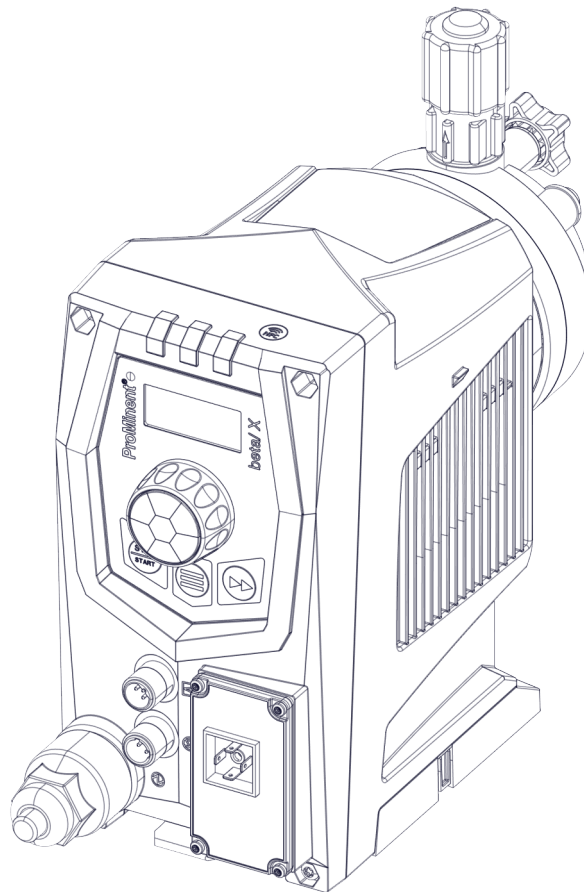


# Operating instructions

## Metering Pump

### beta/ X

EN



Target group: Technical personnel

**Please carefully read these operating instructions before use. · Do not discard.  
The operator shall be liable for any damage caused by installation or operating errors.  
The latest version of the operating instructions are available on our homepage.**

### Supplementary information



Fig. 1: Please read!

Read the following supplementary information in its entirety! You will benefit more from the operating instructions if you are aware of 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 section

- 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 pictogrammes - see Safety section.

#### 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

<b>1</b>	<b>Identity code</b> .....	<b>5</b>
<b>2</b>	<b>About this pump</b> .....	<b>7</b>
<b>3</b>	<b>Safety section</b> .....	<b>8</b>
	3.1 Intended use.....	8
	3.2 Requirements governing personnel.....	8
	3.3 Warning signs, symbols and pictogrammes.....	9
	3.4 General safety.....	10
	3.4.1 Hazard-free operation.....	10
	3.4.2 Hydraulic hazards.....	11
	3.4.3 Electrical hazards.....	11
	3.4.4 Danger from materials and operating substances...	12
<b>4</b>	<b>Storage, transport and unpacking</b> .....	<b>14</b>
<b>5</b>	<b>Overview of equipment and control elements</b> .....	<b>16</b>
	5.1 Overview of equipment.....	16
	5.2 Control elements.....	16
	5.2.1 Display elements.....	17
	5.2.2 Calibrate.....	18
	5.3 Functional and fault indicators.....	19
	5.4 "External control" socket.....	19
	5.5 "Level switch" socket.....	19
<b>6</b>	<b>Functional description</b> .....	<b>20</b>
	6.1 Liquid end.....	20
	6.2 Drive unit.....	20
	6.3 Dosing rate.....	20
	6.4 Operating modes.....	20
	6.5 Functions.....	20
	6.6 Relays.....	21
	6.7 Hierarchy of operating modes, functions, and fault statuses.....	21
<b>7</b>	<b>Assembly</b> .....	<b>23</b>
	7.1 Installation - base surface.....	23
	7.2 Installation - wall-mounted.....	25
<b>8</b>	<b>Installation</b> .....	<b>27</b>
	8.1 Basic installation information.....	27
	8.2 Hydraulic installation.....	28
	8.2.1 Installing hose lines.....	30
	8.3 Electrical installation.....	32
	8.3.1 Supply voltage.....	33
	8.3.2 Description of the sockets.....	33
	8.3.3 Relays.....	36
<b>9</b>	<b>Start up</b> .....	<b>39</b>
<b>10</b>	<b>Operation</b> .....	<b>41</b>
	10.1 Manual operation.....	41
	10.1.1 Dosing rate.....	41
	10.1.2 Functions.....	41
	10.1.3 External contact.....	42
	10.1.4 External analogue.....	42
	10.2 Factory settings.....	42

<b>11</b>	<b>Maintenance</b> .....	<b>43</b>
11.1	Service message / maintenance message.....	43
11.2	Overview of maintenance work.....	43
11.2.1	Visual check for damage.....	44
11.2.2	Maintenance work - standard liquid end.....	44
11.2.3	Maintenance work - liquid end with vent valve.....	45
11.2.4	Tightening torques.....	46
<b>12</b>	<b>Repair</b> .....	<b>47</b>
12.1	Replacing valves.....	47
12.2	Replacing the diaphragm.....	48
12.2.1	Changing the vPTFE or vPE diaphragm.....	49
<b>13</b>	<b>Troubleshooting</b> .....	<b>50</b>
13.1	Faults without fault message.....	50
13.2	Fault messages.....	51
13.3	Warning messages.....	51
13.4	Warnings and faults with fault message.....	51
13.4.1	Warnings.....	51
13.4.2	Fault.....	52
<b>14</b>	<b>Decommissioning and disposal</b> .....	<b>54</b>
14.1	Decommissioning.....	54
14.2	Disposal.....	55
<b>15</b>	<b>Technical data</b> .....	<b>56</b>
15.1	Performance data.....	56
15.2	Precision.....	56
15.2.1	Standard liquid end.....	56
15.3	Viscosity.....	56
15.4	Material specifications.....	57
15.5	Electrical data.....	57
15.6	Temperatures.....	58
15.7	Climate.....	58
15.8	Installation height.....	58
15.9	Degree of protection and safety requirements.....	59
15.9.1	Degree of protection.....	59
15.9.2	Safety requirements.....	59
15.9.3	Degree of pollution.....	59
<b>16</b>	<b>Declaration of Conformity for Machinery</b> .....	<b>60</b>
<b>17</b>	<b>Index</b> .....	<b>61</b>

# 1 Identity code

Product range beta/ X	
BTXb	Type
<b>Regional version</b>	
EU	Europe
US	USA
<b>Pump type</b>	
16006	16 bar / 6 l/h
07018	7 bar / 18 l/h
04028	4 bar / 27.6 l/h
02050	2 bar / 50.4 l/h
<b>Material</b>	
PV	PVDF
PE	PE
SS	Stainless steel
<b>Diaphragm + seal</b>	
T	Standard diaphragm + PTFE seal
P	PE diaphragm + PE seals (Only with PE dosing head version)
M	vPTFE diaphragm + PTFE valve seats Design only for PV and SS heads
<b>Dosing head version</b>	
0	Without vent valve, without valve spring (Only with SS version)
2	With vent valve, without valve spring (Only with PV and PE version)
<b>Certificate</b>	
0	No certification
F	FDA
G	1935/2004
P	PFAS free (Only with PE version)
<b>Hydraulic connector</b>	
0	Standard connector (metric universal connector set)
K	Inch universal connector
<b>Version</b>	
0	Housing RAL5003 / cover RAL2003
<b>Logo</b>	
0	With Prominent logo and beta/ X lettering
<b>Voltage version</b>	
U	Universal control 100 - 240 V AC
<b>Cable and plug</b>	
A	2 m European
B	2 m Swiss
C	2 m Australian

Product range beta/ X

	D	2 m USA 120 V
	G	2 m Brazilian
	E	2 m English
	1	2 m open end
	2	5 m open end
	3	10 m open end
	<b>Modules</b>	
	0	No relay
	1	Relay 3-pin, 240 V 1x changeover contact 240 V - 8 A (Relay normally closed)
	4	Relay 4-pin, 24 V 100 mA 2x N/O 24 V-100 mA (Relay normally closed _ pacing relay normally open)
	A	0-24 mA output + relay 2-pin 24 V 0, 1 A DC (Relay normally closed + 4-20 mA output)
	C	CAN-Open
	<b>Communication</b>	
	0	Manual + Contact
	3	Manual + Contact + Analogue input 0/4-20 mA
	B	Manual + Contact + Bluetooth
	C	Manual + Contact + Analogue input 0/4 - 20 mA
	<b>Accessories</b>	
	0	No accessories
	1	Injection valve + foot valve 2 m PVC hose 5 m PE hose
	4	as 1 + multifunctional valve
	5	as 1 + universal control cable
	<b>Language</b>	
	00	No documentation - storage type
	EN	German
	EN	English
	ES	Spanish
	FR	French
	...	...
	<b>Approval</b>	
	01	CE
	07	MET (USA)

## 2 About this pump

### Properties of the unit

The beta/ X metering pump is equipped with all adjustment and control functions for modern water treatment and chemical metering.

The beta/ X diaphragm metering pump is simple to operate, meters precisely, and is digital.

All aspects of the beta/ X are focused on ease of operation and use. The volume is set directly using an intuitive Clickwheel. The volume to be pumped is adjusted directly on a display. Thanks to a click-in foot, it can also be quickly and easily mounted on the floor or wall.

The beta/ X also impresses in terms of its energy consumption. Its is twice as energy efficient as its comparable predecessor model beta/ b.

## 3 Safety section

### 3.1 Intended use

- Only use the pump to meter liquid feed chemicals.
- Only use the pump once it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions.
- Observe the general limitations with regard to viscosity limits, chemical resistance and density - see also the ProMinent Resistance List in the Product Catalogue or at [www.prominent.com](http://www.prominent.com).
- All other uses or modifications are prohibited.
- The pump is not designed to meter gaseous media and solids.
- The pump is not designed to meter flammable media.
- The pump is not designed to meter explosive media.
- The pump is not suitable for operation in areas at risk from explosion.
- The pump is not designed for use outdoors, without appropriate protective measures.
- The pump should only be operated by trained and authorised personnel, see also [Chapter 3.2 'Requirements governing personnel'](#) on page 8.
- You have a duty to observe the information contained in the operating instructions during the different phases of the unit's service life.

### 3.2 Requirements governing personnel

#### Qualification of personnel

Task	Qualification
Storage, transport, unpacking	Instructed person
Assembly	Technical personnel, service
Planning the hydraulic installation	Qualified personnel who have a thorough knowledge of metering pumps
Hydraulic installation	Technical personnel, service
Installation, electrical	Electrical technician
Operation	Instructed person
Maintenance, repair	Technical personnel, service
Decommissioning, disposal	Technical personnel, service
Troubleshooting	Technical personnel, electrical technician, instructed person, service

#### Explanation of the table:

##### Qualified personnel

A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognise possible dangers based on his/her technical training, knowledge and experience, as well as knowledge of pertinent regulations.

Note:

A qualification of equal validity to a technical qualification can also be gained by several years of employment in the relevant field of work.

**Electrical technician**

An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations.

The electrical technician should be specifically trained for the working environment in which he is employed and know the relevant standards and regulations.

An electrical technician must comply with the provisions of the applicable statutory directives on accident prevention.

**Instructed person**

An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.

**Service**

The Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.

**3.3 Warning signs, symbols and pictogrammes**



**Identification of safety notes**


The following signal words are used in these operating instructions to denote different severities of danger:

Signal word	Meaning
<b>WARNING</b>	Denotes a possibly dangerous situation. If this is disregarded, you are in a life-threatening situation and this can result in serious injuries.
<b>CAUTION</b>	Denotes a possibly dangerous situation. If this is disregarded, it could result in slight or minor injuries or material damage.

**Warning signs denoting different types of danger**

The following warning signs are used in these operating instructions to denote different types of danger:

Warning signs	Type of danger
	Warning – automatic start-up.
	Warning – high-voltage.

Warning signs	Type of danger
	Warning – danger zone.

### 3.4 General safety



**CAUTION!**

**Danger from incorrect metering**

Should a different liquid end size be fitted, this will change the metering behaviour of the pump.

- Have the pump reprogrammed in the works.

#### 3.4.1 Hazard-free operation



**DANGER!**

**Injury to personnel and property by the use of untested third-party components**

- Only fit parts to metering pumps, which have been tested and recommended by ProMinent.



**CAUTION!**

**Danger from incorrectly operated or inadequately maintained pumps**

Danger can arise from a poorly accessible pump due to incorrect operation and poor maintenance.

- Ensure that the pump is accessible at all times.
- Adhere to the maintenance intervals.

### 3.4.2 Hydraulic hazards

**DANGER!****Rupturing hydraulic components by exceeding the maximum permissible operating pressure**

Hydraulic components can rupture if the maximum permissible operating pressure of the hydraulic parts is exceeded.

- Adhere to the maximum permissible operating pressure of all hydraulic components - please refer to the product-specific operating instructions and system documentation.
- Never allow the metering pump to run against a closed shut-off device.
- Install a relief valve.

**Rupturing hydraulic components caused by pressure peaks**

Peak loads during the metering stroke can cause the maximum permissible operating pressure of the system and pump to be exceeded.

- Design the pressure lines professionally.

### 3.4.3 Electrical hazards

**DANGER!****Fatal injury by electrocution**

Supply voltage may be present inside the pump housing.

- Safely and quickly disconnect the pump from the mains power supply if the pump housing has been damaged.

**WARNING!****Warning of personal injury and material damage**

The pump may start to pump as soon as it is connected to the supply voltage.

- Install an emergency cut-off switch in the power supply line to the pump or integrate the pump in the emergency cut-off management of the system.
- The power socket can also be used as an Emergency Stop if the mains plug of the original cable is accessible at all times. (The cable must be < 5 m)



**NOTICE!**

**Wear caused by "Pump ON/OFF" using the mains connection**

Frequent switching of the pump on and off using the supply voltage leads to increased wear in the pump. The pump is not technically designed for this.

If necessary, use the "Pause" function to switch the pump to standby mode. Do not switch the pump on and off using the supply voltage to spare a pause input.

### 3.4.4 Danger from materials and operating substances



**DANGER!**

**Danger from hazardous substances!**

Possible consequence: fatal or very serious injuries.

When handling hazardous substances, please ensure that you have read the latest material safety data sheets provided by the manufacturer of the hazardous substances. The measures required are described in the material safety data sheet. Check the material safety data sheet regularly and replace it, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that the material safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workplaces affected.

**WARNING!****Feed chemical spraying around due to improper installation**

Pipes can come loose or rupture if they are not installed correctly.

- Route all hose lines so that they are free from mechanical stresses and kinks.
- Only use original hoses with the specified hose dimensions and wall thicknesses.
- Only use clamp rings and hose sleeves intended for the respective hose diameter to ensure the long service life of the connections.

**Feed chemical spraying around due to pressure in the liquid end and adjacent system components**

Feed chemical may spray out of the hydraulic components if they are tampered with or opened.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.
- Correlate the selected dosing head with the chemical resistance list.

## 4 Storage, transport and unpacking

### Safety information



**WARNING!**

Shipping pumps that have been used with radioactive feed chemicals is prohibited!

They will not be accepted by ProMinent!



**WARNING!**

Only return metering pumps for repair in a cleaned state and with a flushed liquid end - refer to "Decommissioning!"

Only return metering pumps with a completed Decontamination Declaration form. The Decontamination Declaration constitutes an integral part of an inspection / repair order. A unit can only be inspected or repaired when a Declaration of Decontamination Form is submitted that has been completed correctly and in full by an authorised and qualified person on behalf of the pump operator.

The "Decontamination Declaration Form" can be found on our homepage.



**CAUTION!**

**Danger of material damage**

The device can be damaged by incorrect or improper storage or transportation!

- The unit should only be stored or transported in a well packaged state - preferably in its original packaging.
- The packaged unit should also only be stored or transported in accordance with the stipulated storage conditions.
- The packaged unit should be protected from moisture and the ingress of chemicals.

### Ambient conditions

Data	Value	Unit
Minimum storage and transport temperature	-20	°C
Maximum storage and transport temperature	+60	°C
Maximum air humidity *	95	% rel. humidity

\* non-condensing

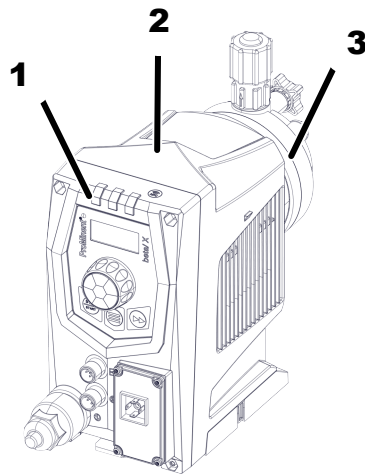
**Scope of delivery**

Compare the delivery note with the scope of delivery:

- Metering pump with mains cable
- Connector kit for hose/pipe connector (optional)
- Product-specific operating instructions with EU Declaration of Conformity
- Possible accessories (optional)

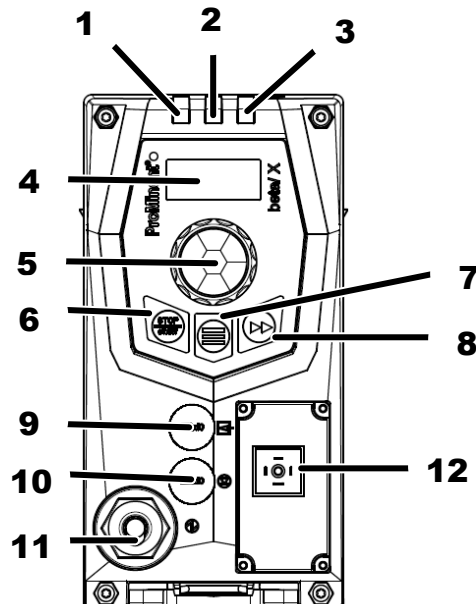
## 5 Overview of equipment and control elements

### 5.1 Overview of equipment



- 1 Control unit
- 2 Drive unit
- 3 Liquid end

### 5.2 Control elements



- 1 Fault indicator (red)
- 2 Warning indicator (yellow)
- 3 Operating indicator (green)
- 4 Display
- 5 Clickwheel
- 6 [STOP/START] key
- 7 [Menu] key
- 8 [Priming] key
- 9 "External control" socket
- 10 "Level switch" socket
- 11 Mains cable
- 12 Optional: Relay

### 5.2.1 Display elements

Dosing rate display and fault displays on the screen

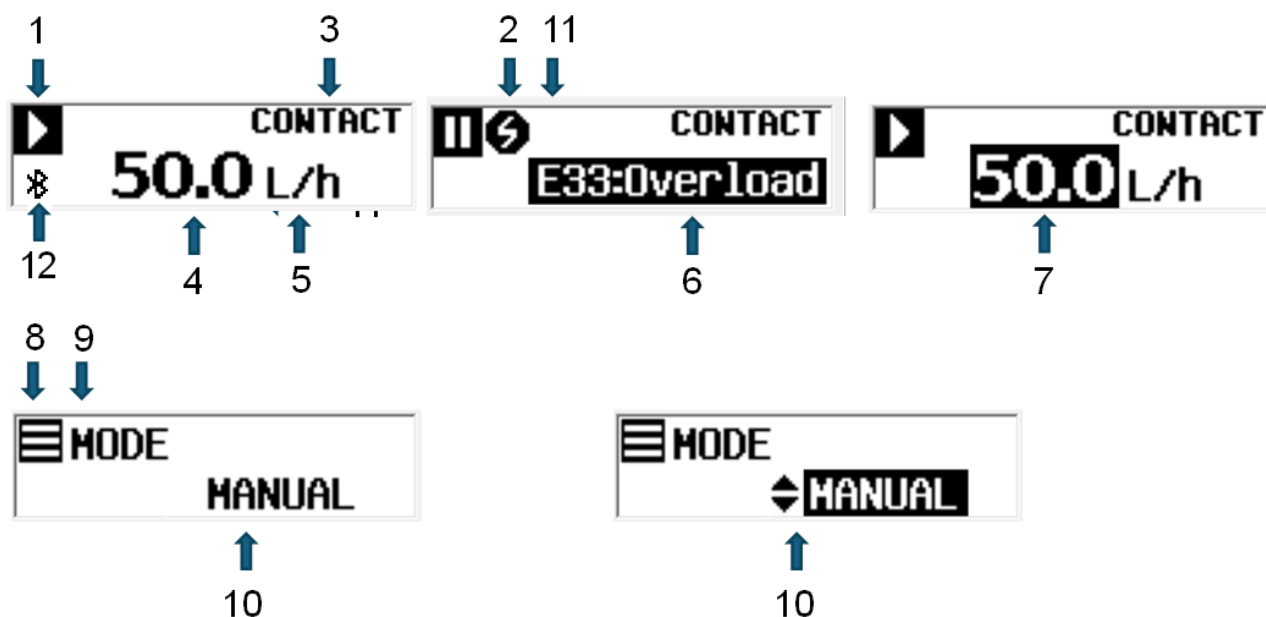



Fig. 2: beta/ X menu

- |   |                    |    |                                           |
|---|--------------------|----|-------------------------------------------|
| 1 | Status symbol      | 7  | Dosing rate (editing mode)                |
| 2 | Stop source symbol | 8  | Menu symbol                               |
| 3 | Operating mode     | 9  | Parameter name                            |
| 4 | Dosing rate        | 10 | Parameter value can be changed            |
| 5 | Volume unit        | 11 | Fieldbus operation (CanOpen) - (optional) |
| 6 | Fault display      | 12 | Bluetooth (optional)                      |


The screen supports the operation and adjustment of the pump using different information and identifiers.

Tab. 1: Operating displays

Symbol	Position	Function	Description		
	1	Operating indicator	Normal, pump in operation and running		
			Pump stopped		
			Pump in priming mode		
			Pause (ext. signal)		
	2	Source indicator for stop / warning	Fault / warning		
			Liquid level warning		
			Service message		
			Temperature warning		
			System fault - the pressure may be too high		
			Module missing e.g.: Bluetooth or BUS module		
			Manual stop		
			Stop by optional module		

Symbol	Position	Function	Description
			Bluetooth / app
CAN	11	Optional	No optional functionality active
BUS			Bus active
MANUAL	3	Operating mode set	Manual
CONTACT			Contact
ANALOG			Analogue (0/4-20 mA)
AUX			Auxiliary mode (ext. signal)

## 5.2.2 Calibrate

 → 'Menu → Calibrate'

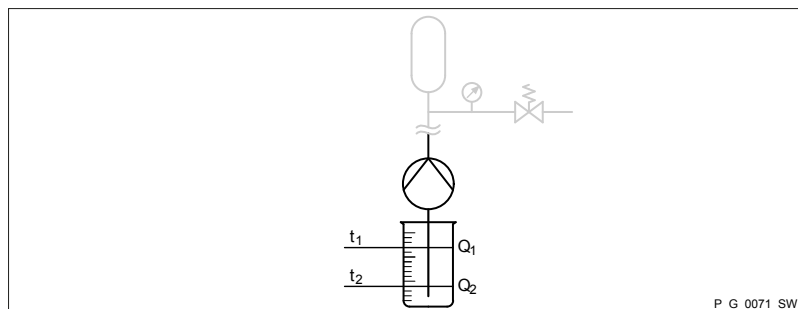


### Calibration - precision


*The pump does not need to be calibrated with media similar to water.*

*Calibration is required with high-viscosity media or if a high level of precision is sought. It is important to calibrate to the working range (operating pressure).*

*With individual pumps in the product range, the dosing rate can systematically deviate from the specified dosing rate by -10% to +10%. A reproducibility of  $\pm 1\%$  from the specified dosing rate remains as a deviation after calibration.*



### Preparation

1. ➤ Guide the suction hose into a measuring cylinder containing the feed chemical – make sure that the pressure hose is permanently installed (operating pressure, ...!).
2. ➤ Prime with the feed chemical (press the  [Priming] button), should the suction hose be empty.

### Calibration procedure

1. ➤ Record the level in the measuring cylinder.
2. ➤ Press the [Clickwheel] to start calibration.
  - ⇒ The 'Calibrate ...' menu item appears, the pump starts to pump, and indicates the number of strokes.

3. ➤ Use the *[Clickwheel]* to stop the pump after a reasonable number of strokes (a minimum of 200).
  - ⇒ The 'Calibrate ended' menu item appears. You are now asked to enter the calibration volume.
4. ➤ Determine the required metering volume (difference between initial volume - remaining volume in the measuring cylinder).
5. ➤ Enter this volume in the 'Calibrate ended' menu item with the *[Clickwheel]* and close it.
6. ➤ Press the *[Clickwheel]*.
  - ⇒ The pump returns to the 'Menu / Information' → *Settings* menu.

### 5.3 Functional and fault indicators

#### Fault indicator (red)

The fault indicator lights up if the liquid level in the dosing tank falls below the second switching point of the level switch (20 mm residual liquid level in the dosing tank) or below the fault threshold of the connected DULCOLEVEL radar sensor.

The fault indicator lights up if the current falls below 3.8 mA (only with 4...20 mA) or exceeds 20.5 mA in "External Analogue" operating mode.

This LED flashes in the event of an undefined operating status.

#### Warning indicator (yellow)

The warning indicator lights up if the liquid level in the dosing tank falls below the first switching point of the level switch or radar sensor.

The warning indicator also lights up if there is a maintenance request.

#### Operating indicator (green)

The operating indicator lights up if the pump is ready for operation and there are no fault or warning messages. It briefly goes out as soon as the pump has performed a stroke.

### 5.4 "External control" socket

The "External control" socket is a five-pin panel socket.

It enables the following functions and operating modes to be used:

- Pause
- External contact
- External analogue (optional)
- Auxiliary frequency (external frequency changer)

### 5.5 "Level switch" socket

A 2-stage level switch with pre-warning and end switch-off can be connected.

## 6 Functional description

### 6.1 Liquid end

Metering is performed as follows:

#### 1) Pressure stroke

The diaphragm is pressed into the dosing head by the motor power; the pressure in the dosing head closes the suction valve, and the feed chemical flows out of the dosing head through the discharge valve.

#### 2) Suction stroke

The diaphragm is now drawn out of the dosing head; the discharge valve closes due to the negative pressure in the dosing head, and fresh feed chemical flows through the suction valve into the dosing head.

One cycle is completed.

### 6.2 Drive unit

The metering diaphragm is driven by a step motor, which is electronically controlled.

### 6.3 Dosing rate

The dosing rate is set directly in litres per hour (with the EU version) or GPH (gallons per hour - with the US version).

A full stroke is always performed.

The longest possible metering stroke of the beta/ X is 1 minute. Above that, the pump switches to Start/Stop mode.

In Start/Stop mode, the delivery volume can be reduced by a factor of 1:1,000. (Exception BTXB16006, adjustment range of 1:700)

### 6.4 Operating modes

The operating modes are set using the menu or app.

#### "External contact" operating mode

"External contact" operating mode is described below - see [↗ Chapter 8.3 'Electrical installation' on page 32](#) and [↗ Chapter 10 'Operation' on page 41](#).

#### "External analogue" operating mode

"External analogue" operating mode is described below - see [↗ Chapter 8.3 'Electrical installation' on page 32](#) and [↗ Chapter 10 'Operation' on page 41](#).

### 6.5 Functions

The functions are described below - see [↗ Chapter 10 'Operation' on page 41](#).

## 6.6 Relays

The pump has three connecting options.

### Fault indicating relay option

The relay can switch a connected power circuit (e.g. for an alarm horn) in the event of warnings or fault messages (e.g. warning level).

If the relay is plugged in, the polarity of the fault indicating relay can be changed from Normally Closed (NC) to Normally Open (NO) either in the pump menu; or via the Bluetooth app. Normally Closed (NC) is the default value for the fault indicating relay

The relay can be retrofitted through an installation opening in the control unit - refer to the supplementary instructions for "Retrofitting relays" supplied with the retrofit kit.

### Fault indicating and pacing relay option

This combined relay can generate a contact with each stroke via its pacing relay in addition to functioning as a fault indicating relay.

If the relay is plugged in, the polarity of the fault indicating relay can be changed from Normally Closed (NC) to Normally Open (NO) either in the pump menu; or via the Bluetooth app. Normally Closed (NC) is the default value for the fault indicating relay. The pacing relay (NO) closes with every stroke cycle. The polarity of the pacing relay cannot be changed

The relay can be retrofitted through an installation opening in the control unit - refer to the supplementary instructions for "Retrofitting relays" supplied with the retrofit kit.

### mA output option

Current output signal I indicates the actual calculated metering volume of the pump.

The current output is not scalable. 4 mA corresponds to 0 l/h and 20 mA corresponds to the maximum flow rate of the pump

The option also always includes a fault indicating relay. If the relay is plugged in, the polarity of the fault indicating relay can be changed from Normally Closed (NC) to Normally Open (NO) either in the pump menu; or via the Bluetooth app. Normally Closed (NC) is the default value for the fault indicating relay.

This option can be retrofitted through the installation opening in the control unit.

## 6.7 Hierarchy of operating modes, functions, and fault statuses

The different operating modes, functions and fault statuses have a different impact on whether and how the pump reacts.

The following list shows the order:

1. - Priming
2. - Fault, Stop, Pause
3. - Auxiliary frequency (external frequency changer)
4. - Manual, Contact and Analogue

Comments:

- re 1. - "Priming" can take place in any pump status (providing it is working).
- re 2. - "Fault", "Stop" and "Pause" stop everything apart from "Priming".
- re 3. - The "Auxiliary frequency" stroke rate always has priority over the stroke rate specified by an operating mode listed under 4.

## 7 Assembly



### CAUTION!

**Danger from incorrectly operated or inadequately maintained pumps**

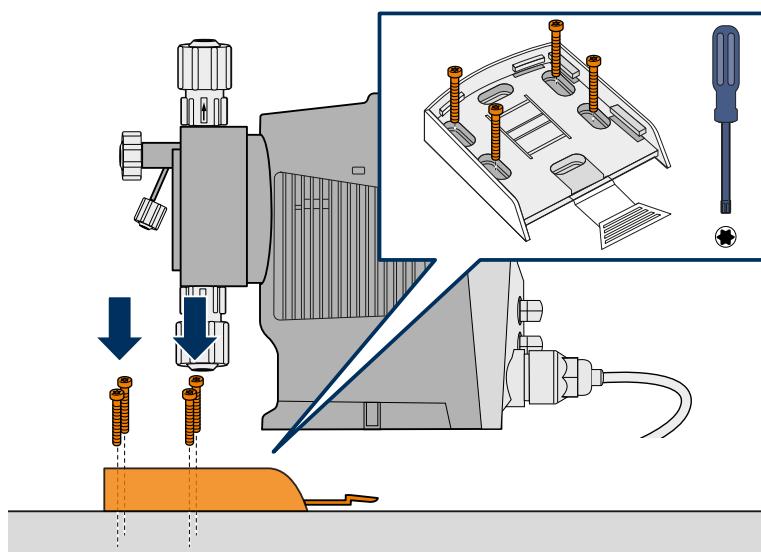
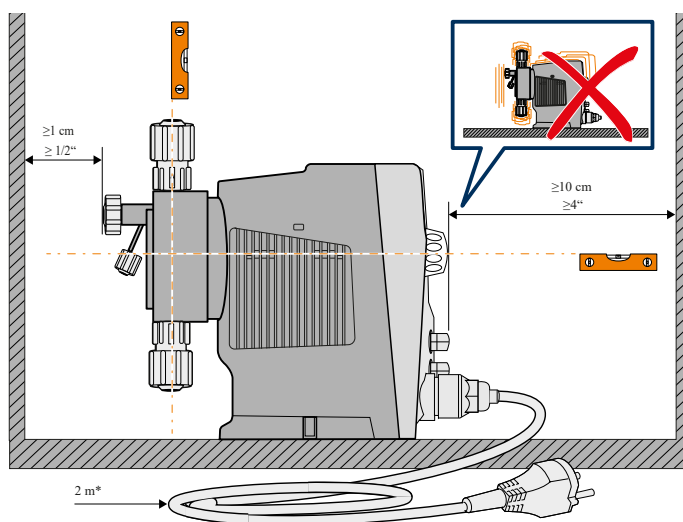
Danger can arise from a poorly accessible pump due to incorrect operation and poor maintenance.

- Ensure that the pump is accessible at all times.
- Adhere to the maintenance intervals.

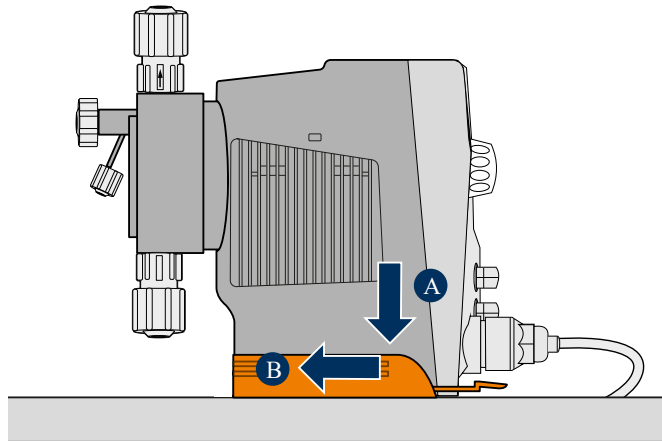
### 7.1 Installation - base surface

#### Installation - base surface

Make sure that the base surface is load-bearing and horizontal.



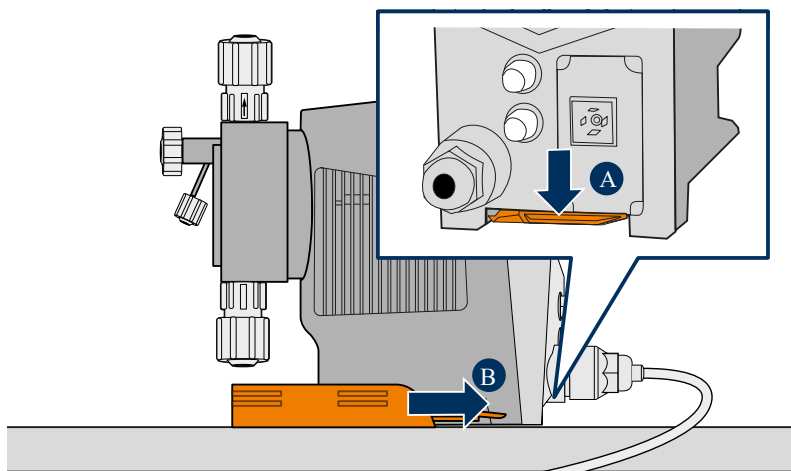
1. → Screw the bracket horizontally to the base surface.



2. Engage the pump in the bracket.

Disassembly - base surface

Make sure that the pump is switched off and disconnected from the mains power supply.

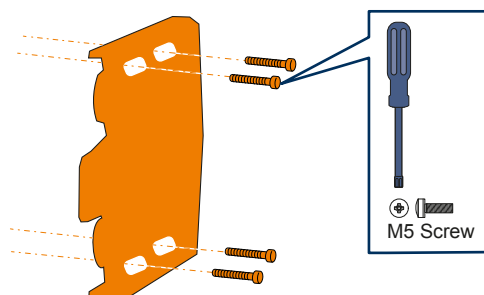


Press in the lug of the bracket and release the pump.

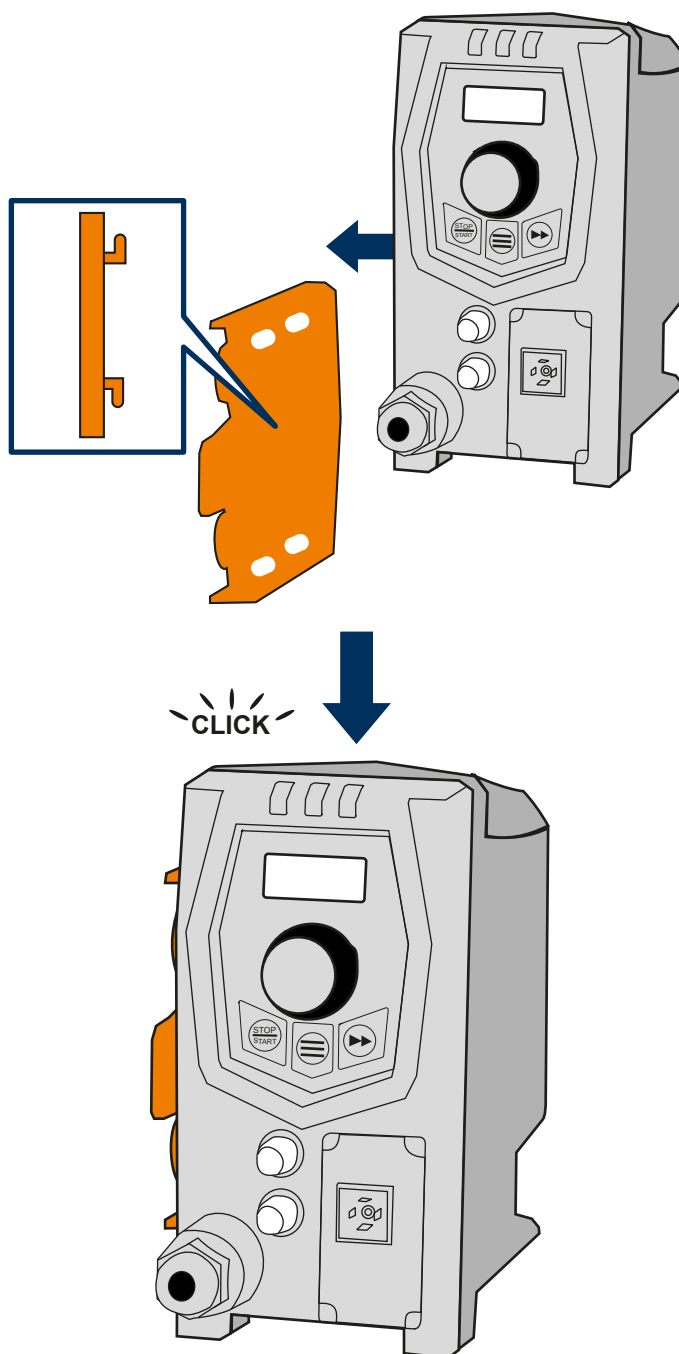
## 7.2 Installation - wall-mounted

### Installation - wall-mounted

Make sure that the wall is load-bearing and straight.

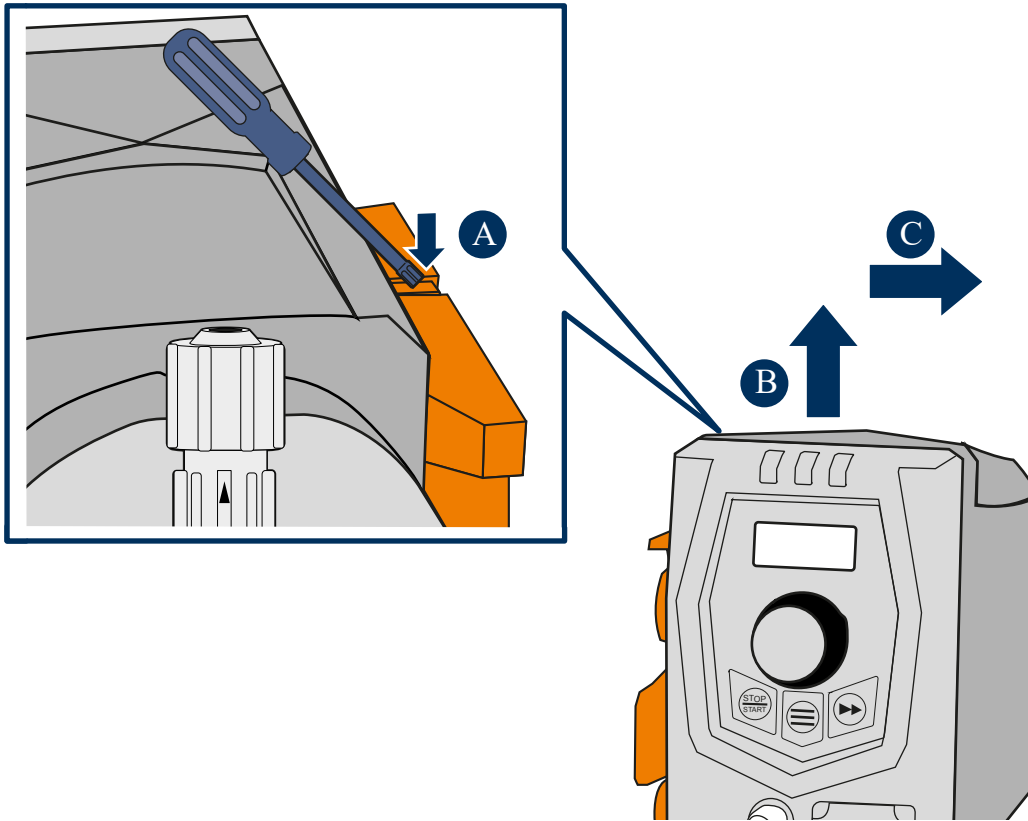


1. → Screw the bracket vertically to the wall.



2. → Slot and engage the pump sideways into the bracket.

Disassembly - wall-mounted



## 8 Installation

### 8.1 Basic installation information

#### Safety information

**CAUTION!**

Only allow qualified and authorised personnel to undertake all work.

**WARNING!****Warning of personal injury and material damage**

The pump may start to pump as soon as it is connected to the supply voltage.

- Install an emergency cut-off switch in the power supply line to the pump or integrate the pump in the emergency cut-off management of the system.
- The power socket can also be used as an Emergency Stop if the mains plug of the original cable is accessible at all times. (The cable must be < 5 m)

**DANGER!****Escape of hazardous feed chemicals by the venting process**

Hazardous or extremely aggressive feed chemicals can escape outside.

- Install a vent line with a return line into the supply tank.

**Escape of hazardous feed chemicals by removal of the metering pump from the installation**

Hazardous or extremely aggressive feed chemicals can escape outside.

- Install a shut-off valve on the pressure and suction side of the metering pump.

**DANGER!****Injury to personnel and property by the use of untested third-party components**

- Only fit parts to metering pumps, which have been tested and recommended by ProMinent.

## 8.2 Hydraulic installation

### Safety information



#### **DANGER!**

##### **Rupturing hydraulic components by exceeding the maximum permissible operating pressure**

Hydraulic components can rupture if the maximum permissible operating pressure of the hydraulic parts is exceeded.

- Adhere to the maximum permissible operating pressure of all hydraulic components - please refer to the product-specific operating instructions and system documentation.
- The maximum operating pressure depends on the ambient and media temperature
- Never allow the metering pump to run against a closed shut-off device.
- Install a relief valve.

##### **Rupturing hydraulic components caused by pressure peaks**

Peak loads during the metering stroke can cause the maximum permissible operating pressure of the system and pump to be exceeded.

- Design the pressure lines professionally.



#### **WARNING!**

##### **Feed chemical spraying around due to improper installation**

Pipes can come loose or rupture if they are not installed correctly.

- Route all hose lines so that they are free from mechanical stresses and kinks.
- Only use original hoses with the specified hose dimensions and wall thicknesses.
- Only use clamp rings and hose sleeves intended for the respective hose diameter to ensure the long service life of the connections.

##### **Feed chemical spraying around due to pressure in the liquid end and adjacent system components**

Feed chemical may spray out of the hydraulic components if they are tampered with or opened.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

**CAUTION!****Uncontrolled flow of feed chemical by back pressure**

Feed chemical can press through the stationary metering pump.

- Use an injection valve or a vacuum breaker.

**Uncontrolled flow of feed chemical by too great a priming pressure**

Feed chemical can press uncontrolled through the metering pump.

- Do not exceed the maximum permissible priming pressure for the metering pump.

**NOTICE!****Feed chemical spraying around caused by the use of unsuitable feed chemical**

An unsuitable feed chemical can damage the wetted parts of the pump.

- Take into account the resistance of the wetted materials and the ProMinent Resistance List when selecting the feed chemical - see the ProMinent Product Catalogue or visit our website.

**INFORMATION:** Arrange the pipes so that the metering pump and the liquid end can be removed to the side if necessary.

## 8.2.1 Installing hose lines

### 8.2.1.1 Installing a hose line with metering pumps without vent valve

Installing hose lines - PV and PE versions

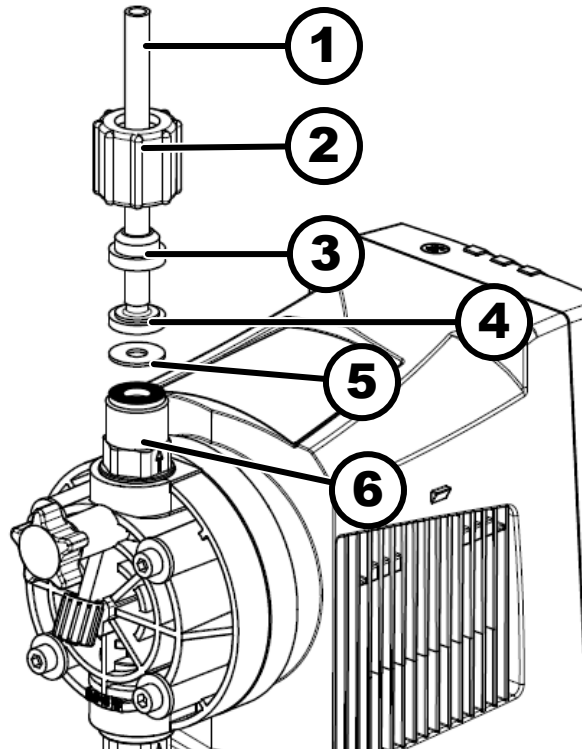


Fig. 3: PV and PE versions

- 1 Hose
- 2 Union nut
- 3 Clamp ring
- 4 Nozzle
- 5 Flat seal
- 6 Valve

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).
3. ➤ Push the hose end (1) up to the stop over the nozzle (4) and widen, if necessary.

**INFORMATION:** Ensure that the flat seal (5) is sitting properly in the valve (6). (Only ever use one flat seal for each sealing surface)

**INFORMATION:** Never re-use used PTFE seals. An installation sealed in this way will not be leak-proof, as these seals are permanently deformed during pressing.

**INFORMATION:** The PV version of the FPM flat seal 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. ➤ Check that the hose is fixed in place.

### Installing the stainless steel pipe - SS versions

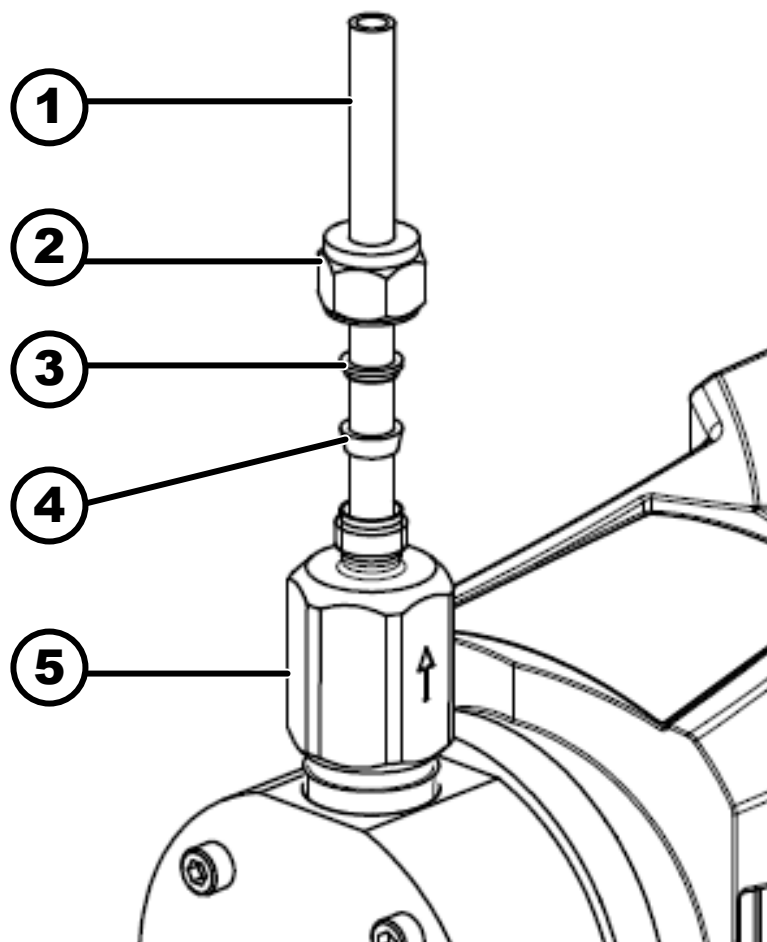


Fig. 4: SS versions

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

1. ➤ Push the union nut (2) and clamp rings (3, 4) over the pipe (1) with approx. 10 mm overhang.
2. ➤ Insert the pipe (1) into the valve (5) as far as the stop and then withdraw it 1...2 mm.
3. ➤ Tighten the union nut (2).

#### 8.2.1.2 Installing a hose line with metering pumps with vent valve

##### Installation of the return line

A return line is also connected to the vent valve in addition to the suction and pressure line.

1. ➤ Attach the hose line to the return hose nozzle or to the liquid end vent valve. A PVC hose, soft, 6x4 mm is recommended.
2. ➤ Feed the free end of the return line into the supply tank.

Always observe the material safety data sheet for the chemicals used. A return to the supply tank is not permitted for some chemicals, such as H<sub>2</sub>O<sub>2</sub>.

## 8.3 Electrical installation

### Safety information



#### **DANGER!**

##### **Fatal injury by electrocution**

- Ensure that it is only connected to a socket with a correctly connected protective contact to reduce the risk of electric shock.
- Install an emergency cut-off switch in the pump power supply line or
- Integrate the pump into the safety concept for the system and inform personnel about isolating options.
- Safely and quickly disconnect the pump from the mains power supply if the pump housing has been damaged.  
Only return the pump to operation after an authorised repair.



#### **WARNING!**

##### **Feed chemical spraying around caused by incomplete hydraulic installation**

Feed chemical can pump from the outlet opening of the discharge valve as soon as the pump is connected to the mains power supply.

- First install the pump hydraulically, then electrically.
- If you have neglected to do this, disconnect the mains plug and de-energise the pump.



#### **NOTICE!**

##### **Material damage possible due to power surges**

If the pump is connected to the mains power supply in parallel to inductive consumers, then inductive power surges from consumers, such as solenoid valves, motors etc., can damage the control when it is being switched off.

- If need be, install external overvoltage protection, e.g. for the socket or control cabinet.



#### **NOTICE!**

##### **Bonding of the contacts of your switching relay**

The high starting current can cause the contacts of the on-site switching relay to bond together if a solenoid metering pump is switched on and off by the supply voltage for a process.

- Use the switching options offered by the external socket to control the pump (functions: Pause, Auxiliary frequency or Contact, Batch, Analogue operating modes).
- Use a starting current limiter if it is impossible to avoid switching the pump on and off via a relay.

### 8.3.1 Supply voltage

#### Parallel connection to inductive consumers

Should the pump be connected to the mains in parallel to inductive consumers (e.g. solenoid valves, motor), the pump must be electrically isolated from these consumers when switching off:

- Supply the pump with voltage via a contactor relay or relay with proprietary contacts for the pump.
- If this is not possible, connect a varistor or an RC member in parallel 0.22  $\mu$ F / 220  $\Omega$ .

### 8.3.2 Description of the sockets

#### 8.3.2.1 "External control" socket

The "External control" socket is a five-pin panel socket.

The "Auxiliary frequency" function can only be used with a five-pin cable.

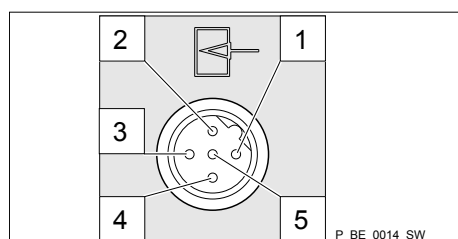


Fig. 5: Assignment on the pump

- 1 Pause
- 2 External contact
- 3 mA input
- 4 Earth GND
- 5 Auxiliary frequency

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	k $\Omega$
Max. pulse frequency	25	pulse/s
Min. pulse duration	20	ms
Min. pause between pulses	3	ms

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or
- semiconductor switch (residual voltage < 0.7 V)

Electrical interface for pin 3 "mA input" (with identity code characteristic "Control version": A - "External analogue")

Data	Value	Unit
Input load, approx.	120	$\Omega$

Tab. 2: Behaviour of the pump

At approx. 0.1 mA (4.1 mA) the metering pump performs its first metering stroke.

At approx. 19.9 mA the pump moves to continuous operation at maximum dosing rate.

With current signal over 20.5 mA, the red fault indicator lights up, the pump stops, and any fault indicating relay fitted is switched (a Fault is pending).

Only with 4-20 mA: With current signals below 3.8 mA, the red fault indicator lights up, the pump stops, and any fault indicating relay fitted is switched (Fault e.g. in the event of a cable break).

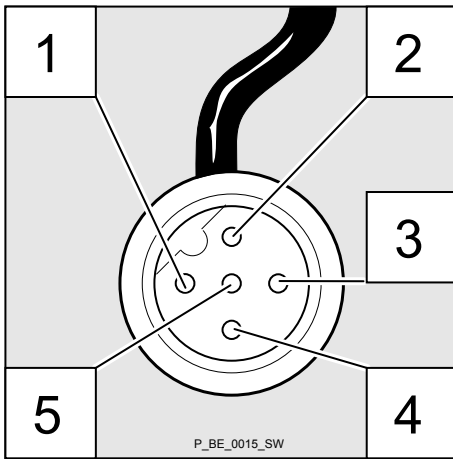


Fig. 6: Cable assignment

Pin	Function	5-wire cable	2-wire cable
1	Pause	brown	bridged at pin 4
2	External contact	white	brown
3	mA input*	blue	-
4	Earth GND	black	white
5	Auxiliary frequency	grey	-

\* with identity code characteristic "Control version": 3 or C - "External analogue"

**"Pause" function**

The pump does not work if:

- The cable is connected and pin 1 and pin 4 are open.

The pump works if:

- The cable is connected and pin 1 and pin 4 are connected.
- No cable is connected.

**"External contact" operating mode**

The pump performs one or more strokes if:

- Pin 2 and pin 4 are connected to each other for at least 20 ms. At the same time, pin 1 and pin 4 must also be connected to each other.

**"External analogue" operating mode**

- The metering pump performs its first metering stroke at approx. 0.1 mA (4.1 mA) and moves to continuous operation at approx. 19.9 mA.

**"Auxiliary frequency" operating mode**

The pump works at a pre-set stroke rate if:

- Pin 5 and pin 4 are connected to each other. At the same time, pin 1 and pin 4 must also be connected to each other. The auxiliary frequency is factory-pre-set to maximum metering volume.

### 8.3.2.2 "Level switch" socket

There is a connecting option for a 2-stage level switch with pre-warning and limit stop.

If the 2-stage level switch is plugged into the beta/ X, it is prioritised over a radar sensor potentially connected via Bluetooth. If the level sensor cable of the 2-stage suction lance is plugged in, the cable always has priority over Bluetooth with regard to fault and warning thresholds for the liquid level.

#### Electrical interface

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or
- semiconductor switch (residual voltage < 0.7 V)

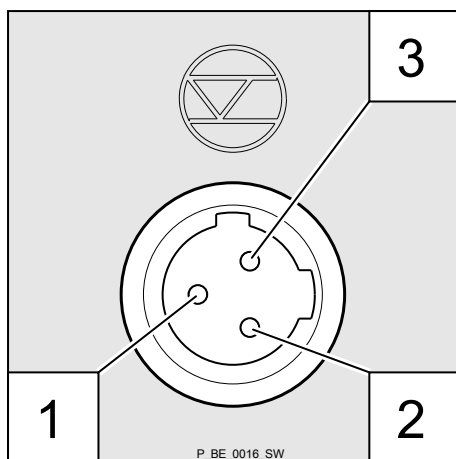


Fig. 7: Assignment on the pump

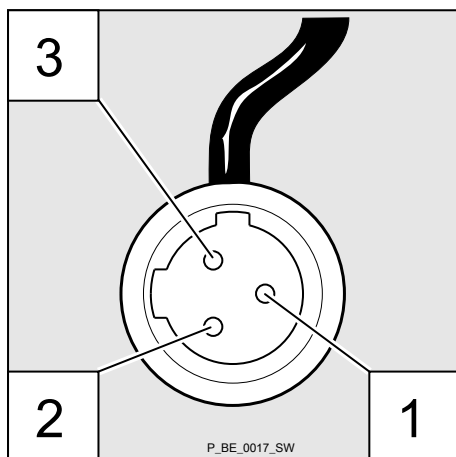


Fig. 8: Cable assignment

Pin	Function	3-wire cable
1	Earth GND	black
2	Minimum pre-warning	blue
3	Minimum limit stop	brown

### 8.3.3 Relays

#### 8.3.3.1 Relay functions

Tab. 3: beta/ X

Identity code	Designation	Maximum voltage	Maximum current	Service life Min. switching operations
0	No relay	-	-	-
1	Fault indicating relay, normally closed (NC)	240 V AC	6 A	50,000
4	Fault indicating relay, normally closed (NC)	24 V DC	1 A	50,000
	Pacing relay, normally open (NO)	24 V DC	100 mA	unlimited
A	4-20 mA current output	-	-	-
	Fault indicating relay, normally closed (NC)	24 V DC	100 mA	unlimited

When does the relay switch:

- Fault indicating relay, normally closed (NC).  
The fault indicating relay switches with all faults and at warning level. The polarity of the fault indicating relay is pre-set to NC. The polarity can be switched over from NC to NO via the pump menu or the DULCONNEX Blue app.
- Pacing relay normally open (NO) switches with every pump stroke.  
The polarity of the pacing relay cannot be changed
- The 4-20 mA current output is not scalable.  
4 mA corresponds to 0 l/h and 20 mA corresponds to the maximum flow rate of the pump

#### Relay polarity

You can set how the respective relay switches (polarity - NO/NC) in the pump menu (or via the DULCONNEX Blue Bluetooth app). The menu is only visible if the relay is fitted.

Menu setting	Action
NC	The relay is closed in normal mode and opens with a triggering event. (NC = Normally Closed)
NO	The relay is open in normal mode and closes with a triggering event. (NO = Normally Open)

#### 8.3.3.2 "Fault indicating relay" output (identity code 1)

A fault indicating relay can be ordered as an option - refer to the ordering information in the appendix. It is used to signal pump fault messages. The fault indicating relay (NC) switches with all fault messages (red LED) and for the warning message "Liquid level low 1st stage" (yellow LED) and the fault message "Liquid level low 2nd stage".

The fault indicating relay can be retrofitted and is operational once plugged into the relay board - refer to the "Retrofitting relays" supplementary operating instructions.

The behaviour is factory-programmed. The polarity of the fault indicating relay can be changed from NC to NO in the menu or via the DULCONNEX Blue app.

Identity code 1

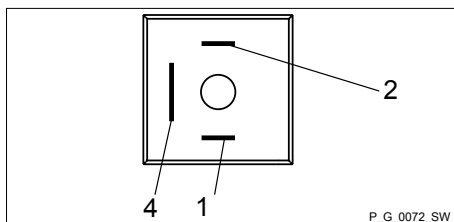


Fig. 9: Assignment on the pump

To pin	VDE cable	Contact	CSA cable
1	white	Normally open contact / NO	white
2	green	Normally closed contact / NC	red
4	brown	C (common)	black

Use pin 1 (white) + pin 4 (brown) for NC switching.

8.3.3.3 Fault indicating and pacing relay output (identity code 4)

A fault indicating and a pacing relay can be ordered as options - refer to the ordering information in the appendix. The pacing output is potentially isolated by an optocoupler with a semiconductor switch. The second switch is a relay (also potentially isolated).

The behaviour is factory-programmed. The polarity of the fault indicating relay can be changed from NC to NO in the menu or via the DULCONNEX Blue app.

The fault indicating/pacing relay can be retrofitted and is operational once it has been plugged into the relay board.

The fault indicating relay (NC) switches with all fault messages (red LED) and for the warning message "Liquid level low 1st stage" (yellow LED) and the fault message "Liquid level low 2nd stage".

The pacing relay (NO) switches with every stroke. The pacing relay cannot be modified.

Electrical interface

for semiconductor switch pacing relay:

Data	Value	Unit
Max. residual voltage at $I_{off\ max} = 1\ \mu A$	0.4	V
Pacing pulse duration, approx.	100	ms

Identity code 4

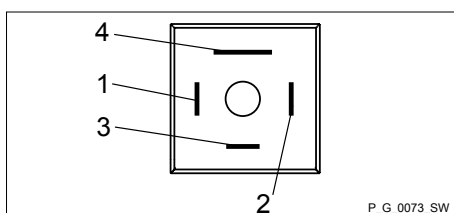


Fig. 10: Assignment on the pump

To pin	VDE cable	Contact	Relay
1	yellow	Normally open contact / NO	Relay 1
4	green	C (common)	Relay 1
3	white	Normally open contact / NO	Relay 2
2	brown	C (common)	Relay 2

## 8.3.3.4 "Current output plus relay" output (identity code A)

A relay combined with a current output can be ordered as an option. The relay switches as a fault indicating relay (NC) with all fault messages and with warning message "Liquid level low 1st stage" and fault message "Liquid level low 2nd stage".

The behaviour is factory-programmed. The polarity of the fault indicating relay can be changed from NC to NO in the menu or via the DULCONNEX Blue app.

The pump emits 4 mA at 0 l/h for the current output, and the beta/X emits 20 mA at the respective maximum pump capacity. In the event of a fault, the current output emits 3.6 mA.

The current output plus relay can be retrofitted and operates once it is plugged into the board.

### Electrical interface

for current output

Data	Value	Unit
Open circuit voltage:	8	V
Current range:	4-20	mA
Ripple, max.:	80	$\mu\text{A ss}$
Load, max.:	250	$\Omega$

for semiconductor switch ("relay"):

Data	Value	Unit
Max. residual voltage at $I_{\text{off max}} = 1 \mu\text{A}$	0.4	V
Pacing pulse duration, approx.	100	ms

### Identity code A

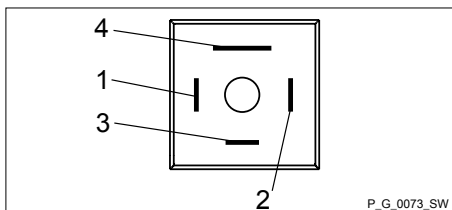


Fig. 11: Assignment on the pump

To pin	VDE cable	Contact	Relay
1	yellow	"+"	Current output
4	green	"-"	Current output
3	white	Normally open contact / NO	Relay
2	brown	C (common)	Relay

## 9 Start up



### WARNING!

#### Danger from hazardous substances!

Possible consequence: fatal or very serious injuries.

When handling hazardous substances, please ensure that you have read the latest material safety data sheets provided by the manufacturer of the hazardous substances. The measures required are described in the material safety data sheet. Check the material safety data sheet regularly and replace it, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that the material safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workplaces affected.



### WARNING!

#### Dangerous reactions are possible due to contact of feed chemical with water

The feed chemical can mix and react in the liquid end with water remaining after testing in the factory.

- Read the safety data sheet on the feed chemical.
- Blast the liquid end with compressed air.
- Flush the liquid end with a suitable medium through the suction connector.



### CAUTION!

#### Warning of feed chemical spraying around

An unsuitable feed chemical may damage the wetted parts of the pump.

- Take into account the resistance of the wetted materials when selecting the feed chemical - refer to the ProMinent Resistance List in the Product Catalogue or at [www.prominent.com](http://www.prominent.com).

### Starting up the metering pump

1. ➤ Fill the liquid end by pressing the priming key. In the event of back pressure, the vent screw on the dosing head may need to be opened.
2. ➤ Check the pump connectors and connections for leak-tightness.
3. ➤ Check the liquid end for leak-tightness and tighten the screws and valves if necessary - see [Chapter 11.2.4 'Tightening torques'](#) on page 46.
4. ➤ Start up the system.
5. ➤ After 24 hours of operation: Tighten the screws on the dosing head - see [Chapter 11.2.4 'Tightening torques'](#) on page 46.

### Draining the liquid end

1. ➤ Close the shut-off valves on the suction and pressure sides.



**WARNING!**

Chemicals leak from the hose.

2. ➤ Unscrew the hose on the suction and pressure side
3. ➤ Turn the pump so that the pressure connector is facing downwards.
4. ➤ Allow the medium to flow out of the liquid end.
5. ➤ Flush a suitable medium through the suction connector and then blast with compressed air.

## 10 Operation



### WARNING!

#### Danger of electric shock

Supply voltage may be present inside the pump housing.

- Safely and quickly disconnect the pump from the mains/power supply if the pump housing has been damaged.

Only return the pump to operation after an authorised repair.

### 10.1 Manual operation

#### Instructed person

The instructed person has been instructed by the operator in a training session about the tasks allocated to them and potential dangers arising from incorrect and improper conduct.

#### 10.1.1 Dosing rate

The dosing rate is set directly in the pump in l/h or ml/h. The dosing rate can also be set in gallons.

The dosing rate is set directly in the pump in l/h or GPH (Gallons per hour).

If the beta/ X is ordered in the "EU" region version, it is set in l/h as standard.

In the "US" region version, the default setting is GPH.

The unit of volume can be swapped from l/h to GPH via the pump menu or the DULCONNEX Blue app.

#### 10.1.2 Functions

The pump has the following functions:

##### "Pause" function

The pump can be remotely stopped via the "External control" socket. The "Pause" function only works via the "External control" socket.

##### "Stop" function

The pump can be stopped by pressing the Start/Stop key.

##### "Priming" function

Optimum priming occurs once the priming key has been pressed.

##### "Level switch" function

Information about the liquid level in the dosing tank is reported to the pump via the level switch socket or the DULCOLEVEL radar sensor (Bluetooth interface).

If the 2-stage level switch is plugged into the beta/ X, it is prioritised over a radar sensor potentially connected via Bluetooth. If the level sensor cable of the 2-stage suction lance is plugged in, the cable always has priority over Bluetooth with regard to fault and warning thresholds for the liquid level.

### "Auxiliary frequency" function

Enables a stroke rate to be switched on via the "External control" socket. This auxiliary frequency has priority over the operating mode volume settings. In the default setting, the pump runs at maximum dosing rate under AUX.

### 10.1.3 External contact

ml/contact are entered directly in External contact operating mode.

An l/h value can be entered in Contact operating mode. This is a limitation of the maximum dosing rate in Contact operating mode. The contacts are performed more slowly because of the limit / volume limitation.

Example: if 5 l/h is set in Contact mode, the beta/ X does not meter more than 5 l/h independently of the number of incoming contacts. The pressure stroke is extended if there is a limit.

There is no memory function in Contact mode. Contacts that cannot be processed are not stored.

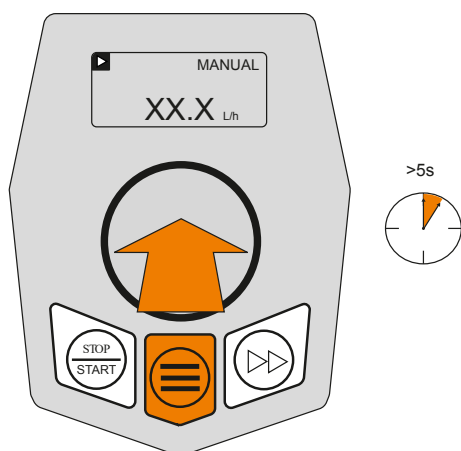
The lowest volume that can be set in Contact operating mode is 0.01 ml/contact. The beta/ X collects the incoming contacts until a full stroke can be performed.

### 10.1.4 External analogue

The beta/ X can be controlled by 0-20 mA and 4-20 mA in "External analogue" operating mode. The mA input is not scalable.

## 10.2 Factory settings

### Resetting the pump to factory settings



1. Press the menu button and the Clickwheel simultaneously for 5 seconds.  
⇒ The "FACTORY RESET" menu opens.
2. Use the Clickwheel to confirm the reset to factory settings.

# 11 Maintenance



## WARNING!

It is mandatory that you read the safety information and specifications in the "Storage, Transport and Unpacking" chapter prior to shipping the pump.



## CAUTION!

### Warning of feed chemical spraying around

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

## 11.1 Service message / maintenance message

If the operating time of the motor exceeds 1 year, or the pump has been switched on for more than 2 years, the service symbol appears and the yellow warning LED lights up.

Maintenance needs to be carried out when the service symbol appears.

Diaphragm and valves (part of the spare parts kit) need to be replaced, see [Chapter 12.2 'Replacing the diaphragm'](#) on page 48

## 11.2 Overview of maintenance work

Task	Personnel	Interval
Visual check for damage. See check-list <a href="#">Tab. 4 'Check-list'</a> on page 44.	Technical personnel	Quarterly
Check standard liquid end. See <a href="#">Chapter 11.2.2 'Maintenance work - standard liquid end'</a> on page 44.	Technical personnel	Quarterly
Check liquid end with vent valve. See <a href="#">Chapter 11.2.3 'Maintenance work - liquid end with vent valve'</a> on page 45.	Technical personnel	Quarterly
Check dosing head screw torque. See <a href="#">Chapter 11.2.4 'Tightening torques'</a> on page 46.	Technical personnel	Annually
Check the operation of the relief valve.	Technical personnel	Annually
Replace diaphragm / valves / seals.	Technical personnel	Annually

### 11.2.1 Visual check for damage


This list includes all the key steps involved in the visual check of the unit.

Tab. 4: Check-list

Object to be inspected	More details
Check the housing for damage	Return the pump to us in the event of any damage.
Check the liquid end for leaks	If a leak is identified, dismantle the dosing head, and check for the source of the fault.
Check the diaphragm	The diaphragm needs to be replaced if it is ruptured or the service message appears. See ↪ <i>Chapter 12.2 'Replacing the diaphragm' on page 48.</i>
Check valve components	The valves need to be replaced if liquid escapes from them, they are not leak-tight, or the service message appears.
Check seals	Rubber seals: they need to be replaced if they are damaged or brittle. PTFE seals: PTFE seals need to be replaced once they have been released. Seals always need to be replaced together with the valves as a result of a service message

### 11.2.2 Maintenance work - standard liquid end

Standard liquid ends:

Interval	Maintenance work	Personnel
Quarterly*	<ul style="list-style-type: none"> <li>■ Check that the hydraulic lines are fixed firmly to the liquid end.</li> <li>■ Check that the discharge and suction valve are tightly fitted.</li> <li>■ Check the leak-tightness of the entire liquid end, see ↪ <i>Chapter 11.2.2 'Maintenance work - standard liquid end' on page 44.</i></li> <li>■ Check that the flow is correct: Briefly prime the pump by pressing the  [Priming] button.</li> <li>■ Check that the electrical connections are intact.</li> <li>■ Check the integrity of the housing.</li> <li>■ Check that the dosing head screws are tight.</li> </ul>	Technical personnel

\* with normal loading (approx. 30% of continuous operation).

With heavy-duty loading (e.g. continuous operation): shorter intervals.

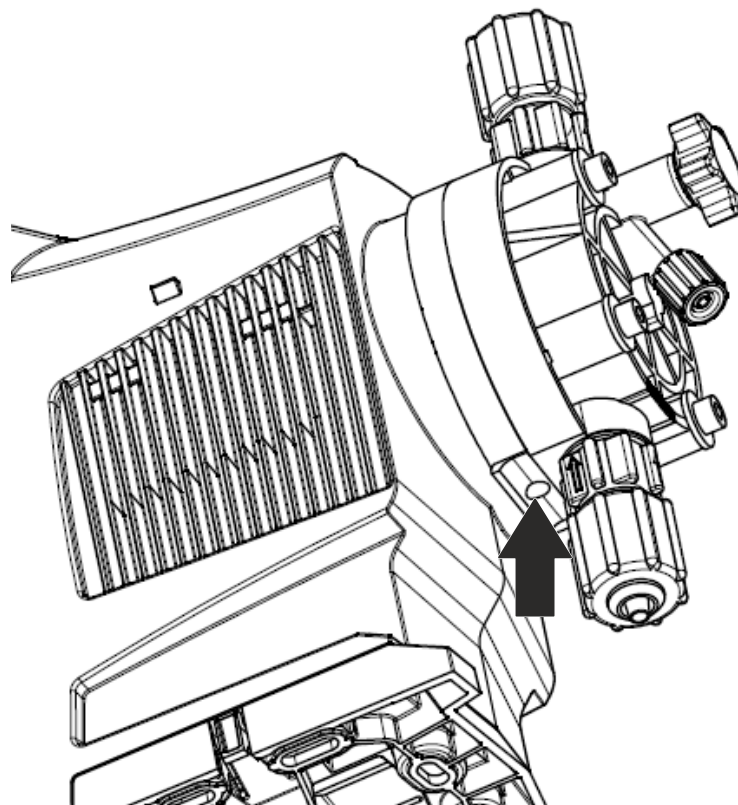


Fig. 12: The leakage hole

Interval	Maintenance work	Personnel
Annually* or when the service message appears	<ul style="list-style-type: none"> <li>■ Replace the diaphragm and valves.</li> </ul>	Technical personnel

\* with normal loading (approx. 30% of continuous operation).

With heavy-duty loading (e.g. continuous operation): shorter intervals.

Check at shorter intervals with feed chemicals that put particular pressure on the diaphragm, e.g. containing abrasive additives or chlorine dioxide.

### 11.2.3 Maintenance work - liquid end with vent valve

Liquid ends with vent valve - additionally:

Interval	Maintenance work
Quarterly*	<ul style="list-style-type: none"> <li>■ Check that the bypass line is fixed firmly to the liquid end.</li> <li>■ Check that the vent valve is firmly fixed in place.</li> <li>■ Check the pressure and bypass line for kinks.</li> <li>■ Check that the vent valve is operating correctly.</li> </ul>

\* with normal loading (approx. 30% of continuous operation).

With heavy-duty loading (e.g. continuous operation): shorter intervals.

## 11.2.4 Tightening torques

### Tightening torques

Specification	Value	Unit
Tightening torques for dosing head screws	4.5 - 5.0	Nm
Tightening torques for valves (plastic head)	5 - 6	Nm
Tightening torques for valves (steel head size 4.7)	22 - 24	Nm
Tightening torques for valves (steel head size 9.2)	30 - 32	Nm

## 12 Repair

### Safety information



#### WARNING!

##### Danger of electric shock

Unauthorised repairs inside the pump can result in an electric shock etc.

For this reason, only allow a ProMinent subsidiary or representative to perform repairs inside the pump, in particular the following:

- Replacement of damaged mains connection lines
- Replacement of the electronic control/board



#### WARNING!

It is mandatory that you read the safety information and specifications in the "Storage, Transport and Unpacking" chapter prior to shipping the pump.



#### WARNING!

##### Contact with the feed chemical

Wetted parts are exposed and touched during repair work.

- Protect yourself against the feed chemical if it is hazardous. Take into account the material safety data sheet for the feed chemical.



#### CAUTION!

##### Warning of feed chemical spraying around

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

List of repairs that may be carried out by qualified technical personnel, in accordance with the operating instructions:

- Valve replacement
- Diaphragm replacement

All other repairs: Contact the ProMinent subsidiary responsible for your company.

### 12.1 Replacing valves

Do not clean valves for plastic heads, instead completely replace them. The complete valves are part of the spare parts kit. Unscrew the old valves and screw in the new valves.

Valves for the steel heads are an exception to this. The spare parts kit only contains the seals, ball seats and valve balls instead of the complete valve body for these heads. Steel valve bodies are not normally subject to wear.

## 12.2 Replacing the diaphragm

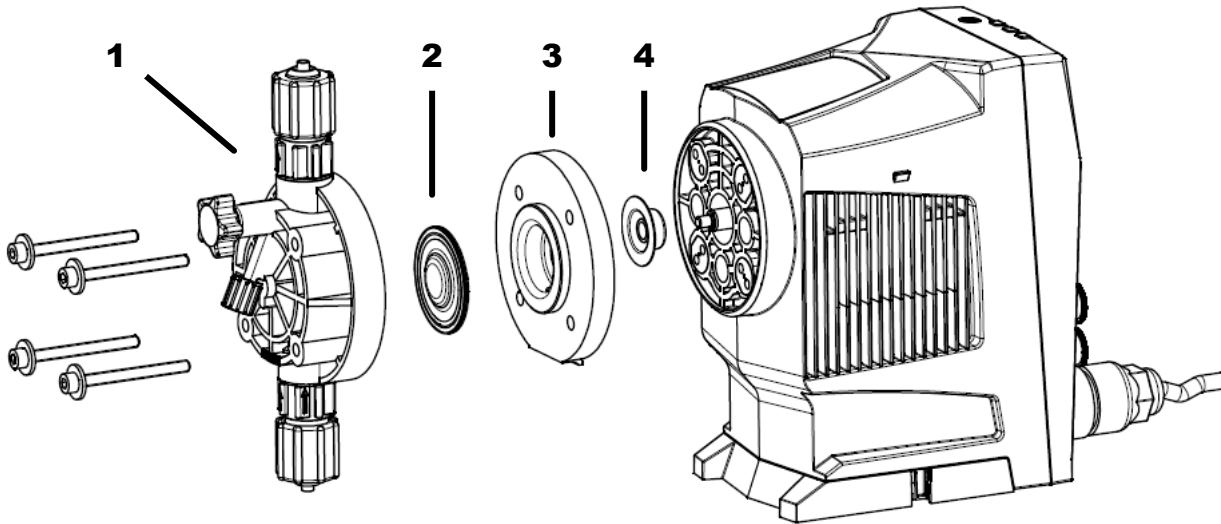


Fig. 13: Partially exploded view of the liquid end

- 1 Dosing head
- 2 Diaphragm
- 3 Backplate
- 4 Safety diaphragm

Feed chemical may have accumulated behind the diaphragm in the backplate following a leak - depending on the design.

- Take this feed chemical into consideration when planning a repair if it is hazardous.
- Take protective measures, if necessary.
- Note the material safety data sheet for the feed chemical.
- Ensure that the system is at atmospheric pressure.

1. ➤ Close the shut-off valves on the suction and pressure sides.

2. ➤



**WARNING!**

Chemicals leak from the hoses.

Unscrew the hoses on the suction and pressure side.

3. ➤ Drain the liquid end.


Turn the liquid end upside down and allow the feed chemical to drain out.

Use a suitable medium to rinse the pump.

Flush the liquid end thoroughly when using hazardous feed chemicals.





4. ➤ Loosen and remove the screws on the dosing head (1).

5. ➤ Remove the dosing head (1) from the pump housing.

6.  Select the change position in the menu.
  - ⇒ The diaphragm moves to the front limit position and can then be changed.



*Moving to the change position resets the maintenance timer of the pump to 0 and cancels the service message.*

7.  Loosen and remove the diaphragm (2) by turning it slightly anti-clockwise.
8.  Insert the new diaphragm and tighten clockwise.
9.  Reverse the change position in the menu.
10.  Attach the dosing head (1) in the specified installation direction and tighten the screws.

### 12.2.1 Changing the vPTFE or vPE diaphragm

#### Spare parts for the vPTFE or vPE diaphragm

The vPTFE (full PTFE) or vPE diaphragm (full PE diaphragm) is replaced in the same way as the standard diaphragm.



*A fitted vPTFE or vPE diaphragm needs to be replaced once the dosing head screws have been loosened, as the pump will otherwise no longer be tight.*

A spare parts kit contains:

- Diaphragm
- Suction valve
- Discharge valve
- Sealing set
- Connector kit

# 13 Troubleshooting

## Safety information



**WARNING!**

**Warning of hazardous feed chemical**

Should a dangerous feed chemical be used: it may escape from the hydraulic components when working on the pump, material failure or incorrect handling of the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Adhere to the material safety data sheet for the feed chemical.
- Drain and flush the liquid end before working on the pump.



**WARNING!**

**Fire hazard with flammable media**

- The pump may not work if there is a mixture of feed chemical with oxygen in the liquid end. A specialist may need to take appropriate actions (using inert gas, ...).



**CAUTION!**

**Warning of feed chemical spraying around**

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.



**WARNING!**

**Feed chemical can be physiologically contaminated**

Only with the FDA version:

Non-FDA-compliant parts will also become wetted in the event of a diaphragm rupture.

- Take this into account if necessary.

### 13.1 Faults without fault message

Fault description	Cause	Remedy	Personnel
Pump does not prime despite venting.	Minor crystalline deposits on the ball seat due to the valves drying out.	Take the suction hose out of the supply tank and thoroughly flush out the liquid end.	Technical personnel

Fault description	Cause	Remedy	Personnel
Pump does not prime despite venting.	Serious crystalline deposits on the ball seat due to the valves drying out.	Replace valves - see "Repair".	Technical personnel
Liquid is escaping from the backplate.	The screws in the dosing head are too loose.	Tighten the screws in the dosing head crosswise - refer to "Repair" for the tightening torque.	Instructed personnel
	The metering diaphragm is not leak-tight.	Replace the metering diaphragm - refer to "Repair".	Technical personnel
Green LED display (operating indicator) does not light up.	The wrong supply voltage or no supply voltage is connected.	Connect the pump correctly to the specified supply voltage - according to the specification on the nameplate.	Electrician

## 13.2 Fault messages

Fault description	Cause	Remedy	Personnel
Red LED display (fault indicator) lights up and the pump stops.	The fluid level in the supply tank has reached "Liquid level low 2nd stage".	Top up the supply tank.	Instructed personnel
	The pump is in "External analogue" operating mode and the control current has risen above 20.5 mA (fault signal).	Clear the cause of the fault on the pump.	
	The pump is in "External analogue" operating mode, set to "4-20 mA", and the control current has fallen below 4 mA.	Clear the cause of the low control current (e.g. cable break).	



## 13.3 Warning messages

Fault description	Cause	Remedy	Personnel
Yellow LED display (warning indicator) lights up.	The liquid level in the supply tank has reached "Liquid level low 1st stage".	Top up the supply tank.	Instructed personnel
Yellow LED display (warning indicator) lights up.	The metering pump requires a service. Maintenance timer recommends maintenance.	Replace the diaphragm and valves (components of the spare parts kit). Performing a diaphragm change in the pump menu resets the maintenance timer. Alternatively, the maintenance timer can be reset in the DUL-CONNEX Blue app	Instructed personnel

## 13.4 Warnings and faults with fault message

### 13.4.1 Warnings

Warnings are displayed by the yellow LED and a symbol. The content of the warning can be viewed in the app




No.	Description	Symbol	Action
1	Level	 Level switch input warns of low feed chemical	Tank is almost empty Check whether there is sufficient feed chemical in the tank
7	Temperature	 Temperature is critical	Check whether the temperature is outside of the specification. Check for ventilation or air conditioning, if necessary.
17	Level sensor (DUL-COLEVEL)		DULCOLEVEL radar sensor emits a warning message. Tank is almost empty, top up tank – or the tank is over-full.

### 13.4.2 Fault

The symbol appears in the status display. The fault appears in the main display and hides the main parameter. If several faults are pending, they are shown sequentially.

#### 13.4.2.1 Faults requiring acknowledgement

There are only 2 faults that require acknowledgement: drive fault (no. 49) and drive missing (no. 58). Should one of these faults occur, it can be reset once rectified using the "Start/Stop key".

No.	Description	HMI display text	Action
33	Level	 LEVEL	Tank is empty. Check whether there is sufficient feed chemical in the tank.
35	Analogue current low	mA LOW	This fault is set with an input current of $\leq 3.8$ mA.
36	Analogue current high	mA HIGH	This fault is set with an input current of $\geq 20.5$ mA.
42		 SYSTEM	Return or replace pump.
47	Temperature too high/low	 TEMPERATURE	Check the temperature: is it outside of the specification? Provide ventilation or air conditioning, if necessary. Check the installation site of the pump: <ul style="list-style-type: none"> <li>■ Is the pump standing in the sun? Cover the pump if necessary</li> <li>■ Is there a heat source close to the pump?</li> </ul>
49		DRIVE-ERROR	Pressure too high. Check whether the line/valve is blocked or whether the system pressure is too high for the pump

No.	Description	HMI display text	Action
51	Supply voltage too low	POWER-FAIL	Ensure that there is adequate mains voltage. The pump will switch off if the mains voltage is too low. The pump will boot up again automatically when there is adequate mains voltage
58	Drive missing	NO DRIVE	Return the pump

## 14 Decommissioning and disposal

### 14.1 Decommissioning



#### **WARNING!**

##### **Danger from chemical residue**

There is chemical residue in the liquid end and at the housing after operation. This chemical residue could be hazardous to people.

- It is essential that the safety information in the "Storage, transport and unpacking" section is read before shipping or transport.
- Thoroughly clean the liquid end and the housing of chemicals and dirt. Pay attention to the material safety data sheet for the feed chemical.



#### **WARNING!**

##### **Warning of hazardous feed chemical**

Should a dangerous feed chemical be used: it may escape from the hydraulic components when working on the pump, material failure or incorrect handling of the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Adhere to the material safety data sheet for the feed chemical.
- Drain and flush the liquid end before working on the pump.



#### **WARNING!**

##### **Fire hazard with flammable media**

- The pump may not work if there is a mixture of feed chemical with oxygen in the liquid end. A specialist may need to take appropriate actions (using inert gas, ...).



#### **CAUTION!**

##### **Warning of feed chemical spraying around**

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

Take into account the information in the "Storage, transport and unpacking" section if the system is temporarily decommissioned.

1. ➤ Disconnect the pump from the mains power supply.
2. ➤ Unscrew the back pressure valve from the discharge valve – slowly to allow the pressure to dissipate.
3. ➤ Drain the liquid end by turning the pump upside down and allowing the feed chemical to run out.
4. ➤ Flush the liquid end with a suitable medium; flush the dosing head thoroughly when using hazardous feed chemicals!

## 14.2 Disposal



### CAUTION!

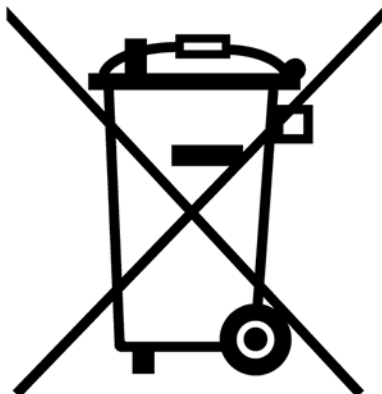
#### Environmental hazard due to incorrect disposal

There are components in the pump, which can have a toxic effect on the environment.

- Note the pertinent regulations currently applicable in your country.

The pump must be cleaned before disposal

Sign indicating EU collection system



In accordance with the European Directive 2012/19/EU on waste electrical and electronic equipment, this device features the symbol showing a waste bin with a line through it. The device must not be disposed of along with domestic waste. To return the device, use the return and collection systems available and observe the local legal requirements.



## 15 Technical data

### 15.1 Performance data

Pump type	Pump capacity at max. back pressure						Connector	Suction lift*	Priming lift**	Shipping weight	
	bar	psi	l/h	gph	ml/stroke	Strokes/min				outer Ø x inner Ø	mWC
BTXB16006	16	232	6	1.5	0.49	200	6x4	5	4	2.4	2.9
BTXB07018	7	101	18	4.7	1.48	200	8x5	4	4	2.6	3.9
BTXB04028	4	58	27.6	7.3	2.32	200	12x9	4	4	2.6	4.0
BTXB02050	2	29	50.4	13.3	4.21	200	12x9	3	3	2.7	4.5

\* Suction lift with a filled suction line and liquid end.

\*\* Priming lifts with moist valves. Priming lift with a free drain or opened vent valve.

### 15.2 Precision

#### 15.2.1 Standard liquid end

Description	Range	Unit
Capacity range of the product range	-10 ... +10	%
Reproducibility	±1	% **

\*\* - under constant conditions. The reproducibility is based on the maximum capacity of the pump.

### 15.3 Viscosity

The liquid ends are suitable for the following viscosity ranges:

Version	Range	Unit
standard	0 ... 1000	mPas

\* Only when the installation is correctly adjusted.

## 15.4 Material specifications

### Standard liquid ends

Version	Dosing head	Suction / discharge valve	Seals	Valve seats	Diaphragms	Valve balls
PVT	PVDF	PVDF	FEP	PVDF	Standard diaphragm - wetted PTFE	Ceramic AL2O3
PVM	PVDF	PVDF	FEP	PVDF	Fully PTFE diaphragm	Ceramic AL2O3
PET	PE	PE	FEP	PEEK	Standard diaphragm - wetted PTFE	Ceramic AL2O3
PEP	PE	PE	EPDM	PEEK	Fully PE diaphragm	Ceramic AL2O3
SST	Stainless steel 1.4404	Stainless steel 1.4404 Valve insert 4.7: 1.4404 Valve insert 9.2: 1.4581	PTFE flat seals Pressure and suction-side	Ceramic ZrO2	Standard diaphragm - wetted PTFE	Ceramic AL2O3
SST USA	Stainless steel 1.4404	Stainless steel 1.4404 Valve insert 4.7: 1.4404 Valve insert 9.2: 1.4581	PTFE flat seals Pressure and suction-side	Ceramic ZrO2	Standard diaphragm - wetted PTFE	Ceramic AL2O3

All wetted materials in the version with FDA-compliant seals adhere to the following FDA guidelines:

Material	Guideline
PTFE	21CFR177.1510
PVDF	21CFR177.2510
PP	21CFR177.1520
EPDM/FKM	21CFR177.2600

### Pump

Housing parts: Polypropylene (PP with 30% fibreglass)

## 15.5 Electrical data

Design: 100 - 240 V AC  $\pm$ 10%, 50/60 Hz, beta/ X

Description	Range	Unit
Supply voltage	100 - 240	V AC $\pm$ 10%
Frequency	50/60	Hz
Nominal power approx.	15	W
Current I eff	300 ... 140	mA
Switch on peak current (for 3...5 ms)	20	A
Fuse (cannot be changed)	1.6	Slow-blow

## 15.6 Temperatures

Pump, fully assembled

Description	Range	Unit
Storage and transport temperature	-20 ... +60	°C
Ambient temperature in operation (drive and control)	-10 ... +45	°C

Liquid end, long-term\*

Tab. 5: Maximum temperature, liquid end

Material version	Value	Unit
PE	50	°C
PV	50	°C
SS	50	°C

\* long term at max. operating pressure, dependent on the ambient temperature and the feed chemical temperature

Minimum temperature, liquid end

Tab. 6: Minimum temperature, liquid end

Material version	Value	Unit
all	-10	°C

Liquid end, short-term\*

Tab. 7: Maximum temperature, liquid end

Material version	Value	Unit
PE	120	°C
PVT	120	°C
SST	120	°C

\* Temp. max., for 15 min. at max. 2 bar, depending on the ambient and feed chemical temperatures

## 15.7 Climate

Material version	Value	Unit
Maximum air humidity*:	95	% relative humidity

\*non-condensing

## 15.8 Installation height

Material version	Value	Unit
Maximum installation height:	2000	m.a.s.l.

## 15.9 Degree of protection and safety requirements

### 15.9.1 Degree of protection

Protection against contact and moisture: The pump is designed in accordance with: IP 66 (EN 60529) and NEMA-4X/indoor (NEMA 250)

### 15.9.2 Safety requirements

Degree of protection: 1 - Mains connection with protective earth conductor

### 15.9.3 Degree of pollution

Degree of pollution: 2

## 16 Declaration of Conformity for Machinery

**For metering pumps:**

In accordance with the DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, ESSENTIAL HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg, Germany,

hereby declare that the product specified below complies with the relevant basic health and safety requirements of the EC Directive on the basis of its functional concept and design and in the version marketed by us.

Any modification to the product that we have not approved will invalidate this declaration.

*Tab. 8: Extract from the Declaration of Conformity*

Designation of the product:	Metering pump, beta/ X product range
Product type:	BTXB _____ U _____
Serial number:	see nameplate on the unit
Relevant EC Directives:	Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive (2014/35/EU) according to Appendix I, No. 1.5.1 of the Machinery Directive EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN ISO 12100:2010 EN 809:1998 + A1:2009 + AC:2010 EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 EN 61000-6-3:2007 + A1:2011 + AC:2012 EN 61000-6-2:2005 + AC:2005 EN IEC 63000:2018
Date:	31/01/2025

You will find the EU Declaration of Conformity to download on our homepage.

## 17 Index

### 1, 2, 3 ...

"External control" socket . . . . . 19, 33, 41, 42

"Level switch" socket . . . . . 19

### A

About this pump . . . . . 7

Applied harmonised standards . . . . . 60

Assembly . . . . . 23

Auxiliary frequency . . . . . 19, 21, 33, 34, 42

### C

Calibrate . . . . . 18

Connector size . . . . . 56

Contact . . . . . 21

Contact relay . . . . . 33

Contacts . . . . . 42

Continuous display . . . . . 17

Control type . . . . . 51

Current output . . . . . 38

### D

Declaration of clearance . . . . . 14

Declaration of Conformity . . . . . 60

Degree of protection . . . . . 59

Designation of the product . . . . . 60

Dosing rate . . . . . 20, 41

Draining the liquid end . . . . . 55

### E

Electrical data . . . . . 57

External . . . . . 42

External analogue . . . . . 19, 34, 42

External contact . . . . . 19, 33, 34, 42

External frequency changer . . . . . 19, 21

### F

Fault . . . . . 21

Fault indicating and pacing relay . . . . . 21

Fault indicating relay . . . . . 21, 36, 37, 38

Fault indicator (red) . . . . . 19

Fault message . . . . . 17

Fault statuses . . . . . 21

Functions . . . . . 19, 21, 41

### G

General non-discriminatory approach . . . . . 2

### H

Hierarchy of operating modes . . . . . 21

### I

Identification of safety notes . . . . . 9

Identifier . . . . . 17

Identity code . . . . . 5

Inductive consumers . . . . . 33

Installation height . . . . . 58

Installation, electrical . . . . . 32

IP . . . . . 59

### L

Leakage hole . . . . . 44

Level switch . . . . . 19, 35, 36, 41

### M

mA input . . . . . 33

mA output . . . . . 21

mA signal . . . . . 42

Main display . . . . . 17

Mains power supply . . . . . 41

Maintenance . . . . . 43

Manual . . . . . 21

Material specifications . . . . . 57

Metering pumps with vent valve . . . . . 31

Minimum stroke length . . . . . 56

Multifunctional switch . . . . . 20, 41

### N

Non-discriminatory approach . . . . . 2

### O

Operating indicator (green) . . . . . 19

Operating modes . . . . . 19, 20, 21

Operation . . . . . 41

Overview of equipment . . . . . 16

### P

Pacing relay . . . . . 37, 38

Parallel connection . . . . . 33

Pause . . . . . 19, 21, 33, 34, 41

Performance data . . . . . 56

Power consumption . . . . . 57

Precision . . . . . 56

Pressure display . . . . . 17

Priming . . . . .	21, 41
Protection against contact and moisture . . . . .	59
Pulse control switch . . . . .	42

**Q**

Qualification of personnel . . . . .	8
--------------------------------------	---

**R**

Radioactive . . . . .	14
RC gate . . . . .	33
Relay polarity . . . . .	36
Relays . . . . .	21, 36
Relevant directives . . . . .	60
Remote operation . . . . .	41
Replacing the diaphragm . . . . .	48
Replacing valves . . . . .	47
Reproducibility . . . . .	20, 41, 56
Return pipe . . . . .	31

**S**

Scope of delivery . . . . .	15
Secondary display . . . . .	17
Semiconductor switch . . . . .	37, 38
Serial number . . . . .	60
Stop . . . . .	21, 41
Storage . . . . .	14
Stroke length . . . . .	20, 41
Stroke rate . . . . .	20, 41
Strokes . . . . .	42

**T**

Technical data . . . . .	56
Test (function) . . . . .	21, 41
Transport . . . . .	14
Troubleshooting . . . . .	50

**U**

Unpacking . . . . .	14
---------------------	----

**V**

Varistor . . . . .	33
Venting . . . . .	31
Viscosity . . . . .	56

**W**

Warning indicator (yellow) . . . . .	19
Warning message . . . . .	17, 36
Warning sign . . . . .	9

---

---

ProMinent GmbH  
Im Schuhmachergewann 5-11  
D-69123 Heidelberg, Germany  
Telephone: +49 6221 842-0  
Fax: +49 6221 842-419  
Email: [info@prominent.com](mailto:info@prominent.com)  
Internet: [www.prominent.com](http://www.prominent.com)

990609, 3, en\_GB