as possible if they have been damaged. Only return the pump to operation after an authorised repair.

Motor

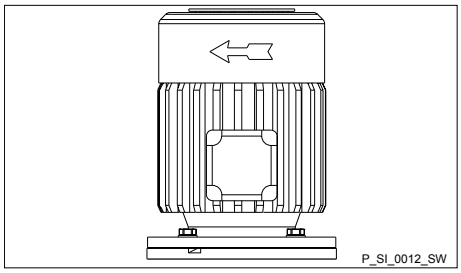


Fig. 42: Direction of rotation of motor

Pump can be damaged

- The pump can be damaged if the motor drives the pump in the wrong direction.
- When wiring the motor, pay attention to the correct direction of rotation indicated by the arrow on the fan cover, as indicated in the diagram.

The motor can be damaged

- The motor is not equipped with a fuse.
- Install a suitable motor protection switch.

Use an electrical isolating device in the mains supply cable, such as a mains switch, to de-energise the pump independently of the entire installation (e.g. for repairs).

1. Connect the terminal box of the motor with the mains voltage using a suitable cable.
2. Install an emergency cut-off switch or include the motor in the system's emergency cut-off management scheme.

- Key motor data can be found on the nameplate.
- Motor data sheets can be requested for more information.
- The terminal wiring diagram is located in the terminal box.
- Notes on the speed controlled motor with external fan and temperature monitoring can be found in the "General operating instructions for ProMinent® motor-driven metering pumps and hydraulic accessories"!

Terminal box in wet areas or outdoors

1. The terminal box must be arranged in such a way that the cable entries point downwards. This can be taken into account when the order is placed.
2. Select suitable cable glands for the supply cable, possibly with a reducer. Ensure that the cable entry is adequately sealed, otherwise all other measures taken will be useless.
3. Cover the cable glands and dummy plug thread with sealant, tighten it securely and apply another coat.
4. Clean the sealing surfaces of the terminal box and terminal box cover thoroughly.

5. The seal must be glued on one side.

   Seals that have become brittle after an extended period of use should be replaced.

6. Seal the terminal box carefully.

If water might drip onto the device, additional measures must be taken - e.g. a suitable protective cover.

External fan

Provide a separate power supply for the external fan for motors with external fans (identity code specification "R" or "Z").

3-Phase AC motor with AC power supply

Each 3-phase AC motor can be operated with a corresponding operating capacitor on the AC power supply. It should however be noted that the initial torque is only approx. 30 % of the nominal torque.

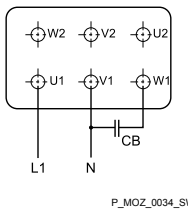


Fig. 43: 3-Phase AC motor with operating capacitor CB (Steinmetz connection)

Variable speed motors with frequency converter

Connect the motor as per the wiring diagram for the controller if it is controlled by an electronic control unit (such as 3-phase AC motors by frequency converter).

Diaphragm rupture sensor (optional)

Possibility of electric shocks

- In the event of a fault, there is a danger of electric shock if conductive feed chemicals are present.
- For safety reasons we recommend connecting to a protective low voltage, e.g. in accordance with EN 60335-1 (SELV).

Danger resulting from unnoticed diaphragm rupture

- If the pump has been ordered with an electric diaphragm rupture sensor, then the diaphragm rupture sensor also needs to be electrically installed.
- Electrically wire the enclosed diaphragm rupture sensor to a suitable monitoring device.

a) Diaphragm rupture sensor with switch contact

- The cable can be connected as required.

b) Namur sensor, inherently safe

Make sure that the monitoring/feed equipment installed by the customer is capable of evaluating the current variations of the Namur sensor to indicate a diaphragm rupture.

When using flammable media:

Risk of fire after a diaphragm rupture

- Make sure that the electric diaphragm rupture sensor switches off the pump immediately after a diaphragm rupture.
- Connect the pump and the diaphragm rupture sensor to a control so that the pump stops immediately in the event of a diaphragm rupture.

Stroke sensor (optional)

→ Connect the stroke sensor to a suitable monitoring device in line with the details in the "Technical data" chapter - also refer to its technical data.

Make sure that the monitoring/feed equipment installed by the customer is capable of evaluating the current variations of the Namur sensor to indicate a diaphragm rupture.

Stroke length actuators / control power ends

Connect the motors in accordance with the enclosed wiring diagram or as per the wiring diagram fixed to the inside of the housing.

Only operate stroke length actuators / control drives when the pump is running.

Otherwise they will become damaged.

Heating cartridge

→ Install the heating cartridge in line with its documentation. The heating cartridge must only be connected to the power device supplied!

Other assemblies

→ Install the other assemblies in line with their documentation.

5 Notes: Start up

The feed chemical may react with water

- The feed chemical can mix and react in the liquid end with water remaining after testing in the factory.
- Read the material safety data sheet for the feed chemical.
- Blast the liquid end with compressed air.
- Flush the liquid end with a suitable medium through the suction connector.

Feed chemicals

- Contact with the feed chemical is possible provided the following handling instructions are adhered to.
- If the feed chemical is dangerous, ensure that appropriate safety measures are included when implementing the following handling instructions.
- Adhere to the feed chemical safety data sheet.

Information regarding spraying feed chemical

- An unsuitable feed chemical may damage the parts of the pump that come into contact with it.
- Take into account the resistance of the materials which will come into contact with the chemical when selecting the feed chemical - see the ProMinent product catalogue or visit *www.prominent.com*.
- Reliable metering cannot be guaranteed after the metering pump has been idle for some time, as the feed chemical can crystallise in the valves and on the diaphragm. Check the valves and diaphragm regularly - see product-specific operating instructions.
- Only adjust the stroke length when the pump is running.
- The metering pump should prime at 100% stroke length, as the priming lift depends on the stroke volume when the liquid end is empty. If the metering pump has to prime at a smaller stroke length and is not priming, reduce the priming lift.

Starting up the metering pump

1. Check whether the drive motor and the associated additional equipment has been connected in compliance with the applicable regulations.
2. Check the pump connectors and connections for leak-tightness.
3. Check the suction valve and discharge valve for leak-tightness and tighten if necessary.
4. Check the liquid end for leak-tightness and tighten the screws on the dosing head if necessary - see product-specific operating instructions for starting torque.
5. Check whether the necessary flushing pipes are connected.
6. Bleeding the discharge side:

   Switch on the pump and allow it to operate at 100% stroke length until the dosing head is filled.

   Switch off the pump.
7. Close the discharge side bleed valve.

   ⇨ The pump is now ready for operation.
8. Open the shut-off valve in the metering line and allow the pump to run.
9. Check the response pressure of the relief valve.
10. If necessary, monitor and correct the capacity.

- If an accumulator is installed on the discharge side, bleed it at regular intervals.
- If a gas diaphragm pulsation damper has been installed, ensure the correct initial gas pressure (approx. 60 to 80 % of the mean operating pressure).

When using pumps with speed control, observe the instructions in the frequency converter operating instructions.

6 Notes: Maintenance

Before commencing all work

1. De-energise the device.
2. Depressurise the device.
3. Rinse the device with a suitable flushing medium.

The wear parts are included in the spare parts kit.

Check the following regularly:

Interval	Maintenance work
	■ Check that the metering lines are fixed firmly to the liquid end. ■ Check that the discharge and suction valve are tightly fitted. ■ Check the leak-tightness of the entire liquid end - particularly around the leakage hole! ■ Check that the flow is correct: Allow the pump to prime briefly. ■ Check that the electrical connections are intact. ■ Check that the dosing head screws are tight.

With heavy-duty loading (e.g. continuous operation): Check more often.

7 Notes: Hydraulic accessories

7.1 Overview and Information on Accessories

In addition to a correctly selected metering pump, individually combined hydraulic and electrical accessories are needed for the perfect operation of metering systems. A number of accessories are shown on the following pages, which are not always needed but provide an overview of the possible options.

We would be happy to assist with the selection of the right accessories for your metering tasks and are also available for ongoing advice, e.g. on pipe calculations.

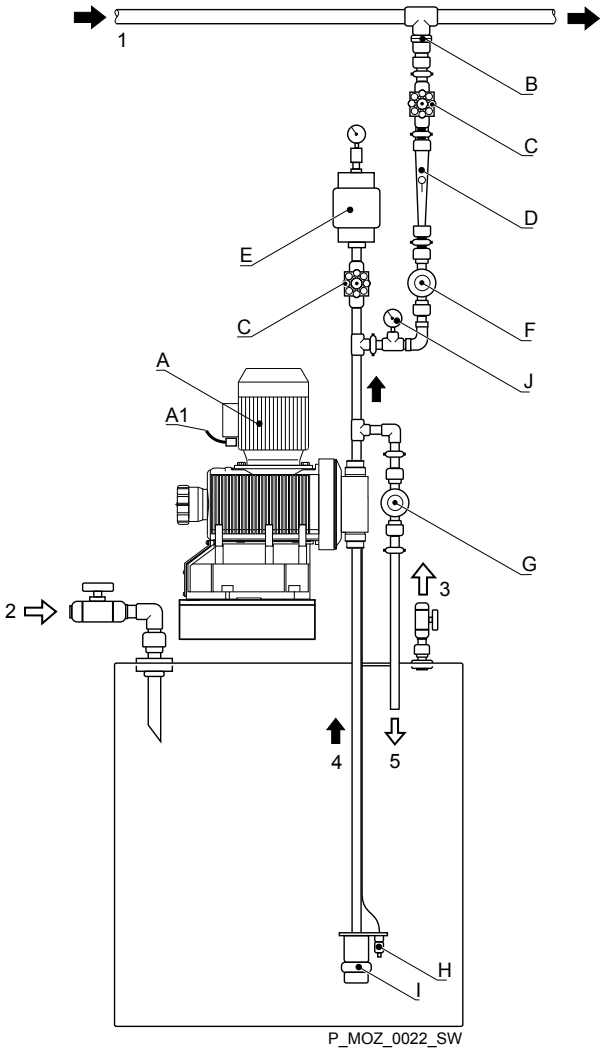


Fig. 44: Standard installation motor-driven metering pump and system components - see following table

1 System
2 Filling connection of dosing tank
3 Bleed valve of dosing tank
4 Suction line
5 Relief line

System components	Function	Use
Metering pump* A with external cable A1	Metering a defined volume of liquid into a system. Control: manual or automatic (external signal)	Perfect adaptation to metering tasks is possible thanks to the variably adjustable metering volume and external control options.
Injection valve* B	Check valve (vacuum breaker)	... in closed pipe systems, to prevent mixing and backflow into the discharge line.
	As a back pressure generator	... to generate a defined back pressure with pipe systems with a free outlet.
Shut-off valves C	To split the pipe system into sections (functional sections)	... for maintenance, renovation or repair work to shut down parts of the system.
Optical flow meter D	Optical display of metering volume (volumetric flow)	... For controlling the set metering quantity.
Pulsation damper, pressure vessel E	Smooths out pulsation in the pipe (discharge side), generates a low-pulsation flow	... for use with long pipes to minimise pressure loss.
		... to generate continuous flow/metering.
		... to avoid disruptive pipe vibrations.
Back pressure valve* F	Generates a defined back pressure (configurable)	... to guarantee the correct operation of the metering pump with pipe systems with a free outlet.
		... when using a pulsation dampener
Relief valve* G	Opens up a relief line when a pressure limit value is set	...as a safety device to protect the metering system from overloading by the metering pump.
Level switch H	Signals the liquid level of the storage tank (two-stage design (with pre-warning) or single-stage)	...for correct operation of the system.
		...to display a pending change of tank or filling of the storage tank.
		...to protect the metering system from sucking dry.
Foot valve* I	Check valve (vacuum breaker)	... to protect the suction line from running dry (e.g. when changing the tanks).
	With filter meshes as a coarse filter	...to protect the metering pump from coarse particles of solids.
Manometer J (general pressure measuring device)	Displays the actual pressure, for example at the pressure connector of the metering pump	...to determine the actual operating pressure in the discharge line.
		...crucial to adjust the back pressure valve or relief valve.
Vacuum cylinder K	Smooths out pulsation in the pipe (suction side), generates a low-pulsation flow	... to reduce pressure losses with longer suction lines.
	Priming aid	... as a priming aid together with a vacuum pump.

System components	Function	Use
Filter L	Filters coarse particles of solids from the suction flow	... to protect metering pump and system from dirt and increased wear and tear.
Solenoid valve M	Automatic shut-off valve Control: for example electrically locked by the metering pump's mains power supply	... as a safety device for shutting off (tightly sealing) the discharge line when the system is idle.

- * The system components in the table marked with a * are not fully leak-tight shut-off elements.
- Use a shut-off valve C or a solenoid valve for this purpose.

7.2 Back pressure/relief valve

The operating instructions provided for the back pressure/relief valve should be used as a priority.

ProMinent DHV-DL (DHV-S-DL, DHV-RM, DHV-U)

Back pressure/relief valves for mounting in metering line:

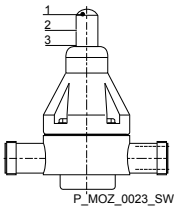
- Adjustable back pressure valve for mounting in metering lines
- Use for generating constant back pressure:
  - for precise flow when metering with a free outlet,
  - with priming pressure on the suction side,
  - with fluctuating back pressure or in vacuum
- Use as a relief valve
- When used as a back pressure valve in order to avoid resonance vibrations:
  Install at the end of the metering line or select a set pressure/line pressure loss

Back pressure/relief valves are not completely sealed shut-off devices.

The DHV-S-DL product range must only be used in conjunction with pulsation dampers when using free outlets and short metering lines.

The DHV-RM/-U product range has no back pressure effect and is therefore especially suitable for use with fluctuating back pressure at the pipe outlet and for use in conjunction with pulsation dampers and/or long lines. The DHV-RM/-U product range can be installed at any location required on the metering line.

Installation and setting instructions



1. Remove the protective cap (1)
2. Prior to commissioning the pump:
   Unscrew the pressure adjustment screw (2) to relieve the pressure, until it turns easily.
3. During pump operation:
   Create the required operating pressure by screwing in pressure adjusting screw (2);
   Read the set pressure on the manometer, which is installed in the pipework.
4. Securing the pressure adjusting screw (2):
   tighten the locking nut (3).

5. When pressure relief is required:

   loosen the locking nut (3) and unscrew the pressure adjustment screw (2), until it turns easily.

7.3 Pulsation damper

The operating instructions provided for the pulsation damper should be used as a priority. Pulsation dampers are frequently used in conjunction with oscillating displacement pumps.

They are required if,

- for example, a low-pulsation delivery flow is required for procedural reasons or
- in relation to the piping situation when impermissibly high pressure peaks need to be reduced while operating oscillating displacement pumps or the pressure loss has to be reduced;
  this means that pulsation dampers must be used on both the suction side and the discharge side.

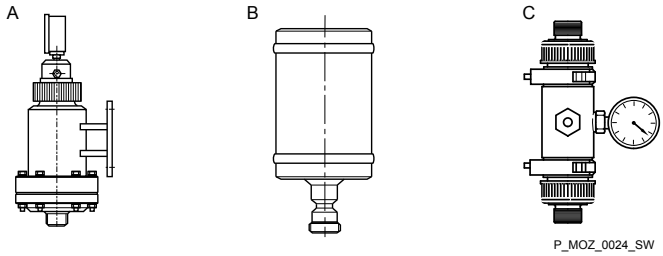


Fig. 45: Types of pulsation dampers

A Diaphragm damper (bladder damper)
B Pressure vessel
C In-line damper

Function

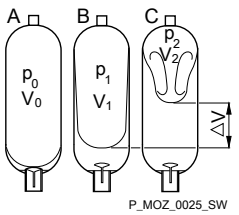


Fig. 46: Functioning of the pulsation dampers with separating diaphragm

Its functioning is based on the energy-converting compression and expansion of a gas cushion (A). When the pressure increases, part of the feed chemical is stored (C) and released in the pipework when the pressure decreases (B).

p_0 Gas filling pressure
p_1 Minimal operating pressure
p_2 Maximum operating pressure
V_0 Effective gas volumes
V_1 Gas volumes at p_1
V_2 Gas volumes at p_2
ΔV Volume modification to compensate for pulsation

A basic distinction is made between pulsation dampers with and without separating diaphragms.

In pulsation dampers without separating diaphragms (e.g. pressure vessel) the feed chemical is in direct contact with the gas cushion, which is formed by the previously confined compressed air. After start-up, the compressed air is compressed to the damping volume. Since the compressed air is gradually dissolved in the chemical, occasional ventilation must be performed in an unpressurised state. In pulsation dampers with separating diaphragms, this disadvantage is avoided. An elastic separating diaphragm separates the damping gas cushion from the feed chemical, thereby preventing it from being absorbed.

Assembly

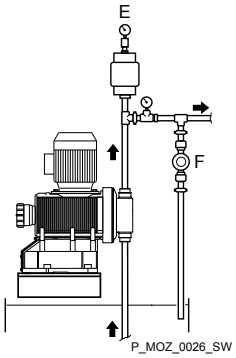


Fig. 47: Example of pulsation damper installation

E Pulsation damper
F Safety relief valve

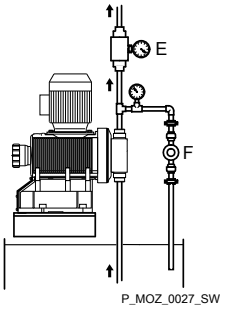


Fig. 48: Example of inline damper installation

E Inline damper
F Safety relief valve

- Pulsation dampers can only fulfil their function of damping pressure peaks and pulsations if they have been installed correctly.
- Pulsation dampers must be integrated into the system in an easily accessible and vibration-free manner.
- Pulsation dampers must be installed in close proximity to the location where the pressure peaks are to be damped.

  For metering pumps, this means that they should be installed the shortest possible distance behind the discharge valve of the dosing head - or if there is a vacuum cylinder, immediately before the suction valve.
- The connecting line should be laid straight and in accordance with the connection nominal diameter of the pulsation damper in order to prevent unnecessary rerouting and pipe friction losses.

Start up

Under no circumstances should oxygen be used for pressure pre-loading air or nitrogen diaphragm pulsation dampers (or bladder dampers). Pulsation dampers function most efficiently when the preload pressure is approximately 60 - 80 % of the subsequent average operating pressure.

Maintenance

If the pulsation damper has not been equipped with a manometer, it is recommended that the preload pressure (pp) should be checked:

- after 500 hours of operation
- prior to commissioning after an extended downtime
- Regular three-monthly inspections are recommended.

8 Installation details

Installation details

Customer:

Project no.: Date: ❑ Sketch enclosed:

Pump	Type:	-	.....
	Pump capacity	l/h	.....
	Stroke rate	Strokes/min	.....
	Stroke length	%	.....
	Valve spring pressure, suction-side	bar	.....
	Valve spring pressure, discharge-side	bar	.....
Medium	Description/Concentration	- / %	..... / .....
	Proportion of solids/Grain size	% / mm	..... / .....
	Solids material/Degree of hardness	- / (Mohs scale)	..... / .....
	Dynamic viscosity	mPa s (cP)	.....
	Density	kg/m^3	.....
	Vapour pressure at operating temperature	bar / °C	..... / .....
Suction-side system	Pressure in the suction tank	bar	.....
	Nominal width of suction line	DN / mm	..... / .....
	Suction lift min./max.	m	..... / .....
	Feed height min./max.	m	..... / .....
	Length of suction line	m	.....
	Number of angles/valves	– / –	..... / .....
	Pulsation dampener	❑	Diaphragm ..... litr
		❑	Pressure vessel ..... litr
Discharge-side	Static system pressure min./max.	bar	..... / .....
	Nominal width of discharge line	DN/mm	.....
	Length of discharge line	m	.....
	Discharge lift	m	.....
	Number of angles/valves	– / –	..... / .....
	Pulsation dampener	❑	Diaphragm ..... litr
		❑	Pressure vessel ..... litr

P MOZ 0003 SW

9 Installation diagram

Customer:	
Project no.:	Date: .....



ProMinent GmbH
Im Schuhmachergewann 5 - 11
69123 Heidelberg
Germany
Telephone: 06221 842-0
Fax: 06221 842-419
Email: info@prominent.com
Internet: www.prominent.com

987702, 2, en_GB

© 2022