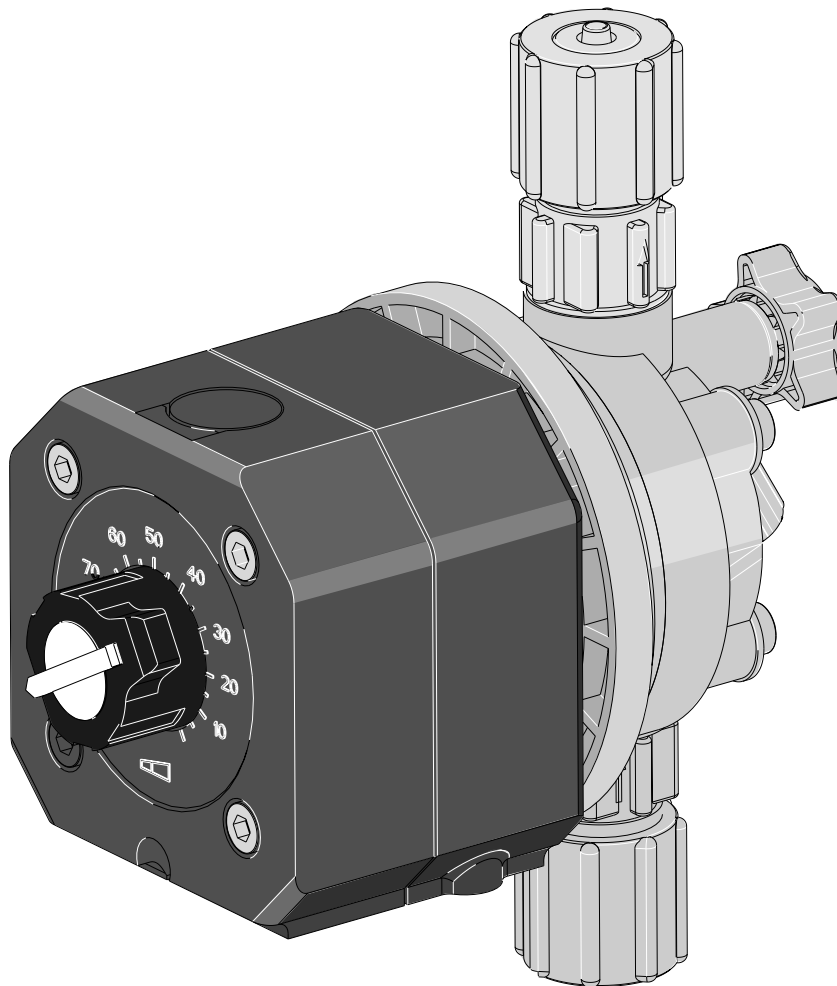




Operating Instructions

Metering pump Pneumados PNDb



**Please completely read through operating instructions! • Do not discard!
The operator shall be liable in case of damages due to improper installation or operation!**

Corporate information:

Operating Instructions
Metering pump Pneumados PNDb
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Technical changes reserved.

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General notes for the user

Please read the following user guidelines. Familiarity with these points ensures optimum use of the operating instructions.

Key points in the text are indicated as follows:

- Enumerations
- ▶ Instructions

Working guidelines

NOTES

A note is to facilitate your work.

and safety guidelines:



WARNING

***Characterizes a possibly hazardous situation.
Your life may be in danger and serious injuries may result if these notes are disregarded.***



CAUTION

***Characterizes a possibly hazardous situation.
There is danger of personal injury and damage to property if these notes are disregarded.***



IMPORTANT

***Characterizes a possibly endangering situation.
There is danger of damage to property if these notes are disregarded.***

1 Preamble

ProMinent® Pneumados is a pneumatically-operated metering pump.

In contrast to solenoid-driven metering pumps, the metering stroke of this pump is effected by a pneumatically actuated diaphragm, the suction stroke by spring force.

The delivery capacity can be varied via the stroke frequency and the stroke length setting.

Metering strokes The external electrically-pneumatically or pneumatically activated compressed air valves facilitate a setting of up to 180 metering strokes per minute.

Stroke length The stroke length and thus the stroke volume can be set between 10 and 100%.

Areas of application Typical areas of application are:

- Feeding stuff treatment -
Metering and spraying of feeding stuff with flavouring agents
- Painting plants -
Metering of coagulants
- Greenhouses -
For metering of fertilisers and minerals compounds
- Car wash -
Metering of cleaning agents, shampoo, brighteners, wax, drying agents as well as for the treatment of recycling water via metering of flocculants, pH adjusters, defoaming agents, and emulsion breakers
- in all plants with central control (e.g. PLC) and compressed air supply

2 Function

Capacity range ProMinent® Pneumados is a pneumatically operated metering pump with a capacity range from max. 0.76 to 16.7 l/h at a max. backpressure of 16 – 2 bar.

Compressed air consumption The compressed air consumption amounts to approx. 47 l/min at 6 bar, preferably non-oiled or also oiled compressed air.

2.1 Functional principle

Pressure stroke Compressed air is applied to the pressure chamber within the housing via an external pneumatic valve. This displaces a pneumatic diaphragm and the resulting axial movement is transferred to the metering diaphragm via a tappet. This diaphragm impulsively expels the metering medium from the liquid end through the pressure valve and the balls on the suction side close.

Suction stroke The pneumatic valve having switched, the pressure chamber is relieved and the tappet together with the metering diaphragm is restored to its original position through the spring. The medium is sucked into the liquid end through the suction valve and the balls on the pressure side are closed.

2.2 Pump drive

The Pneumados pump drive is operated solely pneumatically with a continuous max. stroke frequency of 180 strokes/min.

The metering stroke is set to 10 - 100% using a stroke length adjustment **(10)**.
The stroke length is max. 1.25mm.

NOTE

Settings should only be made with the pump in operation – when the adjustment pin of the metering stroke is momentarily relieved!

2.3 Delivery unit

The Pneumados metering pump is equipped with genuine ProMinent® beta delivery units of the type series 1000 - 0220.

Liquid end materials The liquid end with double-ball valves in the suction and pressure valves is available in the following material types:

PV = PVDF

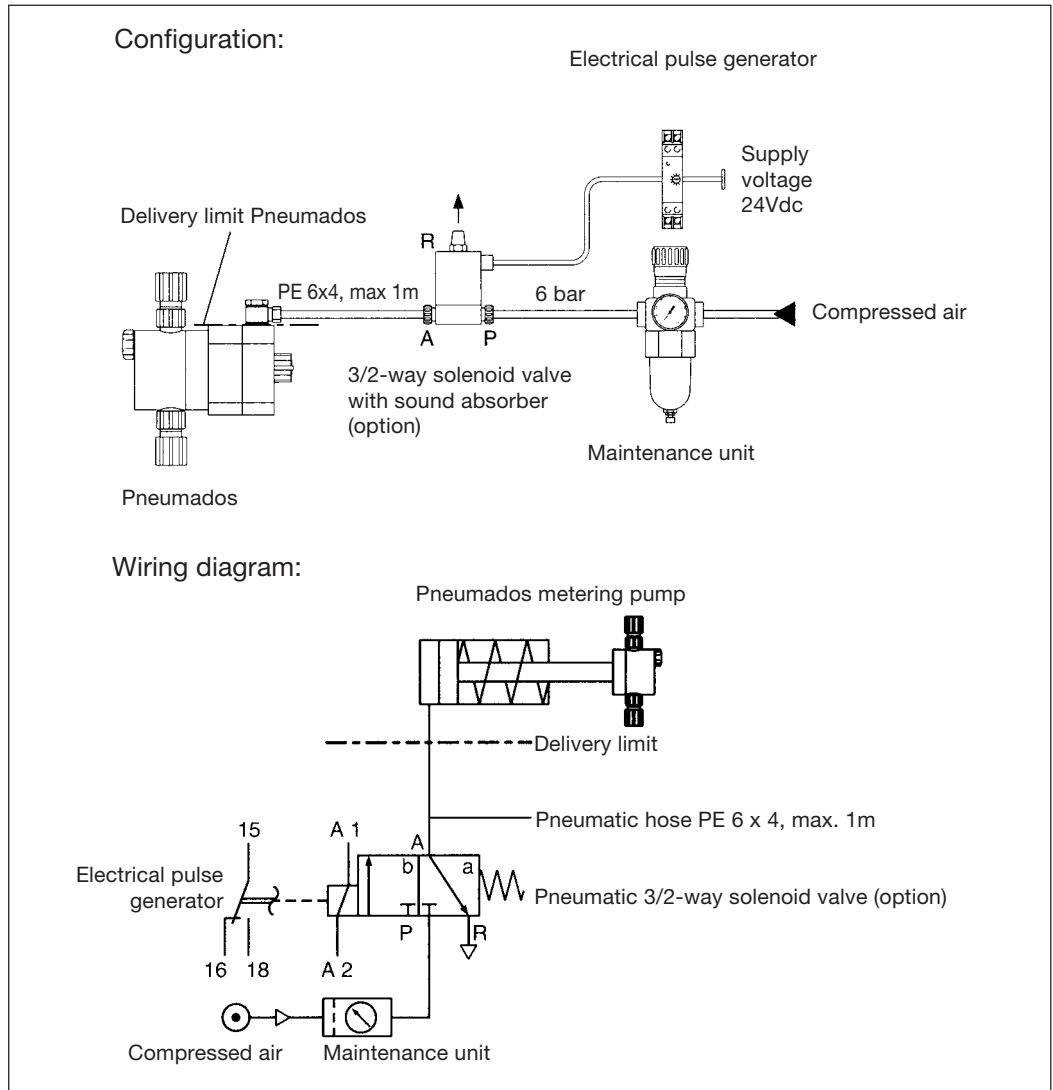
SS = stainless steel (material number 1.4571).

The DEVELOPAN® metering diaphragm has a PTFE layer.

2.4 Pump control

A pump control is required to operate the Pneumados.

2.4.1 Electrical-pneumatic control



An electrical pulse generator drives a pneumatic solenoid valve. During the metering stroke, the pneumatic solenoid valve applies compressed air to the pump; during the suction stroke, this air volume is released into the open from the solenoid valve via the vent connection "R".

Technical data of the electrical-pneumatic control:

<i>Electrical control</i>	Via pulse generator – pulse control of PLC control or pulse generator relay with pulse duration of approx. 250ms, e.g. flashing relay, adjustable between 0.1 and 1s, 24Vdc
<i>Pneumatic control</i>	Via 3/2-way solenoid valve, e.g. MHE3-M1H-3/2G-QS-6-K-525152 (order no. 1030275)
<i>Mode of action</i>	Relieved in rest position
<i>Nominal width</i>	≥ 3,0 mm
<i>Nominal flow rate</i>	≥ 200 l/min
<i>Line connection</i>	QS-6 (for hose 6x4)
<i>Operating pressure</i>	6 - 8 bar
<i>Operating voltage</i>	24 V DC
<i>Power consumption</i>	3,7 W
<i>Type of protection pursuant to EN 60259</i>	IP65
<i>Switching time On / Off</i>	8 / 4,5 ms
<i>ED</i>	≤ 0,1s
<i>AD</i>	≤ 0,15s

3 Technical data

NOTE

Depending on the existing air pressure, the length of the pneumatic line and the layout of the control, minor deviations in the delivery output may result.

Pump type	Delivery output at maximum pressure			Connection size oØ • iØ mm	Suction height ^{3), 4)} mWC	corresp.	Suction height	corresp.	Admissible pre-pressure on suction side bar
	bar	l/h	ml/ stroke			suction pressure ²⁾ mbar	¹⁾ mWC	suction pressure ²⁾ mbar	
1000	10	0.76	0.07	6x4	6	600	2.0	200	8
1601	16	1.0	0.09	6x4	6	600	2.8	280	8
1602	16	1.7	0.16	6x4	6	600	3.0	300	5.5
1005	10	3.8	0.35	8x5	5	500	3.0	300	3
0708	7	6.3	0.58	8x5	4	400	2.0	200	2
0413	4	10.5	0.97	8x5	3	300	2.5	250	1.5
0220	2	16.7	1.55	12x9	2	200	2.0	200	1

- ¹⁾ Suction height / suction pressure (dry) determined with clean as well as moistened valves, is tested with empty liquid end.
- ²⁾ Value corresponds to the obtainable vacuum compared to atmospheric pressure.
- ³⁾ Suction height / suction pressure tested with filled liquid end and filled suction line, provided sufficiently dimensioned suction line cross-sections are given.

The delivery outputs were determined with an air hose length of 1m, using the Festo solenoid valve MHE3-M1H-3/2G-QS-6K, as well as at max. stroke frequency (180 strokes/min.) and 100% stroke length, with pump at operating state temperature, test medium water.

Compressed air filtered 6 bar ± 10%, filter size 40µm
Air consumption for 1m line 47 l/min
Stroke frequency max. 180 strokes/min

Materials in contact with medium, type	PV	SS...
<i>Liquid end</i>	PVDF	Stainless steel ²⁾
<i>Suction/pressure connection</i>	PVDF	Stainless steel ²⁾
<i>Gaskets</i>	PTFE	PTFE
<i>Balls</i>	Ceramic	Ceramic

²⁾ Material no. 1.4571
 DEVELOPAN® metering diaphragm with PTFE layer.

Reproducibility, metering accuracy ±2 given constant conditions, minimum backpressure 1 bar, stroke setting 30 – 100%, and water-like medium for short time intervals

Permissible deviation of the delivery output for all material types -5 % ...+ 15 %

Permissible ambient temperature -10 °C bis +50 °C

Perm. media temperature -5 °C bis +50 °C

Climate conditions for storage and transport:

Humidity: < 95% relative humidity

Temperature: -10 °C bis +50 °C

4 Accessories



WARNING

The assembly of ProMinent metering systems using third-party components which are not verified and recommended by ProMinent is not permitted and may lead to personal injury and damage to property for which ProMinent will not accept any liability!

Order no. 354641	Compressed air connection union for Pneumados G 1/4A-6mm made of anodised aluminium with gaskets, rotatable, quick coupling piece LCK 1/4"
Order no. 1030275	3/2-way solenoid valve MHE3-M1H-3/2G-QS-6-K 24Vdc
Order no. 1030277	Sound absorber UC QS-6 made of PE for solenoid valve
Order no. 1030276	Mounting angle MHE2-BG-L for solenoid valve
Order no. 1030351	Electrical pulse generator for assembly within protective housing on DIN rail pursuant to IEC/EN 60715, adjustable stroke frequency 30 – 180 strokes/min., electrical connection 24Vdc / 0.6W.
Order no. 37205	Suction and metering line as well as pneumatic line made of PE 6 x 4mm (no fig.) Foot valve with screen and non-return ball * (no fig.) Metering valve with non-return ball * (no fig.)
Order no. 1030028	Wall bracket compl. for Pneumados metering pump (no fig.)

* Order number for size and material see product catalogue!

5 Notes on safety



WARNING

- **The pumps must be accessible any time for operation and maintenance, access may not be hindered or blocked!**
- **Pneumados metering pumps can be operated with a max. permissible air pressure of 8 bar. Corresponding measures have to be taken to ensure that this pressure is not exceeded – if required by installing a safety valve or a pressure limiting valve upstream of the pump!**
- **Always rinse the liquid end first before commencing maintenance and repair work if hazardous or unknown metering media are used!**
- **When metering hazardous or unknown metering media, suitable protective equipment (goggles, gloves ...) must be worn when working at the liquid end! Observe the safety data sheets of the metering media!**
- **Switch off the pump control and close the compressed air supply line first before starting any work at the pump! Always depressurise the metering line! Always empty and rinse the liquid end! Observe the safety data sheets of the metering media!**

Proper use

- The pump is only designed for metering liquid media.
- All other uses or modifications are prohibited!
- The pump must not be used to meter gaseous media or solids.
- The pump is not designed for use in Ex areas.
- The pump may only be used in compliance with the technical specifications stated in the operating instructions and in the technical data.
- The pump may only be operated if all components were installed in compliance with the technical documentation and a proper installation was performed.
- The pump may only be operated by trained personnel.



IMPORTANT

- **Settings should only be made with the pump in operation – when the adjustment pin of the metering stroke is momentarily relieved!**
- **Only use the clamping rings and hose grommets specified for the corresponding hose diameter as well as genuine hoses of the specified hose dimensions and wall thicknesses. Otherwise, the stability of the connection is not guaranteed!**
- **Avoid reducing the hose sizes! In case of long lines and viscous media, the next higher line cross-section or a pulsation dampener should be used!**

6 Identcode

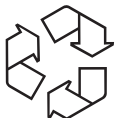
Please enter the Identcode listed on the rating plate under "Type" into the space below.

PNDb	Solenoid metering pump Pneumados B											
	Pump typ: 1000 10 bar – 0.76 l/h 1601 16 bar – 1.00 l/h 1602 16 bar – 1.70 l/h 1005 10 bar – 3.80 l/h 0708 7 bar – 6.30 l/h 0413 4 bar – 10.50 l/h 0220 2 bar – 16.70 l/h											
	Material: PV PVDF SS Stainless steel											
		T	Diaphragm + gasket: Standard diaphragm with PTFE gasket									
			Liquid end type: 0 without vent, without valve spring 1 without vent, with valve spring 2 with vent, without valve spring 3 with vent, with valve spring									
			Hydraulic connection: 0 Standard connection 1 Special connection 6x4 2 Special connection 8x5 3 Special connection 12x9									
			Design: 0 with PM-Logo									
			Energy connection: 0 Connection G1/4, air pressure 6 bar 1 Connection 6x4, air pressure 6 bar									
			Control type / control: 0 Single-acting (standard) 1 Electrical-pneumatic control									
			Approvals: 01 CE									
PNDb	_	_	_	_	_	_	_	_	_	_		

Viton® is a registered trademark of DuPont Dow Elastomers.

7 Unpacking

Polystyrene parts



Outer packaging



IMPORTANT

Polystyrene parts are hazardous waste and may not be included in domestic waste but must be disposed off separately (hazardous waste disposal sites)!

Please keep the outer packaging complete with polystyrene parts to be able to return the metering pump and accessories in case of repair or warranty claims!

First compare the delivery note and the package contents.



IMPORTANT

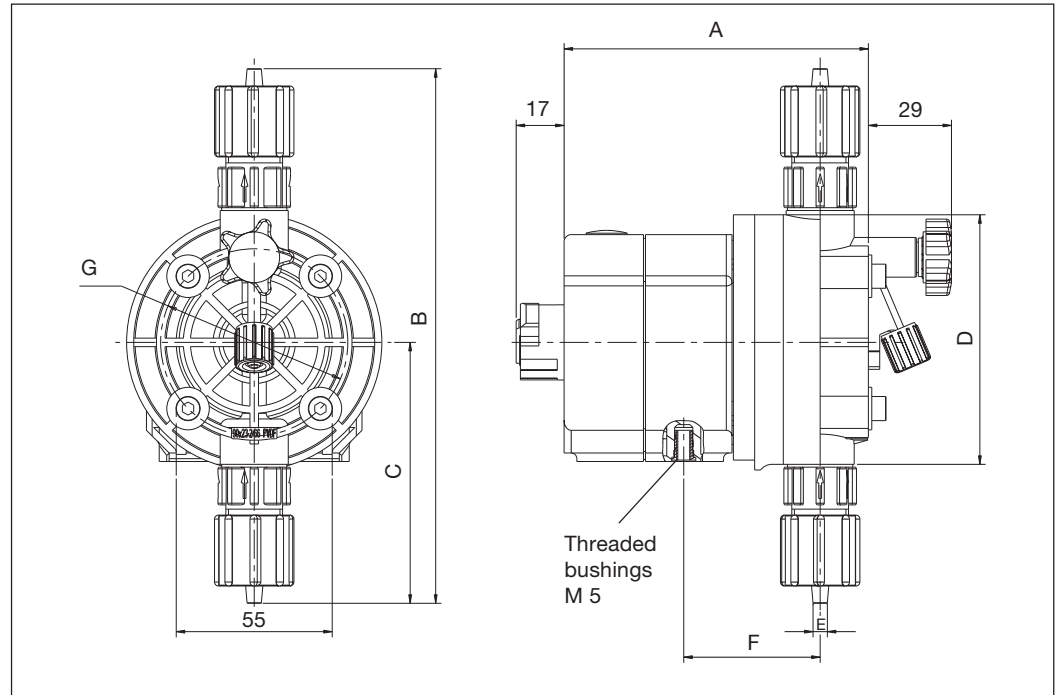
**Please check whether the data on the rating plate match your order data!
If not, please immediately contact your local ProMinent branch or agency!**

Each Pneumados metering pump is equipped with a rating plate. The technical data as well as the Identcode and the serial number are listed. These two numbers are to be used for any contact and replacement part orders because they facilitate a unique identification of the pump type and the material type.

Please note the following data of the delivered pump to be able to immediately provide these data when needed:

Identcode	_____
Serial number	_____
Installation location	_____
Metering insert	_____
Commissioning	_____

8 Dimension sheet



Dimension sheet PNDb PVC
(dimensions in mm)

	1000	1601	1602	1005	0708	0413	0220
<i>A</i>	103	105	103	107	109	109	111
<i>B</i>	164	176	172	189	190	181	181
<i>C</i>	78	90	88	92	93	88	88
<i>D</i>	70	70	70	90	90	90	90
<i>E</i>	6x4	6x4	6x4	8x5	8x5	8x5	12x9
<i>F</i>	48	49	48	48	50	50	52
<i>G</i>	50	50	50	66	66	66	66

Dimension sheet PNDb SST
(dimensions in mm)

	1000	1601	1602	1005	0708	0413	0220
<i>A</i>	108	103	103	106	111	113	113
<i>B</i>	124	139	139	141	205	205	205
<i>C</i>	62	69	69	71	103	103	103
<i>D</i>	60	70	70	80	85	85	85
<i>E</i>	6x5	6x5	6x5	8x7	8x7	8x7	12x10
<i>F</i>	55	49	49	52	54	54	54
<i>G</i>	50	50	50	66	66	66	66

9 Assembly / installation

9.1 Requirements on the compressed-air supply

Air pressure

As is the case with all pneumatic components, Pneumados metering pumps, too, should be operated with clean and dry compressed air. In addition, a pressure reduced should be installed upstream which guarantees a constant air pressure of 6 bar \pm 10%.

The metering pump should preferably be operated with oil-free compressed air – however, oiled compressed-air can also be used.

All parts coming into contact with compressed air are oil-resistant, however, oil may collect in the pump housing after a longer period of time. This oil can be removed by blowing out, if required.

In order to prevent pressure fluctuations and condensate, the maintenance unit should be installed as close as possible to the pump.

9.2 Assembly of the Pneumados metering pump

Mount the metering pump onto a tank or a bracket using 2 screws M5 and 2 washers \varnothing 5mm.

The valves must always be installed in a vertical position to guarantee a proper function.

Install the metering pump such that the suction height or the length of the suction line is kept as short as possible to increase the operating safety.

9.3 Pneumatic connection

Remove the protective plug (1) at the top of the metering pump housing and check whether the gasket surface is clean.

Install the compressed air connection union with gasket, fix the direction and tighten. Alternative, a commercially available union (connection G 1/4" for hose 6 x 4mm) can be used.

Connect the compressed air hose 6 x 4mm to the pump and pneumatic valve; keep the hose length as short as possible. In case of a longer distance (up to max. 1m), the metering output decreases by up to 15% and the air consumption increases.



IMPORTANT

The pneumatic hose may not be kinked!

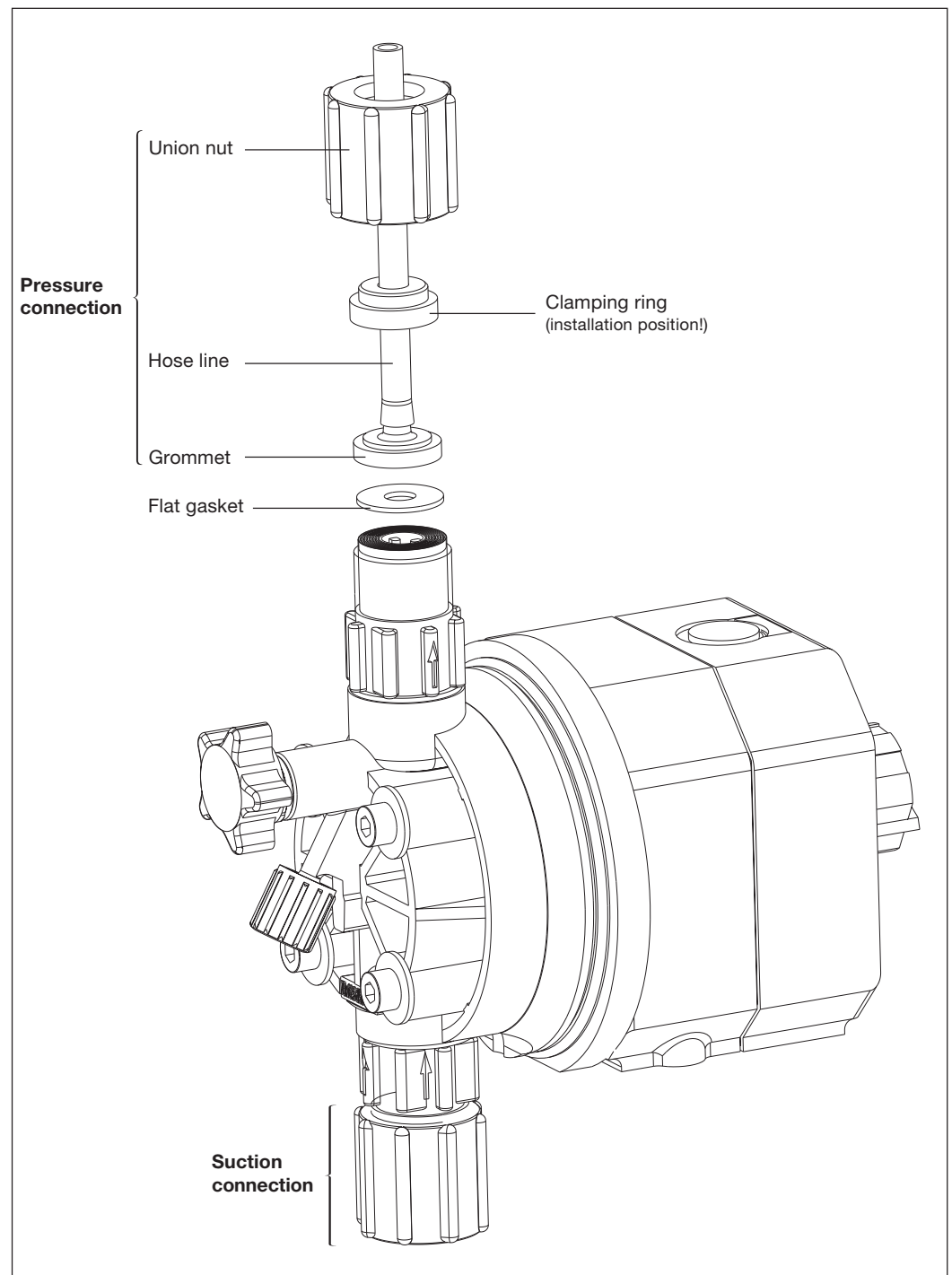
9.4 Connection of the suction and metering line

If the suction/pressure connection (5/3) of the liquid end (4) is closed with a plug, remove the plug.



WARNING

The metering pump may still contain residual water resulting from the test at the facility! Remove any water from the liquid end before commissioning if metering media are used which may not come into contact with water! For this purpose, rotate the pump by 180° and empty the liquid end, then rinse with a suitable medium from top via the suction connection.



Hose connection Connect the hose to the suction/pressure connection **(5/3)** as follows:

- Position clamping ring and union nut onto the hose
- Extend the hose end of the rectangularly cut hose a bit and fully push onto the grommet
- Insert the flat gasket and tighten the union nut
- Now pull shortly at the hose and re-tighten the union unit.

NOTE

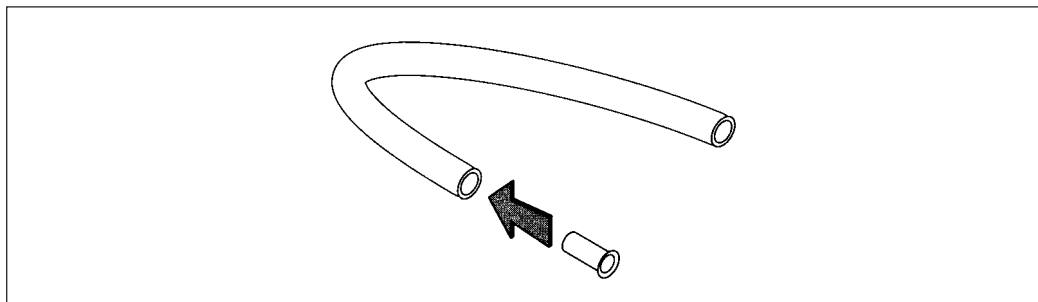
- **Only use the clamping rings and hose grommets specified for the corresponding hose diameter as well as genuine hoses of the specified hose dimensions and wall thicknesses. Otherwise, the stability of the connection is not guaranteed!**
- **Avoid reducing the hose sizes!**
- **In case of long lines and viscous media, the next higher line cross-section or a pulsation dampener should be used!**

Stainless steel connection

- For stainless steel pipe connections, place union nut and clamping ring onto the pipe and let protrude approx. 10mm.
- Push the pipe into the valve up to the stop.
- Tighten the union nut at first fingertight.
- In case of **first assembly**, then tighten the union nut 1 1/4 turns more
- In case of **re-assembly**, tighten 1/4 turns more.

Connection of PE/PTFE lines to stainless steel valves

- When connecting PE/PTFE lines to stainless steel valves, insert stainless steel support sleeve into the plastic line in addition.



Order no. 359365
Order no. 359366
Order no. 359368

Support sleeve for hose 6 x 4 mm
Support sleeve for hose 8 x 5 mm
Support sleeve for hose 12 x 9 mm

Suction line

Cut the free suction line end such that the subsequently installed foot valve is positioned shortly above the bottom of the tank – for metering solutions with contaminations or sediment at least 50mm above the tank bottom.



IMPORTANT

Always cut the suction line to the required length and route as riser!

Bypass hose line

For the material type “PV“, a vent valve (9) is included. In this case, a hose line with an inner diameter of 4 – 5mm must be slipped on the bypass hose grommet (10) and the other end of the hose must be returned to the metering tank; preferably use PVC soft 6 x 4mm. For PE lines, this is e.g. to be secured against coming loose using an instant cable fastener. In this case, also connect the pressure line to the pressure connection and the metering valve. Open the vent valve (9) by turning the star handle anti-clockwise – the way for the coarse suction ventilation via the bypass is now open. For liquid ends without vent valve, only connect the pressure line to the liquid end but not to the metering valve!

9.5 Installation examples

Individual components:

- 1 Metering pump
- 2 Metering tank
- 3 Foot valve with screen and non-return ball
- 4 Metering valve spring-loaded
- 5 Pressure-retaining valve type DK (liquid end installation)
- 6 Pressure-retaining valve type DL (metering line installation)
- 7 Air chamber / pulsation dampeners
- 8 Solenoid valve (closed if pump is idle)
- 9 Discharge valve
- 10 Vent valve
- 11 Shut-off device

NOTE

Height (h) x density (δ) ≤ max. suction height in mWC!

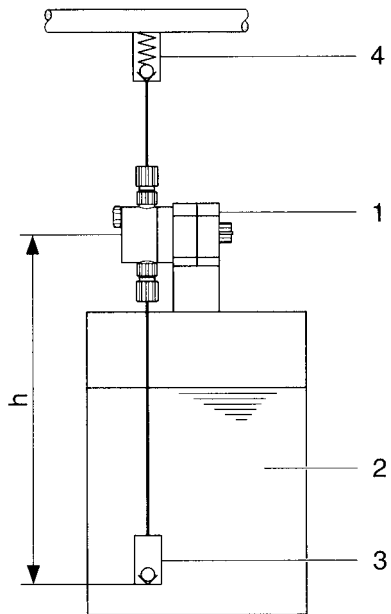
Installation examples
Pneumados PNDb

Suction height in WS

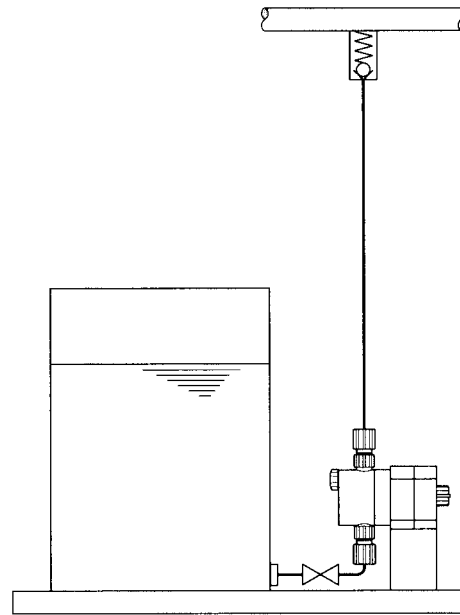
1000	1601	1602	1005	0708	0413	0220
6	6	6	5	4	3	2

9.5.1 Correct installation

1) Standard installation

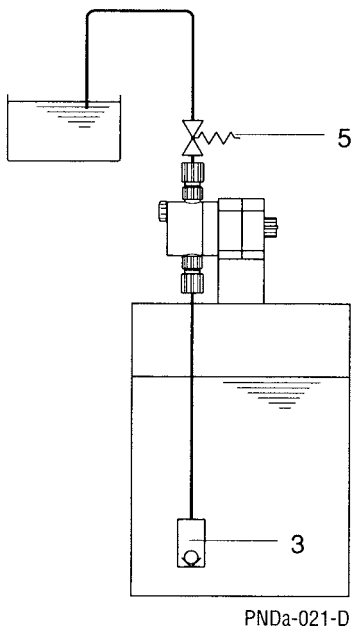


2) For outgassing metering media

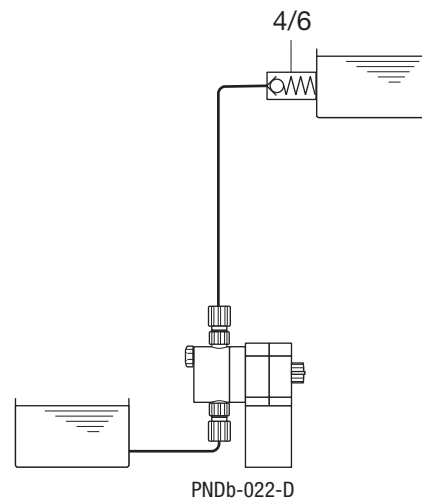


For heavily outgassing media such as hydrogen peroxide H_2O_2 or sodium hypochlorite $NaOCl$, a "feed" from the metering medium is recommended

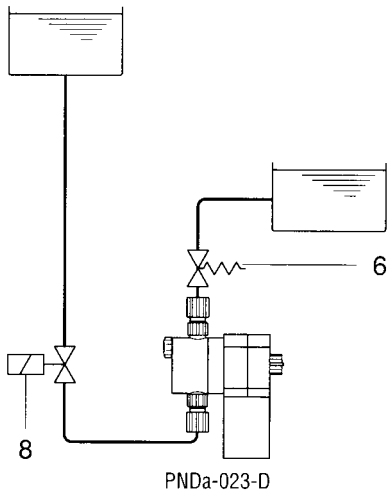
3a) Metering with free outlet and low delivery height



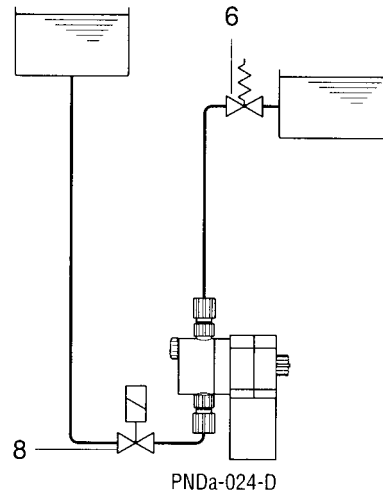
3b) Metering with free outlet and large delivery height



4a) For pre-pressure on suction side and low delivery height



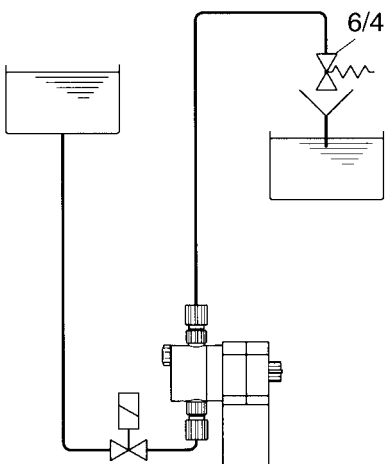
4b) For pre-pressure on suction side and large delivery height



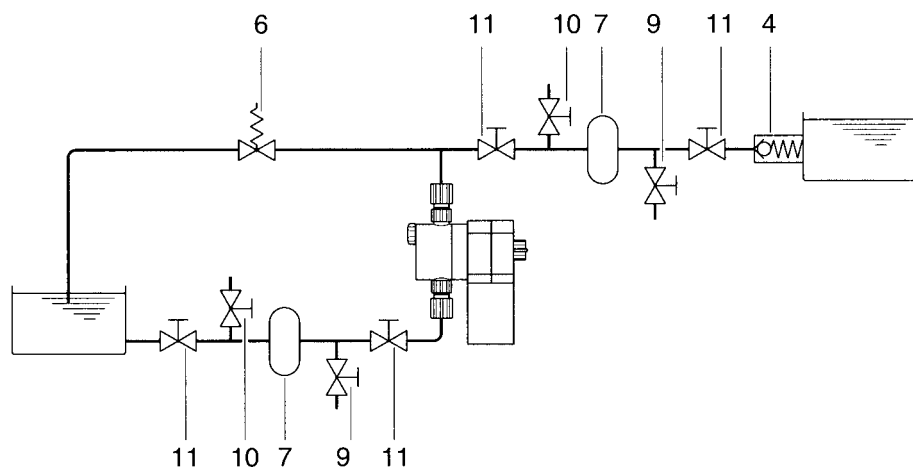
For pre-pressure on suction side and free outlet on the pressure side, an adjustable pressure-retaining valve must be provided in the metering line!

In addition, a shut-off valve (e.g. a solenoid valve) is to be provided which is closed when the pump is idle!

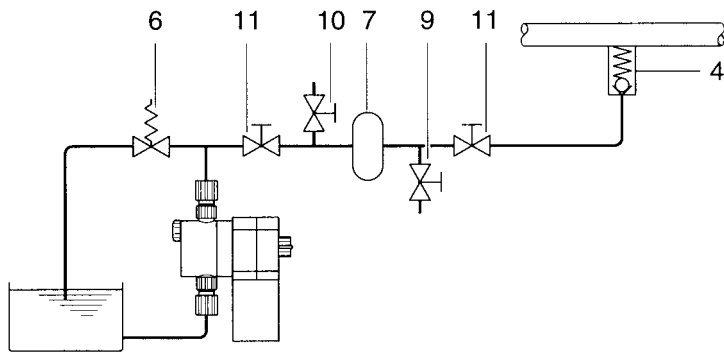
5) Installation for absolute prevention of lifting-through in case of hazardous media



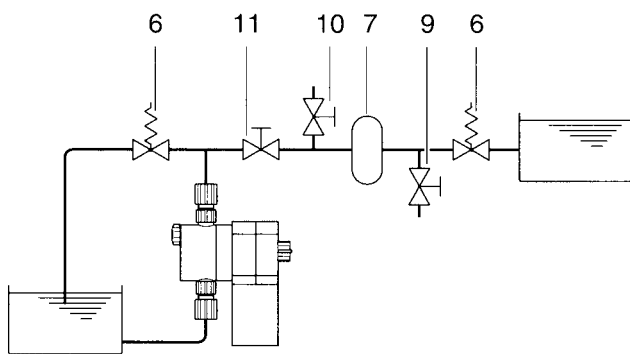
6a) Suction and pressure air chamber for long lines



6b) Pressure air chamber for pulsation-free metering in pressure lines



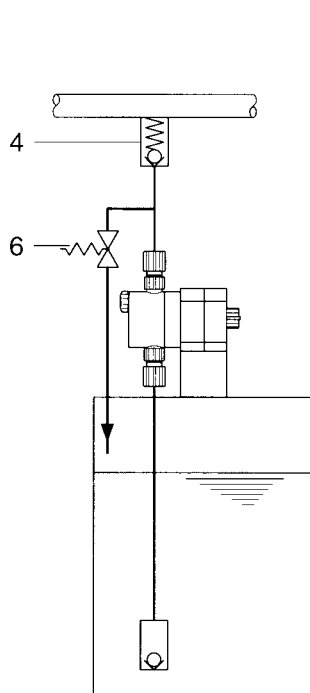
6c) In case of free outlet



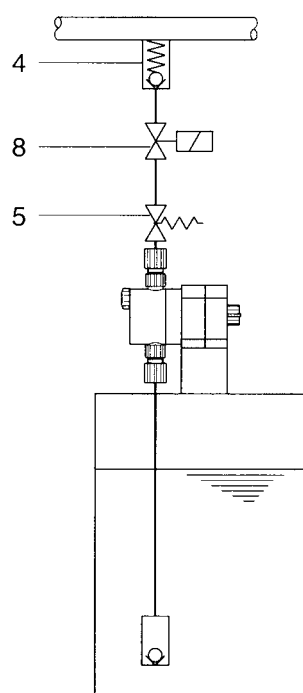
6d) Zur pulsationsfreien Dosierung ohne Nachlauf

Nozzle

7) To protect against excess pressure

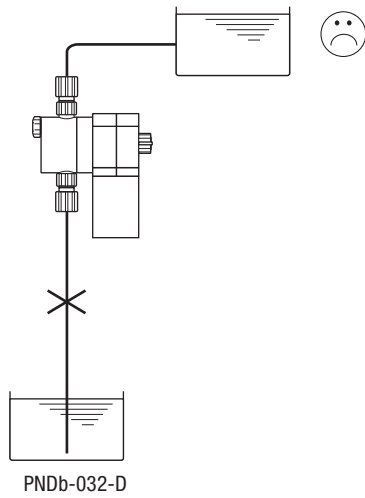


8) Metering in vacuum

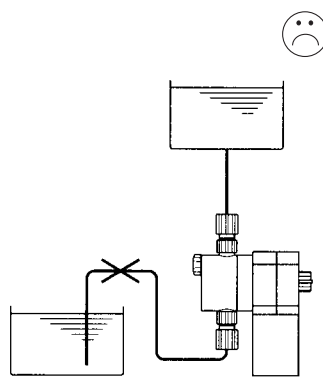


9.5.2 Incorrect installation

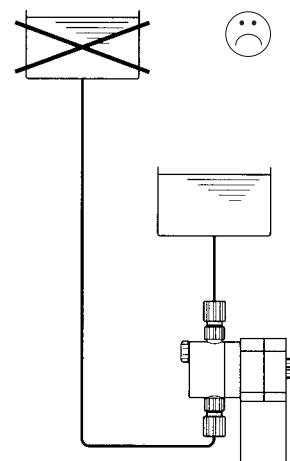
9) Suction height too high



10) Suction line cannot be vented

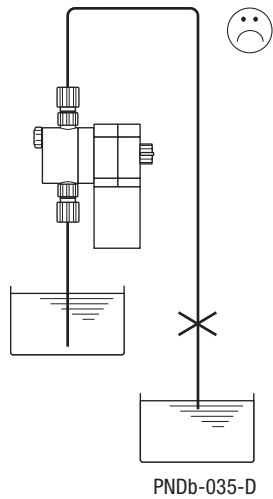


11) Suction-side pre-pressure too high

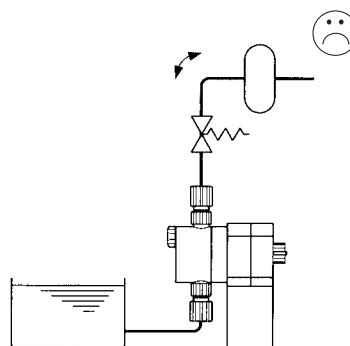


Do not route the suction line in loops because air bubbles might remain in the suction line which may result in a failure of metering.

12) Lift effect



13) Air chamber ineffective



If the metering point is below the chemicals store tank, an adjustable pressure-retaining valve as well as an additional shut-off valve is to be provided in the metering line!

10 Operation

10.1 Operation for SS version

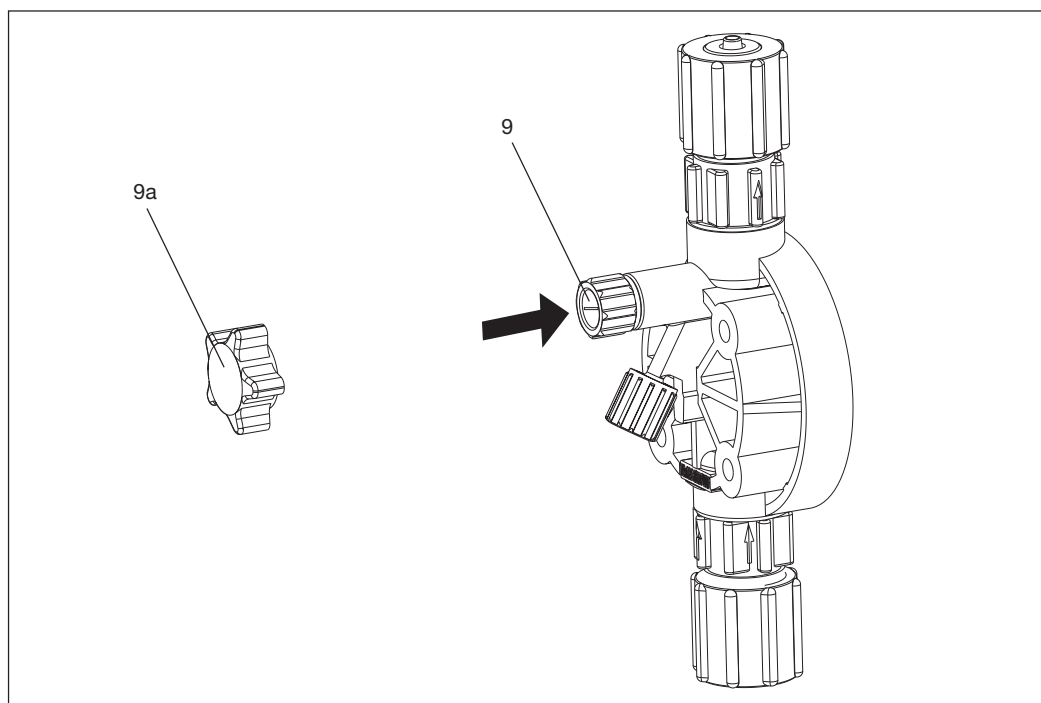
- ▶ Operate the metering pump at a stroke length of 100% and unpressurised metering line by pneumatic control until the liquid end has been completely and bubble-free filled with the medium. This is evidenced when the medium becomes visible in the venting or metering line or if it discharges from the metering line.
- ▶ Now connect the metering line to the metering valve.

10.2 Operation for PV version

- ▶ Operate the metering pump at a stroke length of 100% and opened vent valve **(9)** by pneumatic control until the liquid end has been completely and bubble-free filled with the medium. This is evidenced when the medium becomes visible in the venting or metering line or if it discharges from the metering line.
- ▶ Close the vent valve **(9)** now.

In case slightly outgassing media, the fine venting can be permanently used for liquid ends with vent valve **(9)**:

- ▶ For this purpose, remove the installed star handle **(9a)** and open the screw in the interior of the vent valve **(9)** approx. 1 turn anti-clockwise.



- This causes a constant partial flow of the metering volume returning to the store tank.
- The returned volume should amount to approx. 20% of the metering volume.
- The media must have a low viscosity and may not have any solids.



WARNING

The above mentioned measures guarantee no absolutely reliable metering after stop of the pump!

A regular check is thus absolutely necessary!

11 Maintenance



WARNING

Metering pumps and their peripherals may only be maintained by trained and authorised persons.

The maintenance of the Pneumados metering pump is limited to checking the metering output, the leak-proofness of the liquid end and the compressed-air connections as well as the compressed-air supply according to the site requirements.

12 Troubleshooting / Remedy

Faults which can be remedied by yourself or minor repair work which can be done by yourself.

NOTE

- **In order to be able to remedy minor defects any time, we recommend to keep a replacement part kit consisting of diaphragms, valves, balls, and gaskets, and a gasket kit!**
- **The order numbers for these kits are listed in our product catalogue in "Solenoid pump accessories - replacement part kits Beta/ 4"**



WARNING

- **Always rinse the liquid end first before commencing maintenance and repair work if hazardous or unknown media are used!**
- **When metering hazardous or unknown metering media, suitable protective equipment (goggles, gloves ...) must be worn when working at the liquid end! Observe the safety data sheets of the metering media!**
- **Switch off the pump control and close the compressed air supply line first before starting any work at the pump!
Always depressurise the metering line!
Always empty and rinse the liquid end! Observe the safety data sheets of the metering media!**

12.1 Pump works, but no metering

Possible cause Air collected in the liquid end

- Remedy*
1. Vent the liquid end:
 - ▶ Set stroke length to 100% with adjustment **(8)** and then stop the pump
 - ▶ For PV type, open the vent valve **(9)** by approx. 1 turn anti-clockwise
 - ▶ For SS type, disconnect the metering line from the metering valve
 - ▶ Operate the metering pump for approx. 5 – 10 metering strokes or until a metering is performed with each metering stroke
 - ▶ Adjust the required stroke length **(8)** with the pump in operation and check whether it still meters
 - ▶ Close the vent valve **(9)** or close the metering line at the metering valve with the pump stopped
 2. Based on the installation examples and notes (page 16), check whether a proper installation was performed
 3. Check whether the union nut of the suction line, the valves and screws at the liquid end are properly tightened
 4. Check whether the suction line has been installed as a riser.

Possible cause The activated fine ventilation does not work because the ventilation hole (\varnothing 1.0mm) is blocked.

- Remedy*
- Remove the star handle **(9a)** and open the vent screw **(9)** by approx. 2 turns anti-clockwise with the pump in operation until the blockage is eliminated
 - If this is not successful, disassemble the vent valve and the fine vent screw and clean all parts (including the holes)
 - Then, mount the vent valve and restore the original settings.

12.2 Pump does not perform any suction despite full stroke movement and venting

Possible cause Crystalline depositions because of drying up of the valves

- Abhilfe*
- ▶ Remove the suction hose from the store tank and thoroughly rinse the liquid end
 - ▶ If required, reduce the suction height or support first suction action with filled suction hose in feed operation
 - ▶ The metering solution can also be taken in using a disposable syringe connected at the pressure valve
 - ▶ If the fault is not remedied, the valves are to be removed and cleaned
 - ▶ The valve seat in the suction and pressure valve can be pushed out with a mandrel \varnothing 3mm.

12.3 Metering stroke is not completed although an air pressure of 6 bar is present

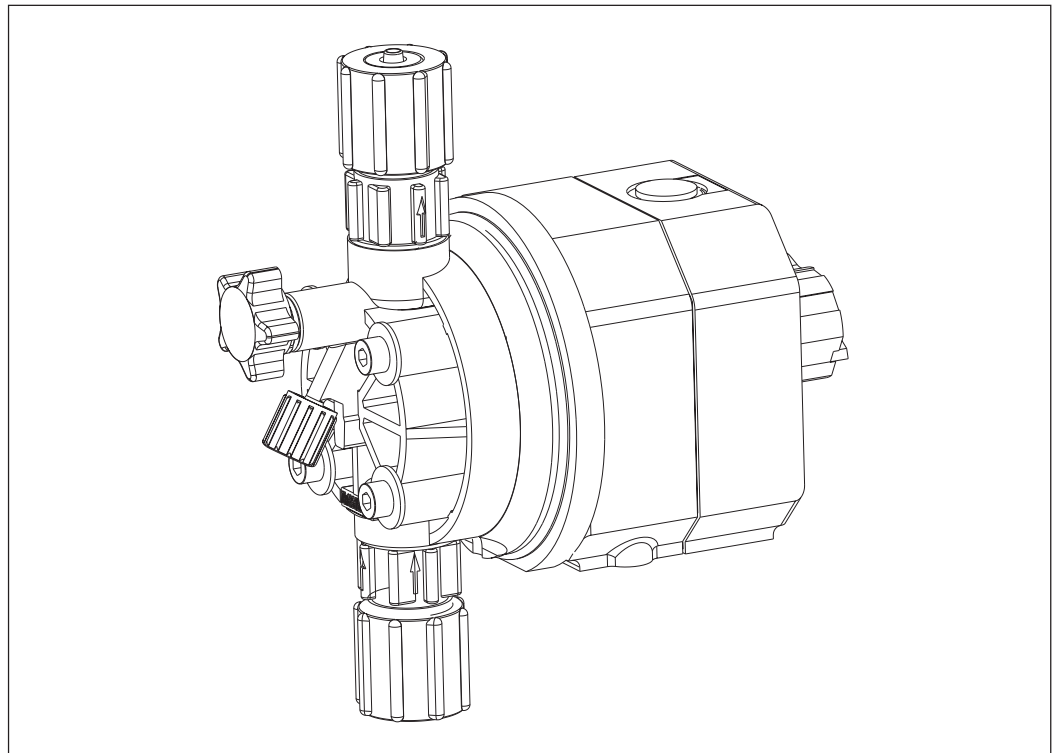
Possible cause Oil has collected in the pressure chamber of the housing

- Remedy*
- Empty pressure chamber
- ▶ For this purpose, turn the pump by 180° until the compressed-air connection points to the bottom (if required, disconnect the suction and metering line at the pump head first)
 - ▶ Operate compressed air continuously for approx. 3 seconds for liquid (oil) to be able to collect at the bottom of the pressure chamber at the connection
 - ▶ Then depressurise and discharge the liquid (oil) through the relief connection "R" at the control valve (see Chapter 2.4.1)
 - ▶ Repeat this step several time until no liquid discharges any longer.

12.4 Liquid leaks at the end disc

Possible cause The delivery unit leaks at the metering diaphragm

- Remedy*
- ▶ Re-tighten the screws at the liquid end crosswise



IMPORTANT

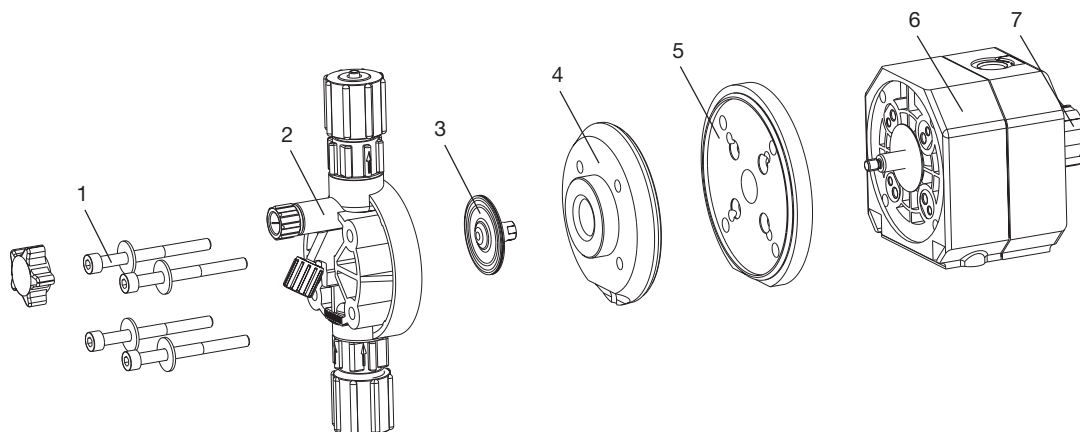
**Observe the tightening torques for the screws!
All pump types: 4.5 to 5 Nm!**

- ▶ If liquid is still leaking, the diaphragm has ruptures and must be replaced. (see Chapter 12.5)

12.5 Replacement of the metering diaphragms

Description of the individual components:

- 1 Screws
- 2 Liquid end
- 3 Diaphragm
- 4 End disc
- 5 End disc holder
- 6 Pump housing
- 7 Stroke adjustment knob



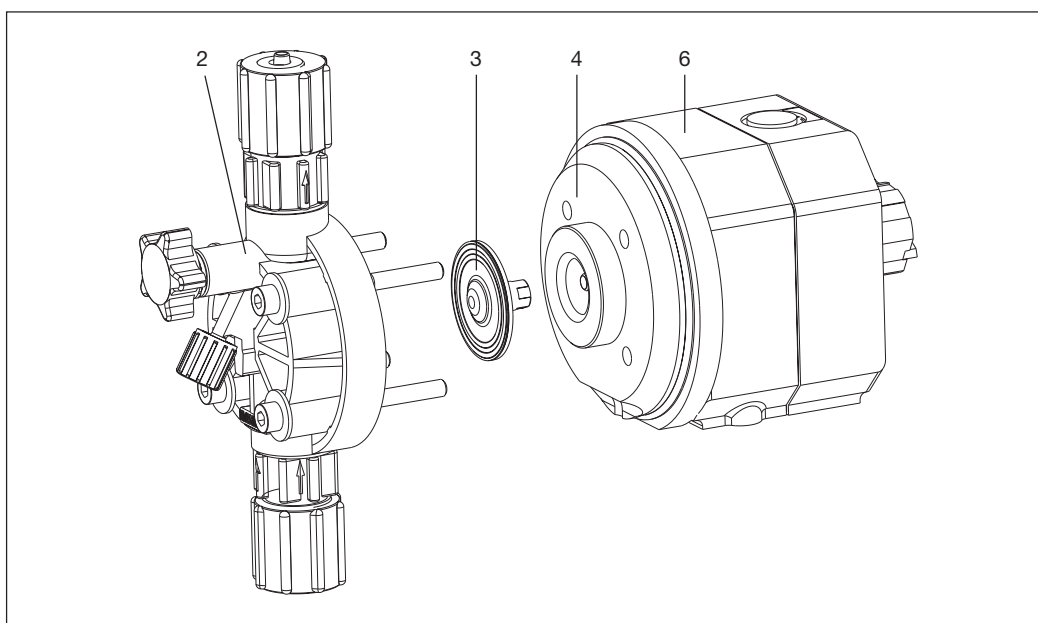
WARNING

- **Protect yourself against the metering medium if it is a hazardous one!**
- **Depressurise the system!**

- ▶ Empty the delivery unit (turn the delivery unit upside down and let the metering medium drain; rinse with a suitable medium; thoroughly rinse the liquid end if hazardous media have been used!).
- ▶ Adjust the stroke length to 0% stroke with pump in operation (the drive axis is then fixed).
- ▶ Switch off the pump.
- ▶ Remove the hydraulic connections from the pressure and suction side.

For pump type 0220 see the following page (has 4 holes at the diaphragm rim)!

*All delivery unit types
except 0220*



- ▶ Loosen the liquid end (2) and the end disc (4) at the pump housing (6) (only loosen!)
- ▶ Grab the pump housing (6) with one hand and clamp the diaphragm (3) with the other hand between the liquid end (2) and the end disc (4). Loosen the diaphragm (3) from the drive axis by slightly and jerkily turning the liquid end (2) and the end disc (4) anti-clockwise.
- ▶ Unscrew the diaphragm (3) from the drive axis.
- ▶ Remove the end disc (4) from the pump housing (6).
Screw on the new diaphragm (3) onto the drive axis up to the stop by way of trial - this must be successful, otherwise the pump will not meter precisely later!
- ▶ Unscrew the diaphragm (3) again.
- ▶ Position the end disc (4) on the pump housing (6).



CAUTION

- **The leakage hole must show to the bottom in the later installation position of the pump!**

- ▶ Insert the diaphragm (3) into the end disc (4).
- ▶ Hold the end disc (4) and tighten the diaphragm (3) clockwise until it is seated firmly (the turning resistance of the return spring becomes noticeable).



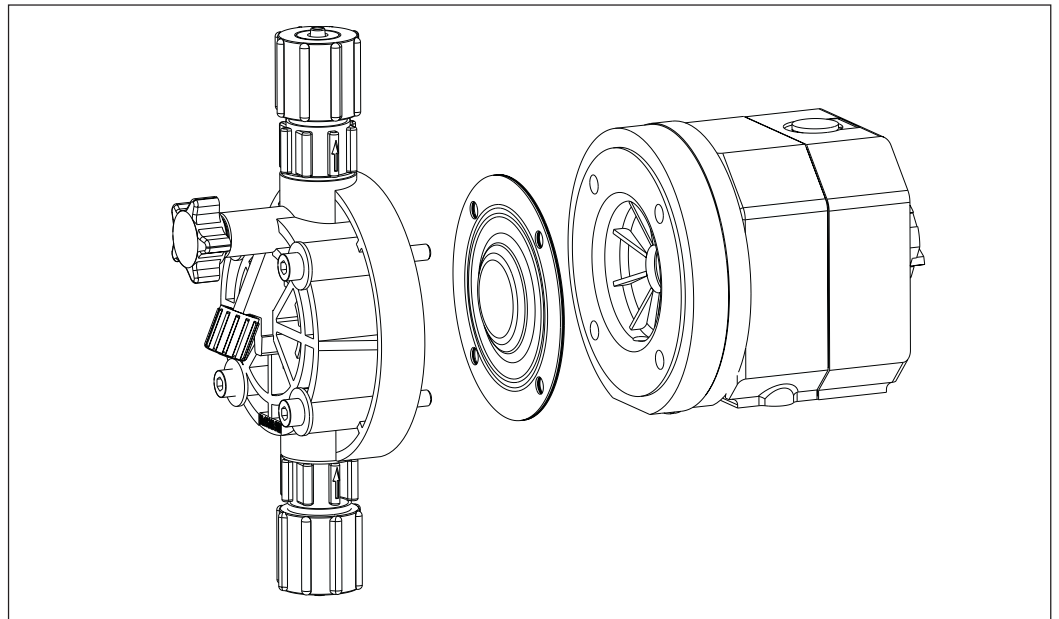
CAUTION

- **Do not excessively turn the diaphragm (3) (applies in particular to type 1601)!**

- ▶ Position the liquid end (2) with the screws (1) onto the diaphragm (3) and the end disc (4) (the suction connection must show to the bottom in the later installation position of the pump)
- ▶ Loosely insert the screws (1) and then tighten crosswise (tightening torques see below).

Tightening torques for screws: 4.5 to 5 Nm

Delivery unit types
except 0220



- ▶ Remove the liquid end (2) with the screws (1) from the pump.
- ▶ Reposition the liquid end (2) with the screws - the screws (1) should be positioned in the holes of the diaphragm (3) but not in the end disc!
- ▶ Grab the pump housing (6) with one hand and clamp the diaphragm (3) with the other hand between the liquid end (2) and the end disc (4).
- ▶ Loosen the diaphragm (3) from the drive axis by slightly and jerkily turning the liquid end (2) and the end disc (4) anti-clockwise.
- ▶ Remove the liquid end (2) with the screws (1) from the diaphragm (3) and unscrew them fully from the drive axis.
- ▶ Remove the end disc (4) from the pump housing (6).
- ▶ Screw on the new diaphragm (3) onto the drive axis up to the stop by way of trial - this must be successful, otherwise the pump will not meter precisely later!

- ▶ Check whether the holes of the diaphragm are flush with those of the pump housing
- ▶ If not, start the pump and set the stroke length to 100%.
- ▶ With the pump in operation, slowly turn the diaphragm (3) clockwise until the 4 holes of the diaphragm are flush with those of the pump housing (6).
- ▶ Hold the diaphragm (3) in this position, set the stroke length to 0%, and stop the pump.
- ▶ Unscrew the diaphragm (3) again.
- ▶ Position the end disc (4) on the pump housing (6).



CAUTION

- ***The leakage hole must show to the bottom in the later installation position of the pump!***
- ▶ Insert the diaphragm (3) into the end disc (4).
- ▶ Hold the end disc (4) and tighten the diaphragm (3) clockwise until it is seated firmly (the turning resistance of the return spring becomes noticeable).



CAUTION

- ***Do not excessively turn the diaphragm (3)!***
- ▶ Position the liquid end (2) with the screws (1) onto the diaphragm (3) and the end disc (4) (the suction connection must show to the bottom in the later installation position of the pump)
- ▶ Loosely insert the screws (1) and then tighten crosswise (tightening torques see below).

Tightening torques for screws: 4.5 to 5 Nm

13 Repair



WARNING

Metering pumps may only be repaired by trained and authorised persons!

Customer service

Contact your competent customer service or your competent ProMinent branch or agency.

NOTE

Only return the metering pump for repair in a cleaned condition and with rinsed liquid end! If possible, please include a short description of the defect including conditions of use and operating hours!



WARNING

- ***Only return the metering pump for repair in a cleaned condition and with rinsed delivery unit! If despite thorough emptying and cleaning of the pump any safety precautions should be required, the necessary information must be listed in the Clearance! The Clearance is material part of the inspection/repair order. A maintenance or repair will only be made if the Clearance has been correctly and fully completed by authorised and qualified personnel of the operator. The form is enclosed in the annex or can be downloaded from www.prominent.com.***
- ***Pumps for radioactive media may not be shipped!***



14 Disposal of used parts

WARNING

Never dispose of the metering pump in the dustbin (domestic waste)! Plastics and mechanical parts are special waste and must be recycled!

*AbfG (Waste Avoidance and Waste Management Act),
AbfRestÜberwV (Ordinance on the Monitoring of Wastes and Residues)*

Wastes (used parts) are subject to a “controlled disposal to guarantee the welfare of the general public, in particular to guarantee environmental protection“. Used parts must thus be disposed of pursuant to the Waste Avoidance and Waste Management Act (AbfG) or recycled pursuant to the Ordinance on the Monitoring of Wastes and Residues (AbfRestÜberwV).

EC Declaration of Conformity

We,

**ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5 - 11
D - 69123 Heidelberg**

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.

Any modification to the product not approved by us will invalidate this declaration.

Product description : ***Metering pump, Series Pneumados***

Product type : ***PNDb...***

Serial number : ***see type identification plate on device***

Relevant EC regulations : ***EC - machine regulation (98/37/EC)***

Harmonised standards used, in particular ***EN ISO 12100-1, EN ISO 12100-2, EN 809, EN 12162, EN 13463-1***

Date/manufacture's signature : ***26.04.2007*** *Dr. Johannes Hartfiel*

The undersigned : ***Dr. Johannes Hartfiel, assistant development manager***

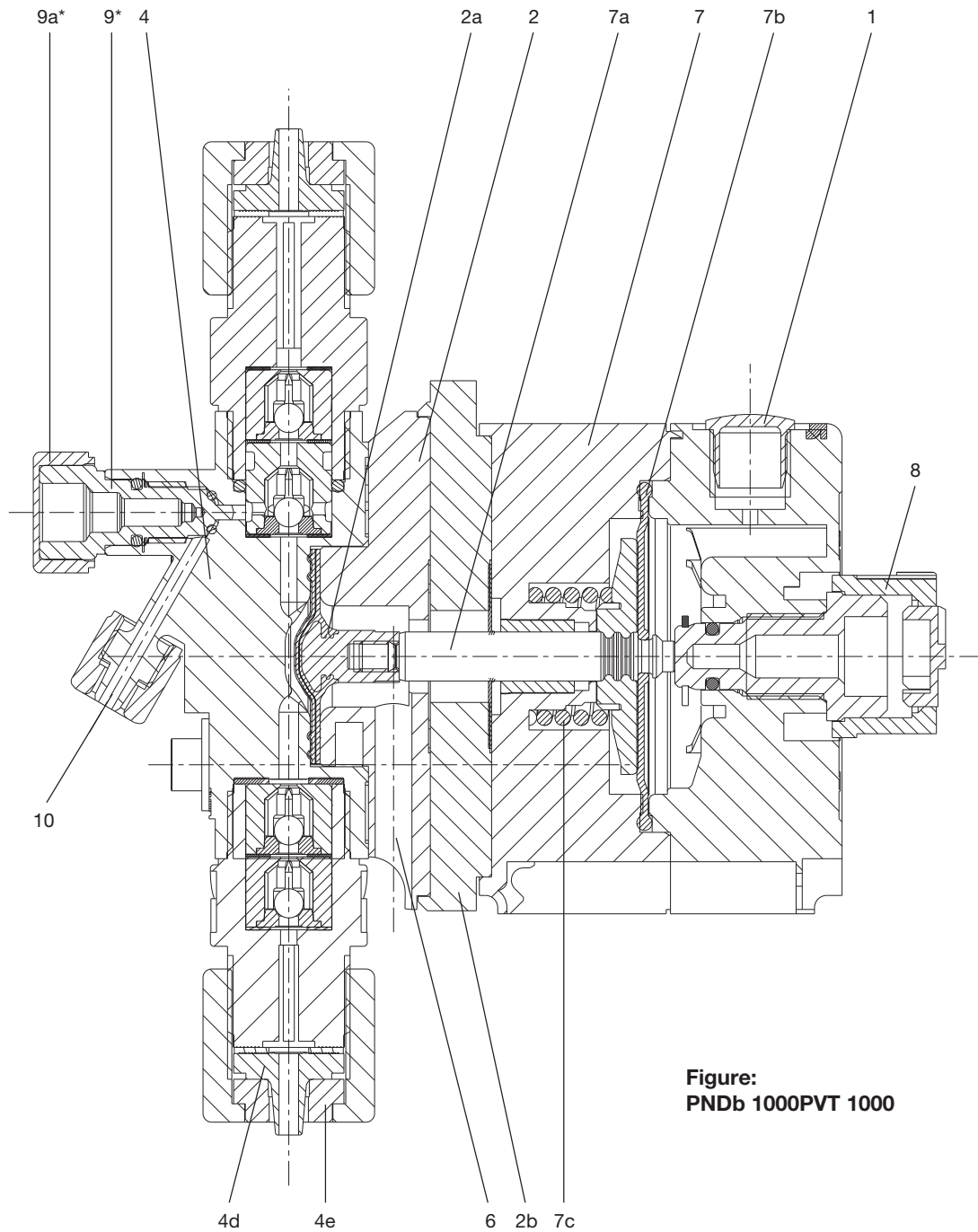


Figure:
PNDb 1000PVT 1000

- 1 Pneumatic connection
- 2 End disc
- 2a Metering diaphragm
- 2b End disc holder
- 4 Liquid end
- 4d Hose grommet
- 4e Clamping ring

- 6 Outlet opening
- 7 Pressure chamber
- 7a Drive axis
- 7b Pneumatic diaphragm
- 7c Pressure spring
- 8 Stroke length adjustment

- * Only for PV version:**
- 9 Vent valve with fine vent screw
 - 9a Star handle
 - 10 Bypass hose grommet

Safety declaration form

**A completed form must always be returned with the equipment!
This declaration must only be completed and signed by an authorized member of the technical staff!**

The equipment or its parts will only be repaired or serviced if it is accompanied by a correctly completed and signed safety declaration form. The work could be delayed if no form is returned.

Legally binding declaration

We hereby assure that:

1. The enclosed equipment

Type: _____

Serial No.: _____

is free from any

- toxic
- corrosive
- microbiological
- carcinogenic
- explosive
- radioactive substances
- or other substances that may be harmful to health.

2. The equipment was thoroughly cleaned before being shipped.

3. There is no hazard due to residual contamination.

4. The details given in this form are correct and complete.

Company / Institute: _____

Street: _____

Postcode, Town: _____

Tel: _____

Fax: _____

Surname, First name: _____

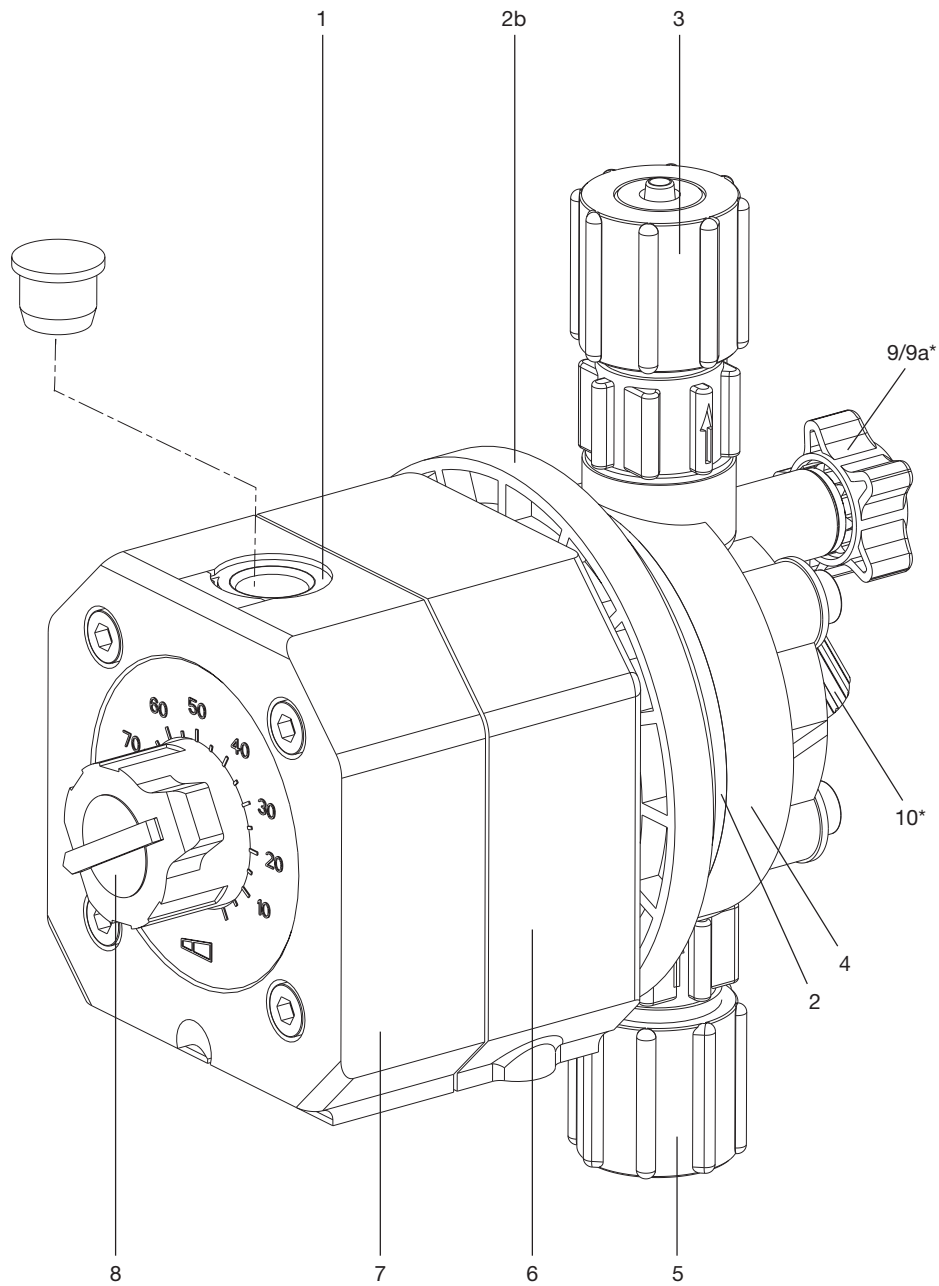
Position: _____

Date: _____

Legally binding signature

Company stamp

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- 1 Pneumatic connection with protective plug
- 2 End disc
- 2b End disc holder
- 3 Pressure valve
- 4 Liquid end
- 5 Suction valve
- 6 Discharge opening (covered) at the bottom of end disc

- 7 Housing with pressure chamber
 - 8 Stroke length adjustment
- * Only for PV version:**
- 9 Vent valve with fine vent screw
 - 9a Star handle
 - 10 Bypass hose grommet