

# Instruction Manual

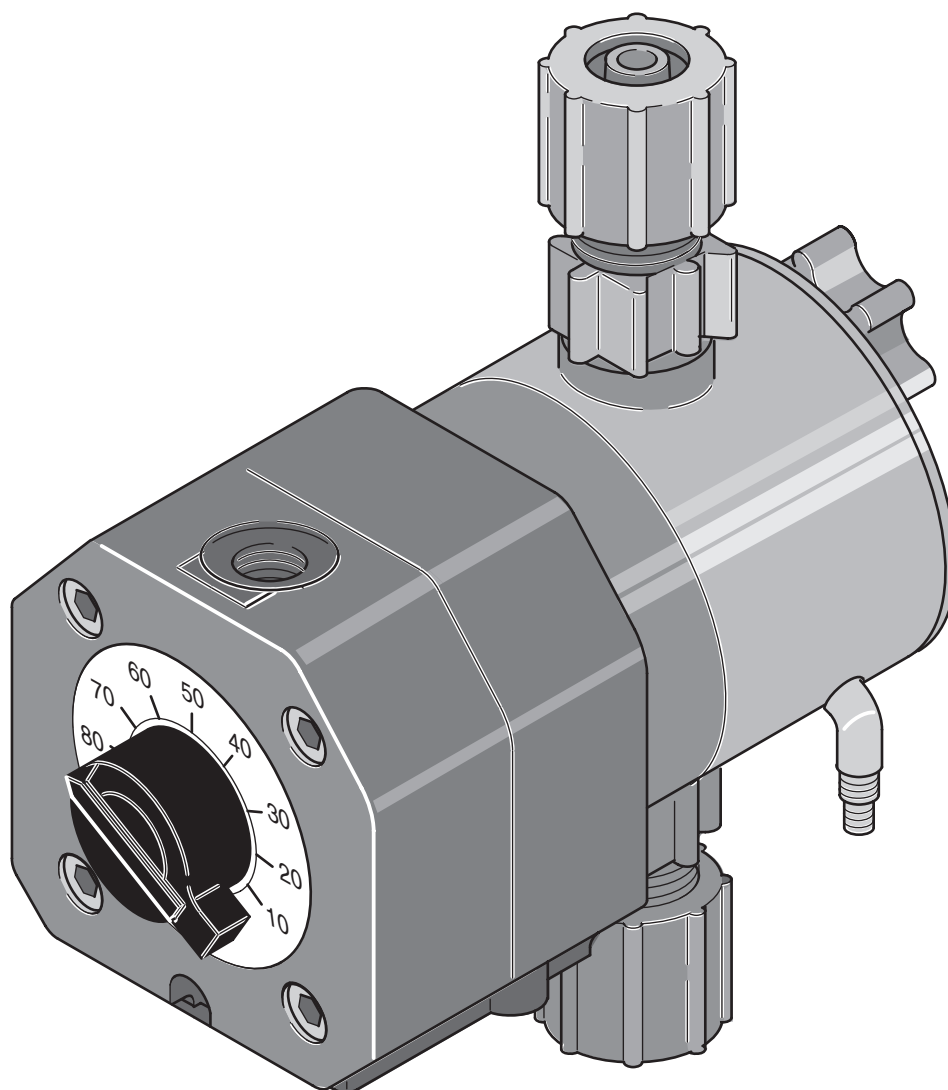
## Metering Pump

### ProMinent® Pneumados



ProMinent®

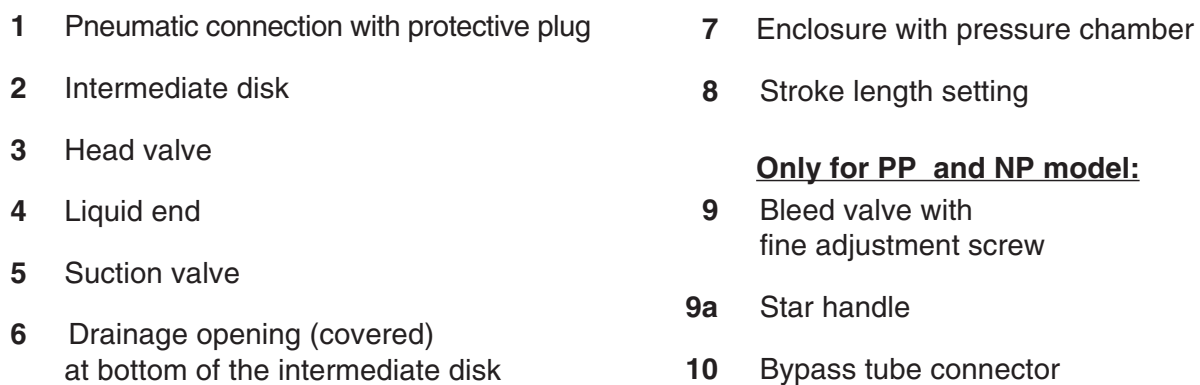
PNDa-001b-D



**Please first read this instruction manual from cover to cover! Do not throw away!**  
**If damages arise due to an operating fault the guarantee expires!**

BA PN 001 12/97 GB / Part no. 986602

PNDa-002-D



**Always unfold the page first! **

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Operating Instructions Pneumados metering pump

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Company address:

ProMinent Dosiertechnik GmbH

Im Schuhmachergewann 5-11

D-69123 Heidelberg, Germany

eMail: ProMOnent@t-online.de

P.O. box address:

ProMinent Dosiertechnik GmbH

P.O. box 101760

D-69007 Heidelberg, Germany

Subject to alterations

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# Table of Contents

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1	Introduction .....	4
2	Function .....	5
	2.4.1 Electrical-Pneumatic Control System .....	6
	2.4.2 Pneumatic Control System .....	7
3	Technical Data .....	8
4	Ancillary Equipment .....	10
<b>5</b>	<b>Safety Instructions .....</b>	<b>11</b>
6	Order Specifications (IDENTITY CODE) .....	12
7	Unpacking .....	12
8	Assembly Dimensions .....	14
9	Assembly / Installation .....	15
	9.1 Requirements for the Compressed-Air Network .....	15
	9.2 Assembly of the Metering Pump .....	15
	9.3 Pneumatic Connection .....	15
	9.4 Connection of the Suction and Discharge Lines .....	16
	9.5 Installation Examples .....	18
10	Operation .....	23
	10.1 Operation of SS and TT Versions .....	23
	10.2 Operation of PP and NP Versions .....	23
	10.3 Operation of the HV-model (PP4) .....	24
11	Maintenance .....	24
12	Trouble Shooting / Eliminating Faults .....	24
	12.1 Pump is Operating but there is no Metering .....	25
	12.2 Pump does not Prime in spite of Full Stroke Length and Air-Bleeding .....	26
	12.3 Discharge Stroke is not Fully Executed .....	26
	12.4 Fluid Leaks out at the Intermediate Disk .....	26
	12.5 Replacing the Metering Diaphragm .....	27
13	Repair .....	30
<b>14</b>	<b>Disposal of Old Parts .....</b>	<b>30</b>
15	Appendix / Pump Cross Section .....	31

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# Introduction

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## 1. Introduction

ProMinent Pneumados is a pneumatically actuated metering pump. In contrast to solenoid driven metering pumps, the discharge stroke is effected by a pneumatically actuated diaphragm and the suction stroke by the force of a spring.

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

*Discharge strokes* By means of external solenoid operated or pneumatically actuated compressed air valves, a stroking rate of up to 120 strokes per minute can be achieved.

*Stroke length* The stroke length and as a consequence, the capacity of the Pneumados can be varied between 10 and 100 %.

*Application areas* Typical uses are:

- Fodder treatment –  
metering and spraying with aroma substances
- Varnishing plants –  
metering of coagulators
- Greeneries –  
metering of fertilisers and minerals
- Car-wash-machines –  
for metering purifiers, gloss paint, shampoo, wax, driers as well as for processing recycling water, for dosing flocculents, ph-adjusters, foam and emulsion breakers
- in all plants with central control (e.g. PLC) and compressed-air-supply
- The following points must be observed in hazardous locations of zone 1 + 2 and 10 + 11:

**DANGER:**



***Metering pumps are to be installed and used in such a way that hazardous charging is avoided when correctly used. This applies equally to maintenance, cleaning and normal operating disturbances (see section 7.1.1 General Information from the Guidelines on "Static Electricity")!***

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# Function

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## 2. Function

*Capacity range* ProMinent Pneumados is a pneumatically actuated metering pump with a capacity range of 0.9 to 15 l/h at a maximum counterpressure of 16 to 1.5 bar.

*Compressed-air requirements* The compressed-air requirements amount to approx. 25 l/min at 6 bar, non-oiled compressed air preferred or also oiled compressed air.

### 2.1 Description of the Function

*Pressure stroke* By means of an external pneumatic valve, compressed air is admitted to the pressure chamber in the enclosure. As a result of this, a pneumatic diaphragm is deflected and the axial movement resulting from this is transferred to the metering diaphragm by means of a tappet. The metering diaphragm thus expels the metering fluid in strokes through the pressure valve out of the liquid end, and the balls on the suction side close.

*Suction stroke* After the pneumatic valve has switched over, the pressure chamber is relieved of pressure, and the tappet with the metering diaphragm is returned to the initial position by means of a spring. In this way, the fluid is sucked into the liquid end by 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 constant max. stroking rate of 120 strokes/min.

The discharge stroke is set in a range from 10 to 100 % by means of a stroke length setting **(10)**. The max. stroke length is 1.25 mm.

**PLEASE NOTE:**

*Settings should only be made when the pump is running when the setting pin of the discharge stroke is momentarily relieved!*

### 2.3 Liquid End

The Pneumados metering pump is equipped with original ProMinent gamma/4 liquid ends of the 1601 to 0215 series.

*Materials liquid end* The liquid end with double ball valves in the suction and pressure valve is available in the following materials:

- PP = polypropylene
- NP = Plexiglas/PVC
- TT = PTFE
- SS = stainless steel (material number 1.4571)

The Developan metering diaphragm has a PTFE layer.





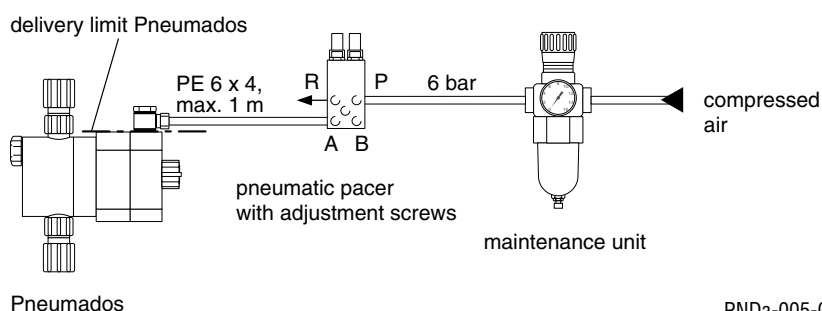
# Function

Technical data of the electrical-pneumatic control:

<i>Electrical control</i>	Via pacer – Pacer control from PLC control system or pacing relay with pulse duration of approx. 250 ms, e.g. flashing relay, can be set from 0.1 to 1 s, 230 V/50 to 60 Hz, type IK 7816
<i>Pneumatic drive</i>	Via 3/2-way solenoid valve, e.g. type 311 C
<i>Operational method</i>	Relieved in rest position
<i>Nominal width</i>	2,5 mm
<i>Nominal flow</i>	175 l/min
<i>Line connection</i>	G 1/8"
<i>Pressure range</i>	6 (10) bar
<i>Switching times</i>	20 ms

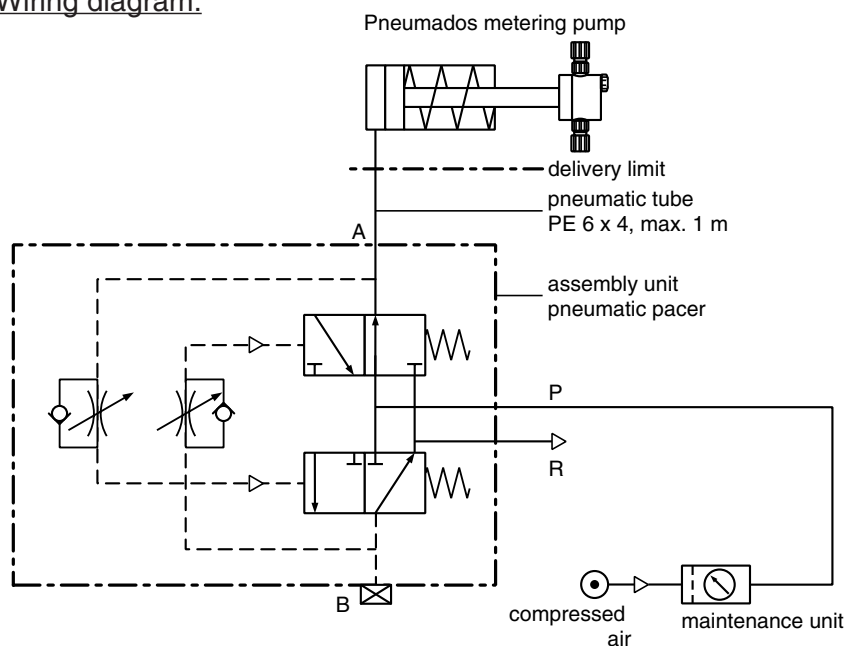
## 2.4.2 Pneumatic Control System

### Configuration:



PNDa-005-GB

### Wiring diagram:



✱ - setting valve for pacing rate

B - connection for second Pneumados, for metering in push-pull action

PNDa-006-GB

## Function / Technical Data

A pneumatic pacer valve directly drives the metering pump with compressed air. The pacing rate can be infinitely set.

At a max. stroking rate of 120 strokes per min  $\hat{=}$  500 msec per discharge stroke, the switch-on time (discharge stroke) and the switch-off relief time (suction stroke) are each to be set at approx. 250 msec. For this purpose both control screws are first closed and then opened equally so wide until the maximum pacing frequency of 120 strokes/min is reached.

For reducing the stroking rate the switch-off time (pause time) is extended.

### 3. Technical Data

**PLEASE NOTE:**

*Due to the air pressure present, the length of the compressed air line and configuration of the control system, slight deviations in the capacity can arise!*

<i>Pneumados pump type <b>PND a</b></i>	<b>1601</b>	<b>1201</b>	<b>0703</b>	<b>1002</b>	<b>0308</b>	<b>0215</b>	–
<i>Pneumados pump type <b>HV</b> for highly viscous media</i>	–	–	–	–	–	–	<b>1002</b>
<i>Capacity at maximum counterpressure in bar</i>	16	12	7	10	3	1.5	10
<i>...in l/h</i>	0.90	1.55	3.40	2.09	7.78	14.80	2.09
<i>...in ml/stroke</i>	0.125	0.215	0.47	0.29	1.08	2.05	0.29
<i>Capacity at average counter pressure in bar</i>	8	6	3.5	5	1.5	1	5
<i>...in l/h</i>	1.17	1.80	3.67	2.81	8.50	15.80	2.81
<i>...in ml/stroke</i>	0.16	0.25	0.51	0.39	1.18	2.20	0.39
<i>Suction height in mWC</i>	6	6	3	6	6	1.5	6
<i>Attainable suction pressure in bar abs. (NPSH required)</i>	0.3	0.3	0.7	0.3	0.4	0.85	0.3
<i>Permissible admission pressure on the suction side in bar</i>	9	8	6	7	2	1	7
<i>Connection size exterior Ø x interior Ø in mm</i>	6 x 4	6 x 4	6 x 4	8 x 5	8 x 5	12 x 9	DN 10
<i>Connection size (stainless steel) exterior Ø x interior Ø in mm</i>	6 x 5	6 x 5	6 x 5	8 x 7	8 x 7	12 x 10	–
<i>Shipping weight (PP/NP/TT-SS) in kg</i>	1-1.7	1-1.7	1-1.7	1.2-2.4	1.2-2.4	1.2-2.4	1.7

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## Technical Data

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<i>Filtered compressed air</i>	6 bar $\pm$ 10 %
<i>Air consumption</i>	max. 25 l/min
<i>Air consumption at 1 m feed line</i>	35 l/min
<i>Pulse duration</i>	250 ms
<i>Stroking rate</i>	max. 120 strokes/min

<i>Media-contacted materials for version</i>	PP1	PP2	PP4 <sup>1)</sup>	NP1	TT1	SS...
<i>Liquid end</i>	Polypropylene	Polypropylene	Polypropylene	Plexiglas	PTFE with carbon	Stainless steel <sup>2)</sup>
<i>Suction/pressure connection</i>	Polypropylene	Polypropylene	Polypropylene	PVC	PTFE with carbon	Stainless steel <sup>2)</sup>
<i>Seals</i>	EPDM	Viton	EPDM	Viton	PTFE	PTFE
<i>Balls</i>	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic

<sup>1)</sup> PP4 with valve springs of Hast. C

<sup>2)</sup> material no. 1.4571

Developan® metering diaphragm with PTFE layer.

Plexiglas® (NP), Viton® (fluororubber) and Duran® (laboratory glass) are registered trademarks.

<i>Reproducibility, Metering accuracy</i>	$\pm$ 2 % under constant conditions, minimum counterpressure 1 bar, stroke setting 30 to 100 % and medium similar to water for short time intervals
<i>Permissible deviation of capacity for all material versions</i>	-5 % ... +15 %
<i>Permissible ambient temperature</i>	-10 °C to +50 °C
<i>Permissible media temp. for PP</i>	60 °C
<i>Permissible media temp. for NP</i>	45 °C
<i>Permissible media temp. for TT/SS</i>	80 °C, max. 6 bar

# Ancillary Equipment

## 4. Ancillary Equipment

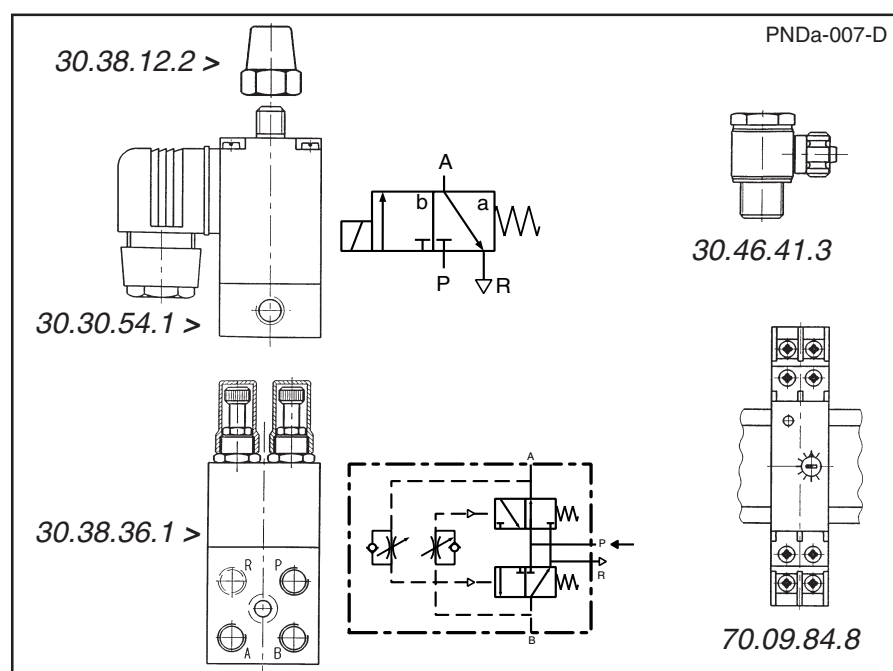


### **WARNING:**

***Assembling ProMinent metering pumps with other parts which have not been tested and recommended by ProMinent is prohibited and can lead to personal injury and damage to property for which no liability will be accepted!***

- O. no. 35.46.41.3 Compressed-air connection union for Pneumados 1/4 A - 6 mm from anodised aluminium with seals, revolving, quick-release union LCK 1/4"
- O. no. 30.30.54.1 3/2-way pneumatic solenoid valve 1/8", 220 V /50 Hz/21 VA
- O. no. 30.38.12.2 Sound absorber of sintered bronze with 1/8" internal screw thread for solenoid valve
- O. no. 35.46.35.5 Connection union 1/8A - 6 mm for the control valves with seal, quick-release union CK 1/8" >not illustrated<
- O. no. 70.09.84.8 Electric pacer for assembly in protective enclosure on top hat rail according to DIN 50022, stroking rate adjustable 30 to 120 strokes/min, electrical connection 230 V/50-60 Hz/3.5 VA, switching capacity max. 3 A, adjustable flashing relay
- O. no. 30.38.36.1 Pneumatic pacer with mechanical throttle units (e.g. FESTO pacer type 4025 VLG-4-1/8")
- O. no. 46.79.21.3 Vent plug 1/8 A with seal for pneumatic pacer, breech screw 1/8" >not illustrated<
- O. no. 03.72.05.2 Suction and discharge line as well as compressed-air line of PE 6x4 mm >not illustrated<
- .....\* Foot valve with strainer and ball check valve >not illustrated<
- .....\* Injection valve with ball check valve >not illustrated<
- O. no. 79.06.05.0 Floor and wall mounting bracket for Pneumados metering pump >not illustrated<

\* Order number for size and material: see catalogue!



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# SAFETY INSTRUCTIONS

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## 5. Safety Instructions



**WARNING:**

*Pumps must always be accessible for operation and maintenance!*



**WARNING:**

*Pneumados metering pumps can be admitted with a maximum operating pressure of 8 bar. Appropriate measures must be carried out to ensure that this pressure is not exceeded - if necessary by switching a safety valve or pressure relief valve in series before the pump!*



**WARNING:**

*For maintenance and repair work when dangerous or unknown fluids are used, always rinse the liquid end first!*



**WARNING:**

*When metering dangerous or unknown fluids, protective clothing (glasses, gloves) must be worn when working on the liquid end!*



**WARNING:**

*Before working on the pump, first switch off the pump control and close the compressed-air line!  
Always relieve the discharge line of pressure!  
Always empty the liquid end and rinse!  
Observe the safety data sheets of the metering fluid!*



**DANGER:**

*(when installed in ex-proof areas)*

*Metering pumps are to be installed and used in such a way that hazardous charging is avoided when correctly used. This applies equally to maintenance, cleaning and normal operating disturbances (see section 7.1.1 General Information from the Guidelines on "Static Electricity")!*

**CAUTION:**

*Settings should only be made when the pump is running when the setting roller pin of the discharge stroke is momentarily relieved!*

**PLEASE NOTE:**

*Only use the specified grippers and tube connectors for the respective tube diameter, as well as original tubes with specified tube dimension and wall thickness, otherwise the durability of the connection is not guaranteed!*

*Reductions of the tube sizes should be avoided!*

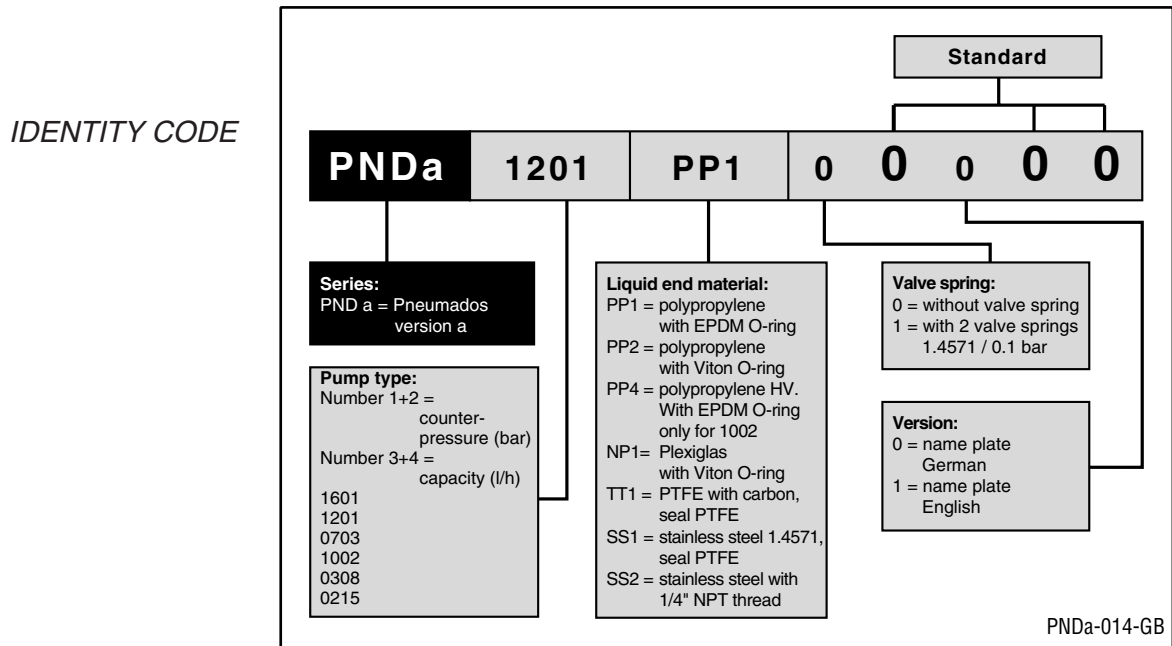
*For long lines and viscous media the next higher line diameter or a pulsation dampener should be used!*

# Specifications / Unpacking

## 6. Order Specifications

The following table provides an overview of pump features which can be ordered using the IDENTITY CODE.

The series, counterpressure, capacity, liquid end material, valve springs and name plate in German or English can be selected. The following diagram shows a random example.



## 7. Unpacking

### **CAUTION:**

*Polystyrene parts are detrimental to the environment and may not be mixed with domestic refuse!*

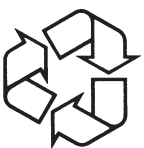
*It is best if you keep secondary packaging complete with the polystyrene parts so that you can send the probes and ancillary equipment back in case of repair or guarantee cases!*

First compare the delivery note with the contents of the package.

### **CAUTION:**

*Check if the specifications on the name plate match your order specifications!*

***If they do not please contact the ProMinent subsidiary or representative responsible for you immediately (addresses can be found at the back of this instruction manual)!***



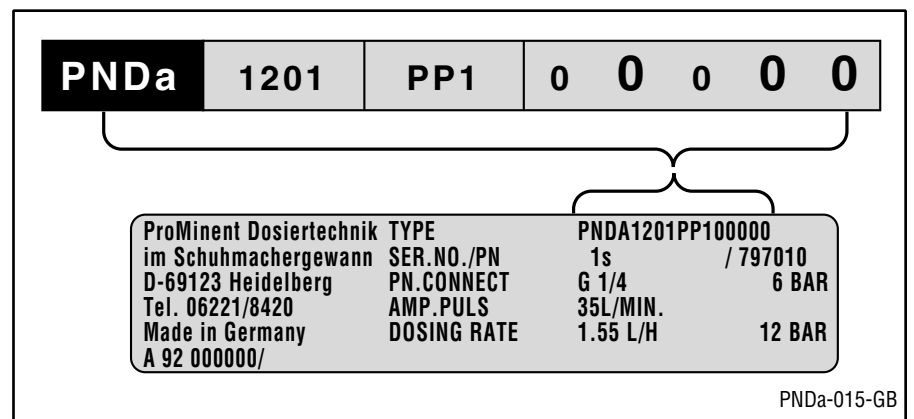
Polystyrene parts

Secondary packaging

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## Unpacking

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Every Pneumados metering pump is provided with a name plate.

In addition to the main technical data the IDENTITY CODE and the series number are specified. These two numbers are to be used for every query and when ordering spare parts as they enable a clear identification of the pump type and the material variants.

Please make a note of the following details of the pump delivered so that these details are always available when needed:

*IDENTITY CODE*

\_\_\_\_\_

*Series number*

\_\_\_\_\_

*Installation location*

\_\_\_\_\_

\_\_\_\_\_

*Metering application*

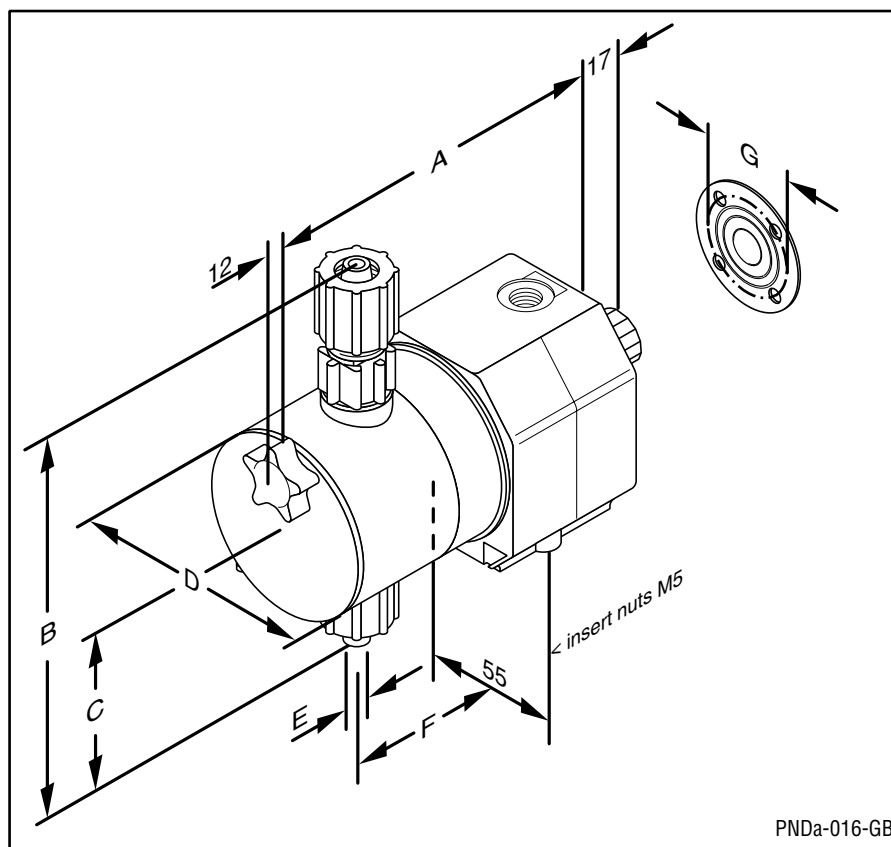
\_\_\_\_\_

*Commissioning*

\_\_\_\_\_

# Assembly Dimensions

## 8. Assembly Dimensions



PNDa-016-GB

		A	B	C	D	E	F	G
<b>1601, 1201</b>	PP	125	130	41	70	6 x 4	52	38
	NP	123	123	39	70	6 x 4	52	38
	TT	107	116	32	60	6 x 4	50	38
	SS	105	107	23	60	6 x 5	50	38
<b>0703</b>	PP	125	130	41	70	6 x 4	52	38
	NP	123	123	39	70	6 x 4	52	38
	TT	107	121	37	70	6 x 4	50	38
	SS	105	112	28	70	6 x 5	50	38
<b>1002, 0308</b>	PP	119	130	40	70	8 x 5	47	50
	NP	117	130	46	85	8 x 5	47	50
	TT	110	149	65	80	8 x 5	50	50
	SS	108	149	65	80	8 x 7	48	50
<b>0215</b>	PP	119	140	51	90	12 x 9	47	66
	NP	117	138	54	100	12 x 9	47	66
	TT	110	159	70	95	12 x 9	50	66
	SS	108	152	68	95	12 x 10	48	66
<b>1002 HV</b>	PP4	108	115	61	70	DN10	48	50



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# Assembly / Installation

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## 9. Assembly / Installation

### 9.1 Requirements for the Compressed-Air Network

*Compressed air* As for all pneumatic modules, the Pneumados metering pump should also be operated with clean and dry 6 bar compressed air. In addition to this, a pressure reducer should be switched in advance which guarantees a constant air pressure of 6 bar  $\pm 10\%$ .

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

All parts in contact with compressed air are resistant to oil, however after a long period oil can accumulate in the pump enclosure. This oil can be removed by blowing it out if necessary.

In order to avoid pressure deviations and condensation water, the maintenance unit should be located as near to the pump as possible.

### 9.2 Assembly of the Pneumados Metering Pump

Mount the metering pump on a container or mounting bracket with two screws M5 and 2 plain washers  $\varnothing 5$  mm. The valves must always be in a vertical position to guarantee they function smoothly.

Attach the metering pumps in such a way that the suction height or the length of the suction line is kept as short as possible to increase the operational safety.

### 9.3 Pneumatic Connection

Remove protective plug **(1)** at the top of the metering pump enclosure and check if the sealing surface is clean.

Insert compressed-air connection union with seal, set the direction and fasten. As a replacement a standard union (connection 1/4" for 6x4 mm tube) can be used.

Connect a compressed-air tube 6x4 mm to the pump valve and pneumatic valve; keep the length of the tube as short as possible. For a longer distance (up to max. 1 m) the metering capacity is reduced up to 15 % and the air consumption increases from 25 to 35 l/h at a stroking rate of 120 strokes per minute.

**CAUTION:**

*The pneumatic tube may not be bent!*

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## Assembly / Installation

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### 9.4 Connection of the Suction and Discharge Lines

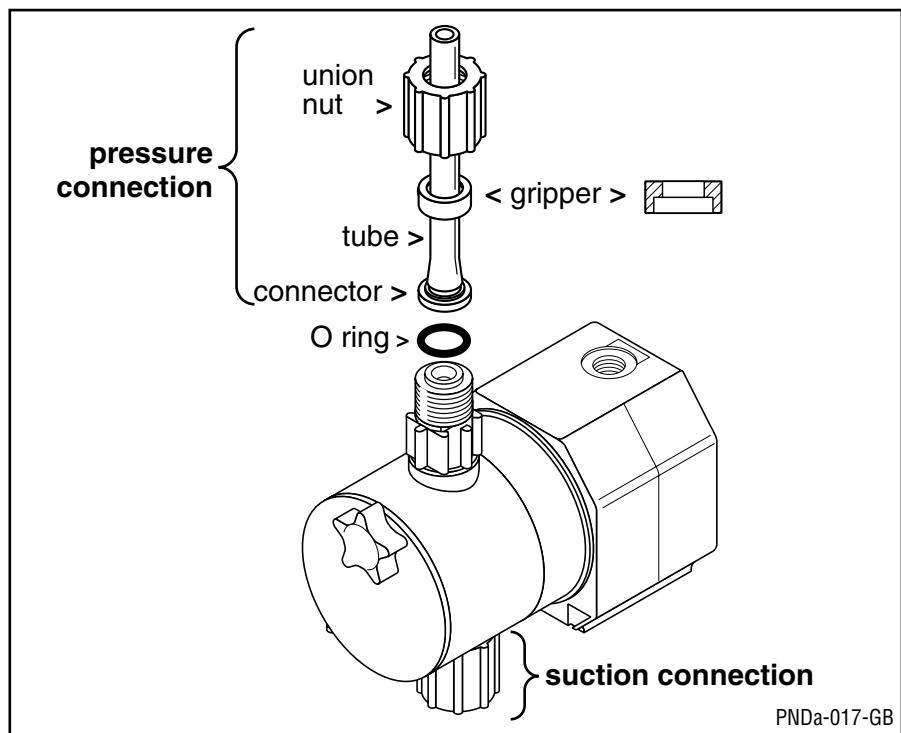
If the suction/pressure connection (5/3) of the liquid end (4) is closed with a plug remove this.



**WARNING:**

*The liquid end of the metering pump may still contain water left over from factory tests!*

*For media which may not come into contact with water, the liquid end must be emptied of the water before commissioning! For this purpose, turn the pump 180° and empty the liquid end. Then rinse from the top via the suction connection with a suitable solution!*



*Tube connection* Attach the tube to the suction/pressure connection (5/3) as follows:

- Push the gripper and union nut over the tube
- Widen somewhat the end of the tube of the angularly cut tube and push fully over the connector
- Insert O ring or flat seal and tighten the union nut
- Now pull briefly at the tube and tighten the union nut again.

**PLEASE NOTE:**

*Only use the specified grippers and tube connectors for the respective tube diameter as well as original tubes with specified tube dimension and wall thickness, otherwise the durability of the connection is not guaranteed!*

*Reductions of the tube sizes should be avoided.*

*For long lines and viscous media the next higher line diameter or a pulsation dampener should be used!*

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## Assembly / Installation

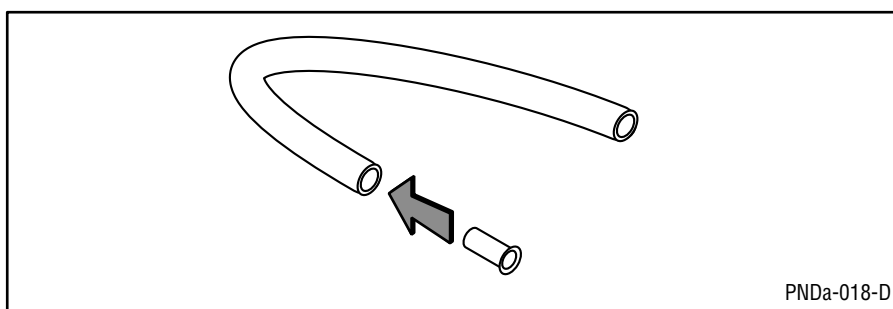
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### *Stainless steel pipe connection*

- For stainless steel connections push on the union nut and gripper onto the pipe with about 10 mm projecting at the end
- Insert the pipe into the valve until the stop
- Initially tighten the union nut with your fingers
- For the **initial assembly** of the union nut then tighten 1 1/4 revolutions tighter
- Tighten 1/4 revolution again for **reassembly**.

### *Connection of PE/PTFE lines and stainless steel valves*

- For the connection of PE/PTFE lines additionally insert ferrule of stainless steel in the plastic line.



*O.no. 35.93.65.4*

Ferrule for tube 6x4 mm

*O.no. 35.93.66.2*

Ferrule for tube 8x5 mm

*O.no. 35.93.68.8*

Ferrule for tube 12x9 mm

### *Suction line*

Now shorten the free suction line end so far that the foot valve mounted hangs just above the bottom of the container – for metering fluids with impurities or feculance at least 50 mm above the bottom of the container.

### **CAUTION:**

*Always shorten the suction line to the measurement needed and lay so it is ascending!*

### *Bypass tube*

For material version "PP" and "NP", a bleed valve **(9)** is present. In this case the tube with an interior diameter of 4 to 5 mm must be fastened onto the bypass tube connector **(10)** and the other end of the tube must be led back to the metering container; preferably use PVC soft 6x4 mm.

For PE lines this is to be secured against slipping for example by using a cable quick-binder.

In this case connect the discharge line immediately at the pressure connection and injection valve.

Open the bleed valve **(9)** anti-clockwise with one turn of the star handle, now the passage for the coarse intake bleeding via the bypass is free.

For liquid ends without bleed valve only connect the discharge tube to the liquid end however not at the injection valve!

# Assembly / Installation

## 9.5 Installation Examples

### Individual elements:

- 1 Metering pump
- 2 Chemical tank
- 3 Foot valve with strainer and ball check valve
- 4 Spring-loaded injection valve
- 5 Back-pressure valve type DK (liquid end assembly)
- 6 Back-pressure valve type DL (assembly in discharge line)
- 7 Accumulator/pulsation dampener
- 8 Solenoid valve (closed when pump is at a standstill)
- 9 Drainage valve
- 10 Aeration valve
- 11 Isolating valve

### **IMPORTANT:**

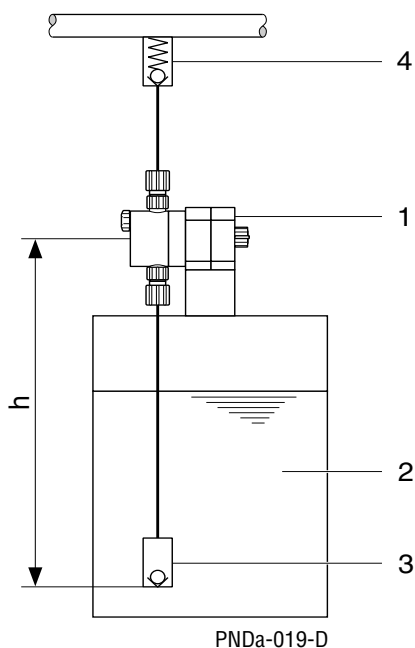
*height (h) x density ( $\delta$ )      max. suction in mWC!*

*Pneumados pump type PNDa  
suction lift in mWC*

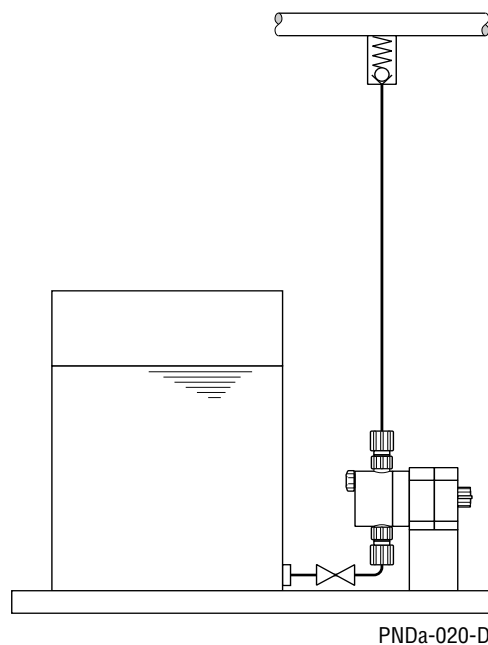
1601	1201	0703	1002	0308	0215
6	6	3	6	6	1.5

### 9.5.1 Correct Installation Procedure

#### 1) Standard installation



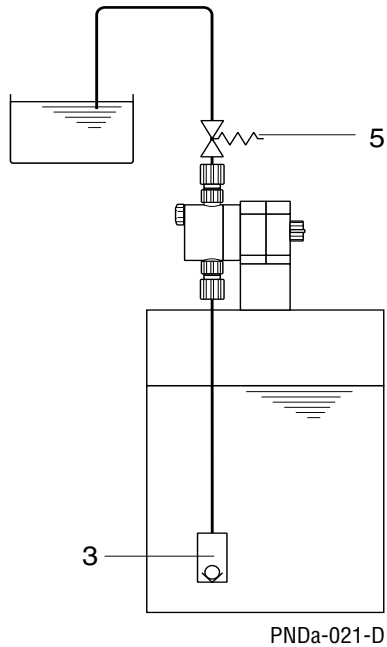
#### 2) For metering fluids emitting gases



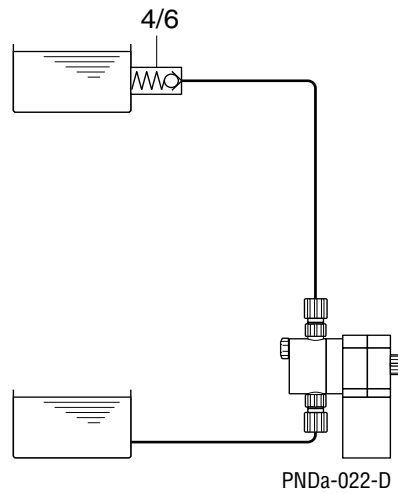
For fluids which emit gases strongly such as hydrogen peroxide  $H_2O_2$  or chlorine bleaching alkali  $NaOCl$  operation with a positive suction head is recommended!

## Assembly / Installation

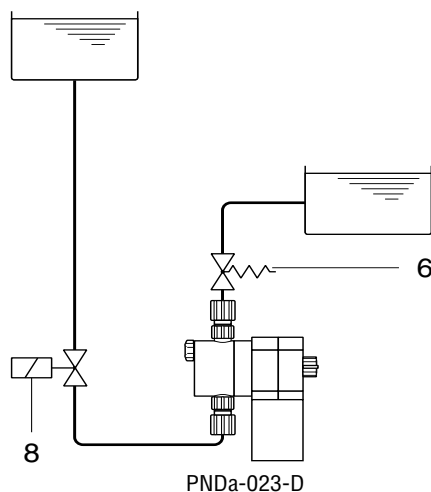
3a) Metering for atmospheric discharge and low head



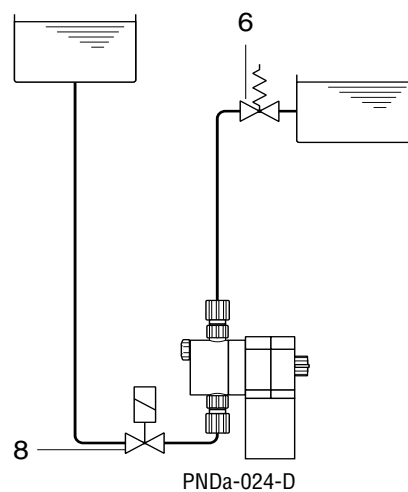
3b) Metering for atmospheric discharge and large head



4a) Response pressure on the suction side and low head



4b) Response pressure on the suction side and large head

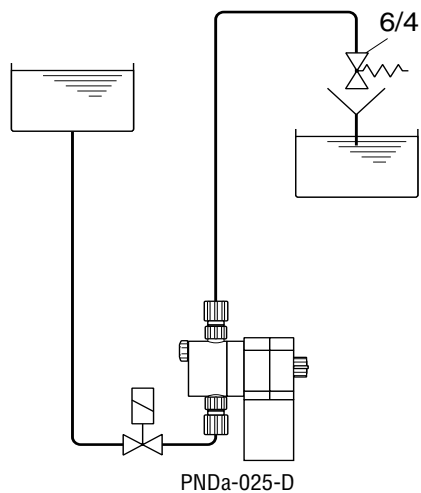


In the event of response pressure on the suction side and atmospheric discharge on the pressure side, an adjustable back-pressure valve must be fitted in the discharge line!

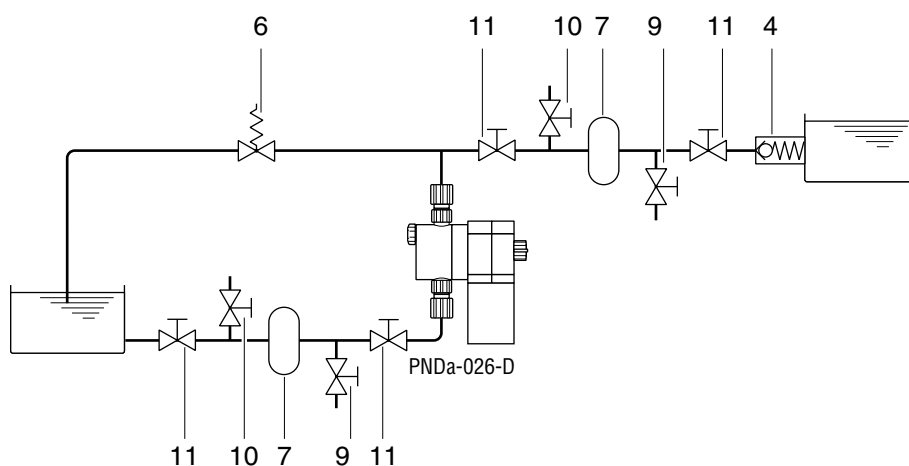
In addition provide an isolating valve e.g. solenoid valve in the suction line.

## Assembly / Installation

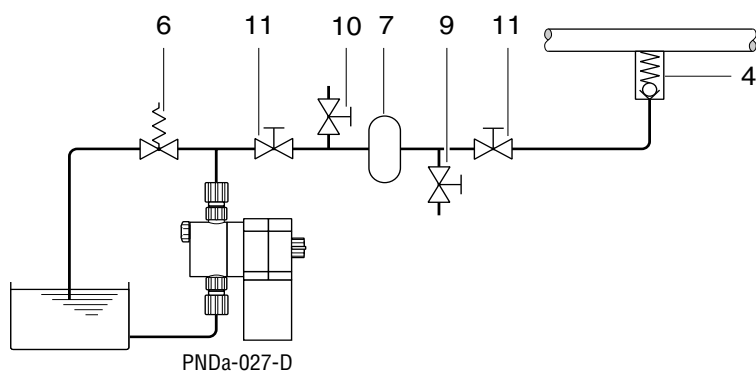
### 5) Installation to safely prevent siphoning of hazardous media



### 6a) Suction chamber and accumulator with long lines

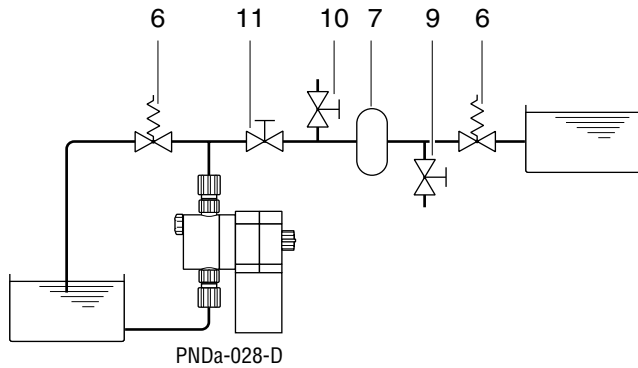


### 6b) Accumulator for pulsation-free metering in discharge lines

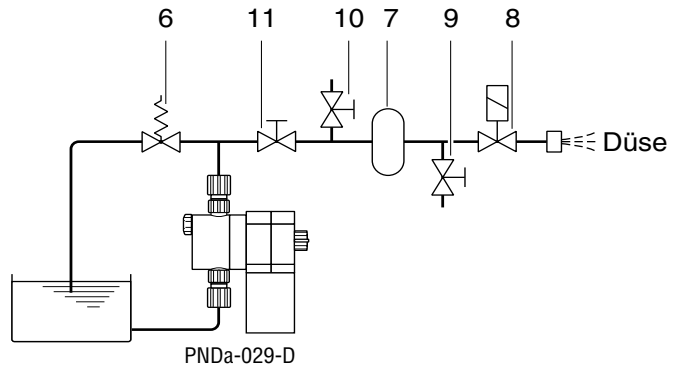


# Assembly / Installation

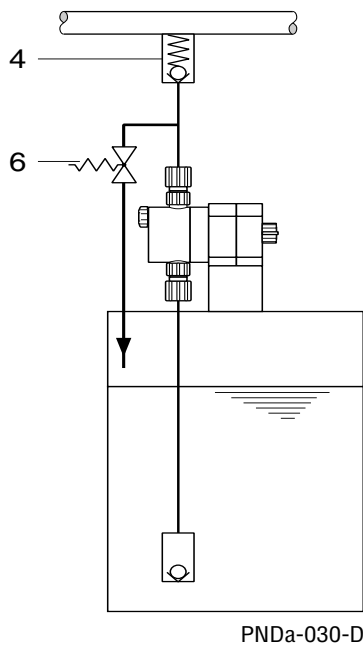
## 6c) Discharge into an atmospheric system



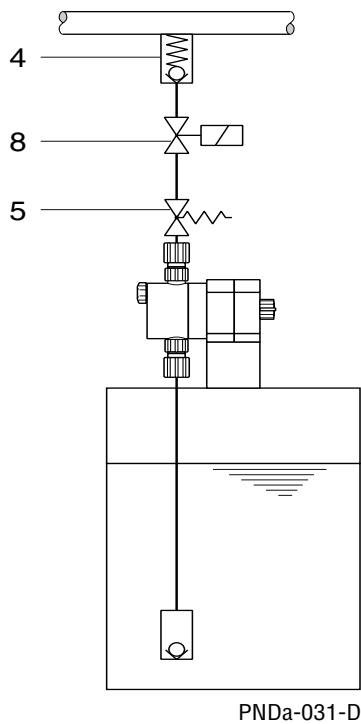
## 6d) For pulsation-free metering without overfeeding



## 7) Protection against excess pressure



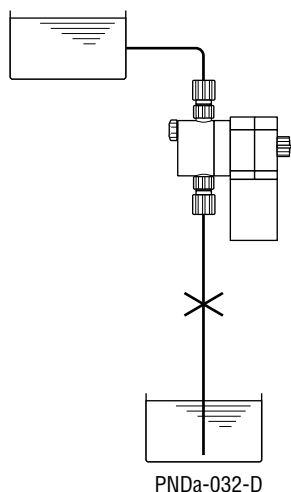
## 8) Discharge into a vacuum



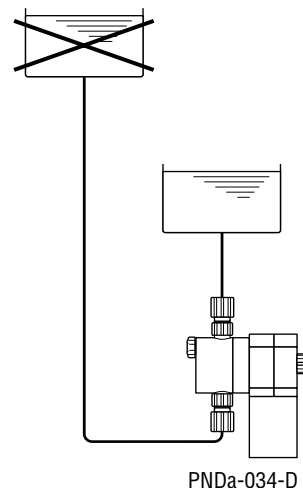
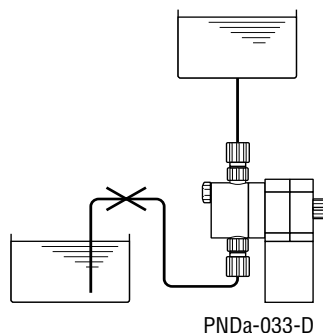
# Assembly / Installation

## 9.5.2 Faulty installations

9) Suction line too high

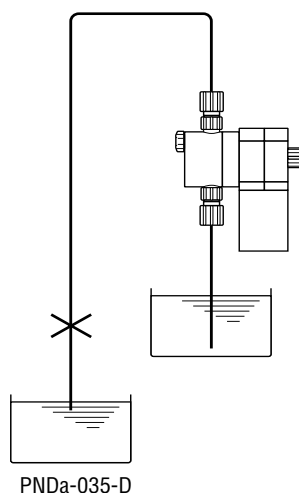


10) Suction line cannot be air-bled 11) Free passage

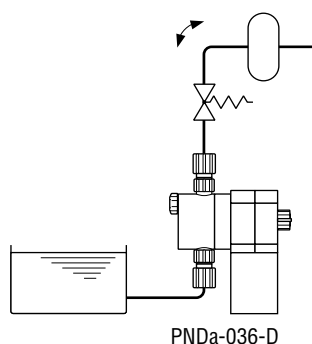


Do not lay the suction line in loops as otherwise air bubbles remain in the suction line which could lead to a stoppage of the metering!

12) Siphoning effect



13) Accumulator ineffective



If the metering point is below the chemical supply tank, an adjustable back-pressure valve and an isolating valve must be provided in the discharge line!



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# Operation

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## 10. Operation

### 10.1 Operation of SS and TT Versions

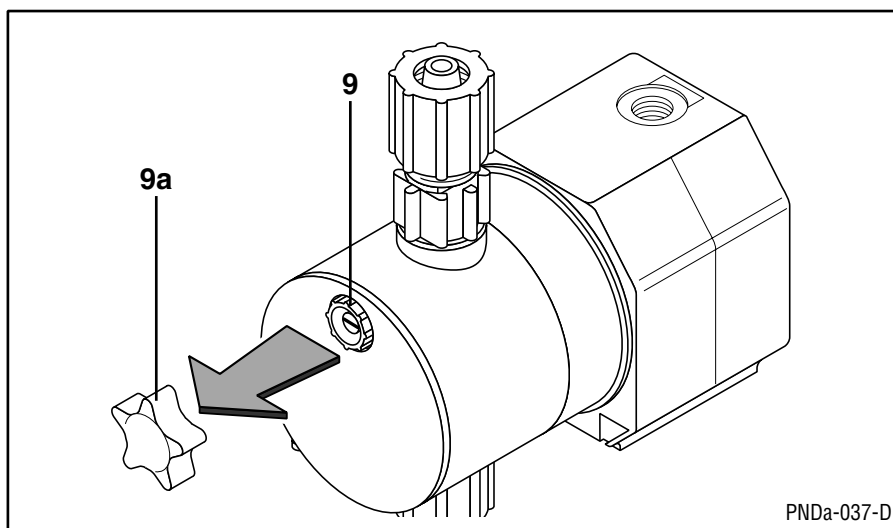
- Operate the metering pump with stroke length 100 % and pressure-free discharge line by compressed-air pacing until the media has completely filled the liquid end free of bubbles. This is recognised when the media becomes visible in the bleed line or discharge line or is expelled out of the discharge line.
- Now fasten the discharge line to the injection valve.

### 10.2 Operation of PP and NP Versions

- Operate the metering pump with stroke length 100 % and opened bleed valve **(9)** by compressed-air pacing until the media has completely filled the liquid end free of bubbles. This is recognised when the media becomes visible in the bleed line or discharge line or is expelled out of the discharge line.
- Now close the bleed valve **(9)**.

For media which has a tendency to emit slight gases, for liquid ends with bleed valve **(9)** the fine adjustment can be constantly set:

- For this purpose after pulling off the star handle **(9a)** the screw found inside the bleed valve **(9)** is opened approx. 1 turn in an anti-clockwise direction.



- As a result a certain quantity of the metering fluid is led back to the supply container.
- The feedback quantity should be about 20 % of the metering quantity
- All media have to be of low viscosity without any solid matters.

### 10.3 Operation of HV-model (PP4)

- For long suction and dosing-lines use fittings with minimum flow resistance, e.g. elbows instead of right-angled joints, insert pulse-dampers near the dosing pump, use larger-bore pipework etc.
- On first starting the pump, the valves and valve-springs may be still dry making removal of air and suction of liquid difficult. For this reason choose the shortest possible suction-lift or de-aerate the dosing head by applying pressure on the suction side. If this is not successful we recommend the following procedure: unscrew pressure connector, push back the O-ring mounting and fill the dosing head with water, or other suitable liquid. Then assemble the pressure connector without the valve spring, attach a short PVC hose (approx. 100 mm) onto the hose nozzle and half-fill with water. Set pump to maximum stroke length and activate until dosing is detected in the hose. Replace the valve spring. When operating the pump at low capacities, it is recommended that the frequency is lowered and a long stroke-length retained. To prevent the spring from jamming at this point, place a rod of approx. 4 mm diameter through the pressure valve to retain the spring in the central position. Re-connect dosing pipe. The pump is ready to operate.
- When operating the pump at low capacities, it is recommended that the frequency be lowered and a long stroke-length retained.



**WARNING:**

***These measures do not guarantee an absolutely reliable metering after stoppage of the pump!  
A routine examination is necessary!***

## 11. Maintenance



**WARNING:**

***Metering pumps and their peripheral equipment may only be serviced by correctly trained authorised persons!***

The maintenance for Pneumados metering pumps is limited to checking the metering performance, that there are no leaks from the liquid end and the compressed-air connection as well as the compressed-air supply in accordance with the requirements on location.

## 12. Troubleshooting / Eliminating Faults

Faults which you can eliminate yourself or minor repairs which you can carry out yourself.

**PLEASE NOTE:**

***In order to be able to correct small breakdowns at any time, we recommend always having a set of spare parts consisting of diaphragms, valves, balls and seals and a set of seals available.***

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## Troubleshooting / Eliminating Faults

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### **PLEASE NOTE:**

*The order numbers for these can be found in our product catalogue under the heading „Spare part kits for gamma/4“!*



### **WARNING:**

***For maintenance and repair work when dangerous or unknown fluids are used, always rinse the liquid end first!***



### **WARNING:**

***When metering dangerous or unknown fluids, protective clothing (glasses, gloves) must be worn when working on the liquid end!***



### **WARNING:**

***Before working on the pump, first switch off the pump control and close the compressed-air line!***

***Always relieve the discharge line of pressure!***

***Always empty the liquid end and rinse!***

***Observe the safety data sheets of the metering fluid!***

### **12.1 Pump is Operating but there is no Metering.**

*Possible reason:* Accumulation of air in the liquid end

*Remedy:*

- Bleed liquid end
- Place stroke length setting **(8)** to 100 % and then stop the pump
- For the PP and NP versions open the screw in the inside of the bleed valve **(9)** by turning once to the left
- For TT and SS versions remove the discharge line at the injection valve
- Now allow the metering pump to operate for approx. 5 to 10 discharge strokes or so long until metering takes place for every stroke
- With the pump running, set the stroke length **(8)** required and check that the metering continues
- Close bleed valve **(9)** or discharge line at the injection valve
- On the basis of the installation examples and information >**pages 18 to 22**<, check whether installation conditions are correct
- Check if the union nut of the suction line, valves and screws are tightened in the liquid end
- Check that the suction line is laid ascending.

*Possible reason:* The additionally switched fine adjustment screw does not function because the ar-bleed bore (Ø 1.0 mm) is blocked.

*Remedy:*

- Take the star-handle **(9a)** and open fine adjustment screw with approx. Two turns anti-clockwise until the blockage is rinsed out.
- If this is not successful, demount bleed valve and fine adjustment screw and clean all parts incl. the bores.
- After this remount the bleed valve and reset to the original setting.

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## Troubleshooting / Eliminating Faults

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### 12.2 Pump does not Prime in spite of Full Stroke Length and Air-Bleeding

*Possible reason:* Crystalline deposits due to the valves drying out

- Remedy:*
- Remove the suction line from the chemical tank and rinse out the liquid end well
  - Possibly reduce the suction lift or support the initial priming by elevating the chemical tank with suction line filled
  - The metering fluid can also be sucked in by means of a disposable syringe applied at the pressure valve
  - If there is no improvement the valves should be disassembled and cleaned
  - The valve deposit in the suction and discharge valve can be pushed out by means of a punch with a diameter of 3 mm.

### 12.3 Discharge Stroke is not Fully Executed although 6 bar Air Pressure is Applied.

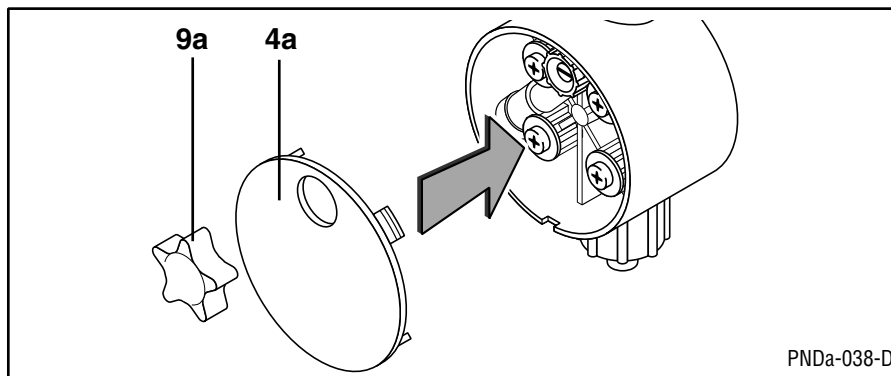
*Possible reason:* Oil has accumulated in the pressure chamber of the enclosure

- Remedy:*
- Drain pressure chamber.
  - In order to do this, turn the pump by 180° until the compressed-air connection is facing downwards (if necessary, remove the suction and discharge line at the liquid end prior to this)
  - Constantly apply compressed air for approx. 3 seconds so that the fluid (oil) can collect at the connection at the bottom in the pressure chamber
  - Then relieve pressure and drain off the fluid (oil) via the relief connection "R" from the control valve
  - Repeat this process several times until no more fluid leakage is observed.

### 12.4 Fluid Leaks out at the Intermediate Disk

*Possible reason:* There is a leak at the metering diaphragm of the liquid end

- Remedy:*
- Only for PP version: remove star handle (**9a**)
  - Only for PP version: remove cover (**4a**) from the liquid end
  - Tighten screws (**arrow**) in the liquid end crosswise



#### **CAUTION:**

*It is essential that the screw torques are observed!*

*Pump types 1601, 1201, 0703: **2.5 to 3 Nm!***

*Pump types 1002, 0308, 0215: **4.5 to 5 Nm!***

## Troubleshooting / Eliminating Faults

- If fluid still leaks the diaphragm is torn and has to be replaced
- Description >pages 27 to 29<!

### 12.5 Replacing the Metering Diaphragm

#### Description of the individual parts:

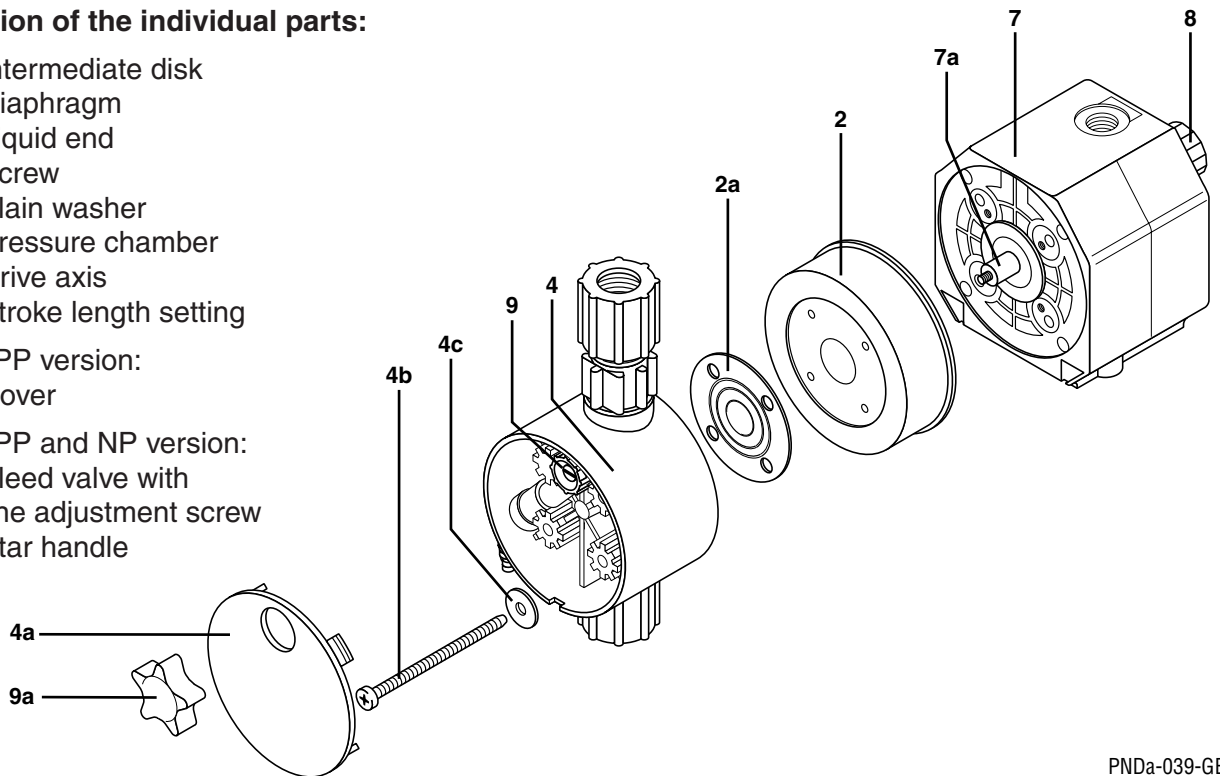
- 2 Intermediate disk
- 2a Diaphragm
- 4 Liquid end
- 4b Screw
- 4c Plain washer
- 7 Pressure chamber
- 7a Drive axis
- 8 Stroke length setting

Only for PP version:

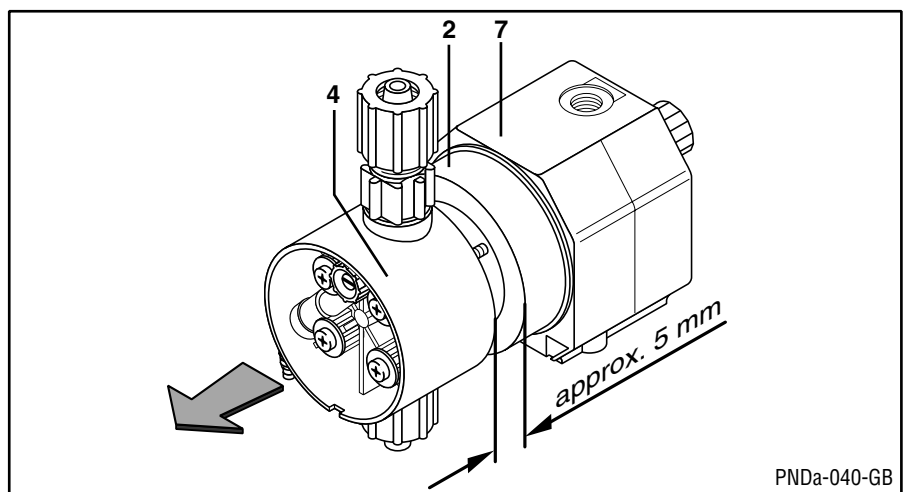
- 4a Cover

Only for PP and NP version:

- 9 Bleed valve with fine adjustment screw
- 9a Star handle



- Set the stroke length to "0" with the rotating knob (8) whilst the pump is running
- For the PP version remove the star handle (9a) from the bleed valve (9) and release the cover (4a) from the liquid end (4)
- Release screws (4b) with the washers (4c)

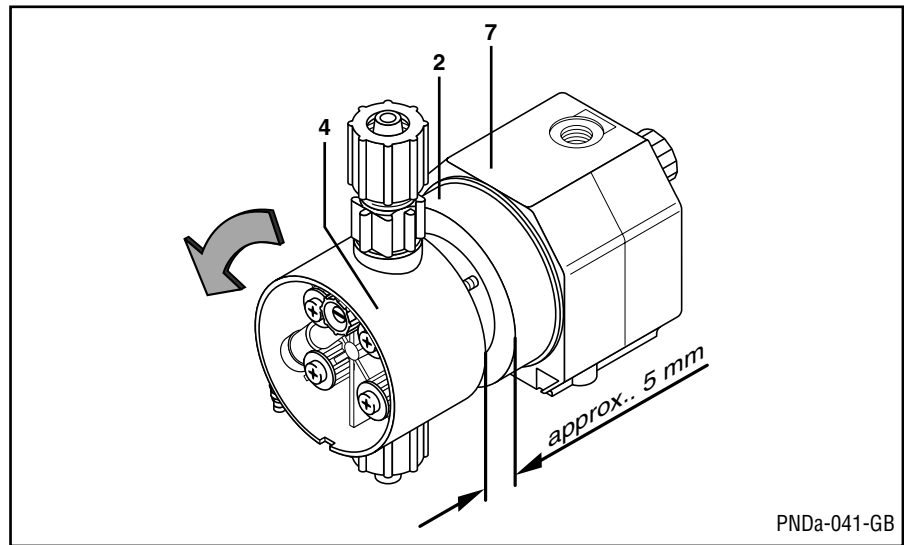


- Pull out liquid end (4) with screws from intermediate disk (2) and pressure chamber (7) (approx. 5 mm) until when turning the liquid end to test, no more resistance can be felt from the screws.

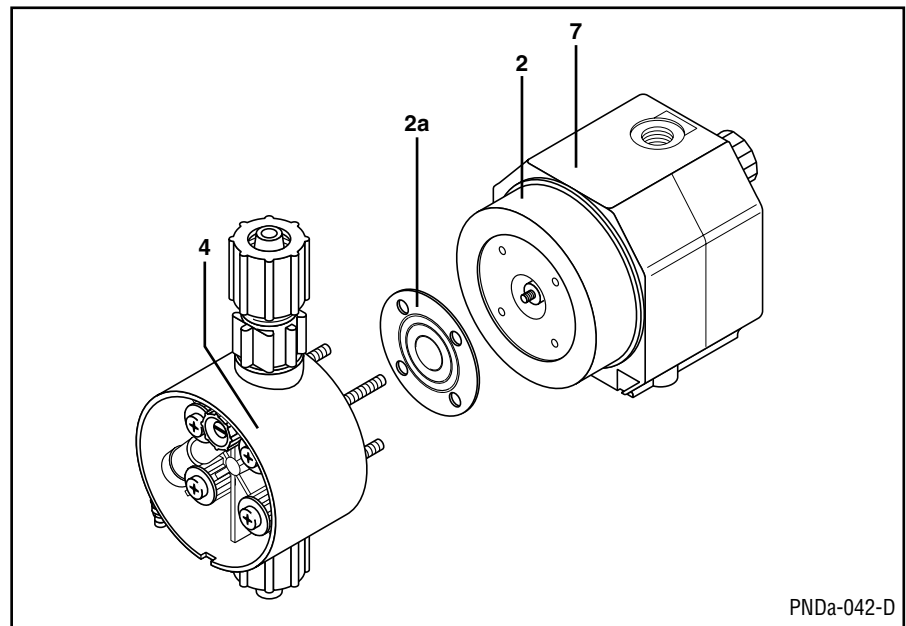
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## Troubleshooting / Eliminating Faults

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- Hold the pressure chamber (7) in the left hand and loosen diaphragm (2a) with the right hand from the drive axis (7a) with a slight jolting of the liquid end (4) and intermediate disk (2) to the left with the screws (4b)
- Now pull the liquid end with the screws out of the diaphragm and unscrew this fully from the solenoid axis



- Remove the intermediate disk (2) from the pressure chamber (7)
- Screw on the new diaphragm (2a) until the stop of the drive axis (7a) and check the thread turns are smooth
- Unscrew the diaphragm again from the drive axis
- Place the intermediate disk on the pressure chamber again
- Insert the diaphragm into the intermediate disk and screw 2 thread turns.

---

## Troubleshooting / Eliminating Faults

---

**CAUTION:**

***Turn the diaphragm in such a way that the 4 bores of the diaphragm and the intermediate disk are fully aligned!  
The outlet opening of the intermediate disk must point downwards!***

- Push on the liquid end (**suction connection must point downwards!**) with the screws so far onto the diaphragm and intermediate disk (a gain leave approx. 5 mm gap between the liquid end and intermediate disk!) so that the parts can still be turned
- Now turn the parts clockwise so long until the diaphragm sits tight (the torsional resistance of the recuperating spring can be felt )

**CAUTION:**

***Do not overstretch the diaphragm!  
Especially important for versions 1601 and 1201!***

- Set the stroke length with rotating knob **(8)** to 100 % and with the metering pump running, turn the complete liquid end to the right until the suction connection points vertically downwards
- For types 1601 and 1201 now set the stroke length to "0"
- For the types 0703 and 0215 leave the stroke length at 100 %
- Stop the pump
- Then tighten the 4 screws/plain washers **(4b/4c)** crosswise

**CAUTION:**

***It is essential that the screw torques are observed!  
Pump types 1601, 1201, 0703: 2.5 to 3 Nm!  
Pump types 1002, 0308, 0215: 4.5 to 5 Nm!***

- Only for PP version: replace cover **(4a)**
- Only for PP version: replace star handle **(9a)** onto the bleed valve **(9)**
- With the pump running set the stroke length desired.

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## Repair / Disposal of Old Parts

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### 13. Repair



*Customer service*

**WARNING:**

***Metering pumps and their peripheral equipment may only be repaired by correctly trained authorised persons!***

***Customer service Inform your customer service department or please contact the ProMinent® subsidiary or representative responsible for you (addresses can be found at the back/page 32 of this instruction manual)!***

**PLEASE NOTE:**

***Only send the metering pump in for repair once it has been cleaned and the liquid end has been rinsed!***

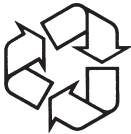
***If possible, please provide a short description of the fault with the application conditions and running time!***

**CAUTION:**

***When metering hazardous chemicals a certificate of quality generally recognised as safe (GRAS) should always be attached as well as the necessary safety precautions if possible.***

***We'll send you the form on request.***

***Pumps for radioactive media should not be returned!***



### 14. Disposal of Old Parts



**WARNING:**

***Never throw the device or part into the bin (domestic refuse)!***

*Taking back old parts*

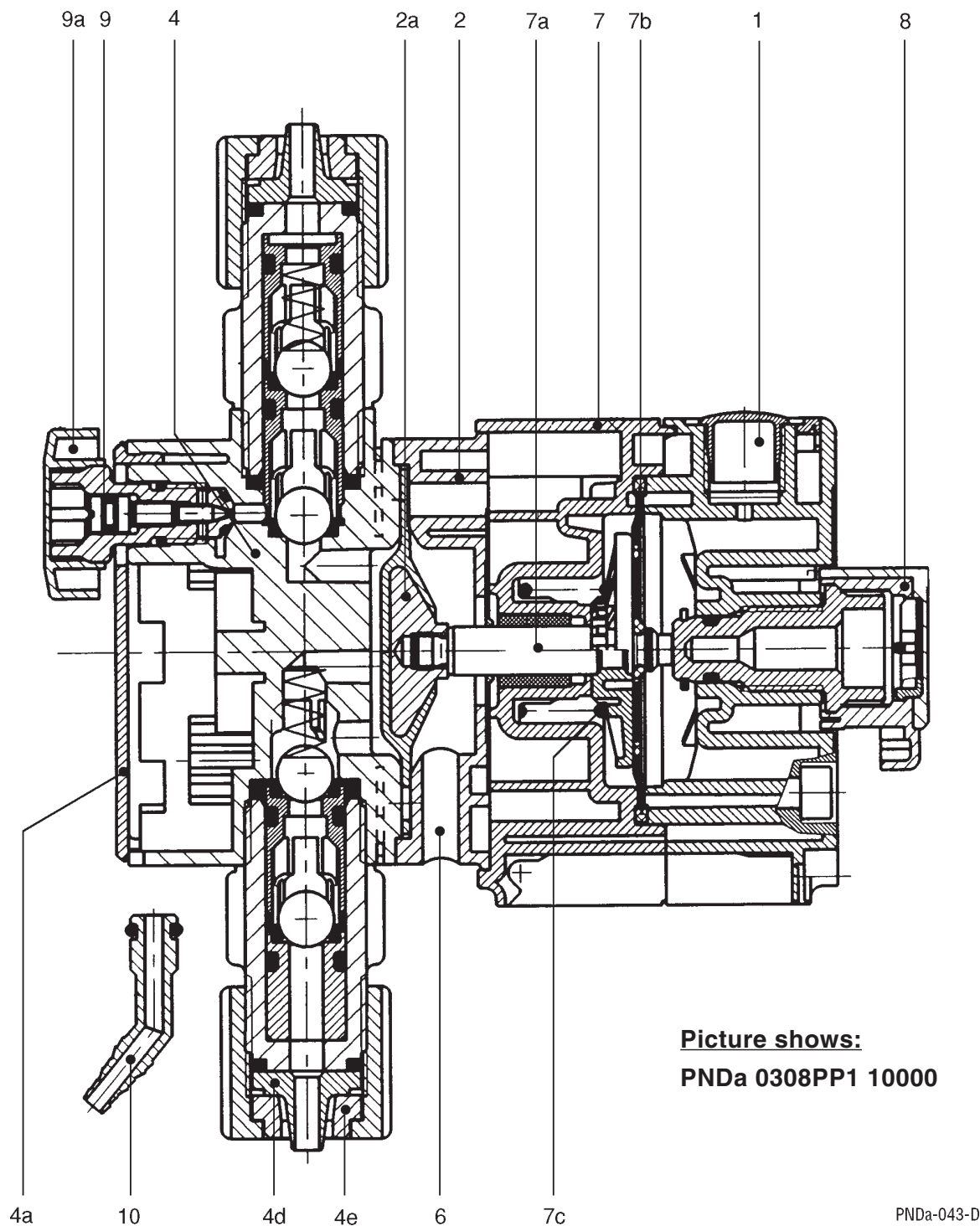
- Old parts should be disposed of in an environmentally friendly way or (if possible) recycled.
- If this is not possible

**the ProMinent subsidiary or representative responsible for you will take back your old parts for a small fee!**

**(Addresses can be found at the back of this instruction manual).**



## Appendix / Pump Cross Section



- 1 Pneumatic connection
- 2 Intermediate disk
- 2a Metering diaphragm
- 4 Liquid end
- 4d Tube connector
- 4e Gripper

- 6 Outlet opening
- 7 Pressure chamber
- 7a Drive axis
- 7b Compressed-air diaphragm
- 7c Pressure spring
- 8 Stroke length setting

Only for PP version:

4a Cover

Only for PP and NP version:

9 Bleed valve with  
fine adjustment screw

9a Star handle

10 Bypass tube connector

