

# Operating instructions

## Solenoid Metering Pump

### gamma/ XL, GXLa

EN



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! Should you already know this information, you will benefit more from referring to the operating instructions.

The following are highlighted separately in the document:

■ Enumerated lists

➔ Instructions

⇒ Outcome of the instructions

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

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

[Keys]

*'Menu level 1 → Menu level 2 → Menu level ...':* Menu paths

*'Software interface text'*

### Information



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

### Safety Information

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

### State the identity code and serial number

Please state the identity code and serial number, which you can find on the nameplate or in the menu under *'Setting / Menu → Information'* when you contact us or order spare parts. This enables the unit type and material versions to be clearly identified.

# Table of contents

<b>1</b>	<b>Identity code.....</b>	<b>6</b>
<b>2</b>	<b>About This Pump.....</b>	<b>8</b>
<b>3</b>	<b>Safety Chapter.....</b>	<b>9</b>
<b>4</b>	<b>Storage, Transport and Unpacking.....</b>	<b>14</b>
<b>5</b>	<b>Overview of equipment and control elements.....</b>	<b>15</b>
	5.1 Overview of equipment.....	15
	5.2 Control elements.....	16
	5.2.1 Control elements.....	16
	5.2.2 Key functions.....	19
<b>6</b>	<b>Functional description.....</b>	<b>21</b>
	6.1 Liquid End.....	21
	6.2 Drive unit.....	21
	6.3 Capacity.....	23
	6.4 Self-Bleeding.....	23
	6.5 Operating modes.....	23
	6.6 Functions.....	24
	6.7 Relay (Options).....	24
	6.8 LED displays.....	25
	6.9 Hierarchy of operating modes, functions and fault statuses.....	25
<b>7</b>	<b>Assembly.....</b>	<b>26</b>
<b>8</b>	<b>Installation, hydraulic.....</b>	<b>27</b>
	8.1 Installing hose lines.....	28
	8.1.1 Installation of metering pumps without bleed valve.....	28
	8.1.2 Installation of metering pumps with bleed valve.....	30
	8.2 Basic installation notes.....	31
<b>9</b>	<b>Installation, electrical.....</b>	<b>32</b>
	9.1 Supply voltage connector - mains voltage.....	33
	9.2 Description of the terminals.....	33
	9.2.1 "Config I/O" terminal.....	33
	9.2.2 "External control" terminal.....	35
	9.2.3 "Level switch" terminal.....	36
	9.2.4 "Metering monitor" terminal.....	37
	9.2.5 "Diaphragm rupture indicator" terminal.....	38
	9.2.6 Relay.....	38
<b>10</b>	<b>Basic set-up principles.....</b>	<b>42</b>
	10.1 Basic principles for setting up the control.....	42
	10.2 Checking adjustable variables.....	44
	10.3 Changing to Setting mode.....	44
<b>11</b>	<b>Set up / 'Menu'.....</b>	<b>45</b>
	11.1 'Information'.....	45
	11.2 'Settings'.....	45
	11.2.1 'Operating mode'.....	45
	11.2.2 'Automatic'.....	50
	11.2.3 'Stroke length'.....	50
	11.2.4 Dosing.....	51
	11.2.5 Concentration.....	55
	11.2.6 Calibration.....	60
	11.2.7 System.....	62
	11.2.8 Inputs/outputs.....	64
	11.2.9 Config I/Os.....	68
	11.2.10 Bleeding.....	69

11.2.11	<i>'Priming time'</i> .....	70
11.2.12	<i>'Set time'</i> .....	70
11.2.13	<i>'Date'</i> .....	71
11.3	Timer.....	71
11.3.1	Activation / deactivation.....	71
11.3.2	Setting the timer.....	72
11.3.3	Clear all.....	79
11.3.4	Examples.....	79
11.3.5	Timer information.....	83
11.3.6	Typical pitfalls Timer functional faults.....	83
11.3.7	Brief explanation of selected functions.....	84
11.4	<i>'Service'</i> .....	87
11.4.1	<i>'Access protection'</i> .....	88
11.4.2	<i>'Password'</i> .....	88
11.4.3	<i>'Clear counter'</i> .....	88
11.4.4	<i>'Error log book'</i> .....	89
11.4.5	<i>'Diaphragm replacement'</i> .....	89
11.4.6	<i>'Display'</i> .....	89
11.4.7	<i>'Factory setting'</i> .....	90
11.4.8	Diaphragm part number: XXXXXXXX.....	90
11.4.9	Spare parts kit part number: XXXXXXXX.....	90
11.5	<i>'Language'</i> .....	90
<b>12</b>	<b>Operation.....</b>	<b>91</b>
12.1	Manual operation.....	91
<b>13</b>	<b>Maintenance.....</b>	<b>93</b>
<b>14</b>	<b>Carrying out repairs.....</b>	<b>95</b>
14.1	Replacing the diaphragm.....	96
14.2	Cleaning the Diaphragm Rupture Indicator.....	98
14.3	Cleaning valves.....	98
<b>15</b>	<b>Troubleshooting.....</b>	<b>99</b>
15.1	Faults without a fault message.....	99
15.2	Faults with error message.....	100
15.2.1	Fault messages on the LCD screen.....	100
15.2.2	Warning messages on the LCD screen.....	101
15.2.3	All other faults.....	102
15.3	Log book.....	102
15.3.1	Fault messages in the log book.....	102
15.3.2	Warning messages in the log book.....	103
15.3.3	Event messages in the log book.....	104
15.3.4	Log book entry - Detailed view.....	104
<b>16</b>	<b>Decommissioning and disposal.....</b>	<b>106</b>
<b>17</b>	<b>Technical data.....</b>	<b>108</b>
17.1	Performance data.....	108
17.2	Accuracy.....	108
17.2.1	Standard Liquid End.....	108
17.2.2	Self-Bleeding Liquid End.....	109
17.3	Viscosity.....	109
17.4	Material specifications.....	109
17.5	Electrical data.....	110
17.6	Temperatures.....	110
17.7	Climate.....	110
17.8	Altitude of site.....	110
17.9	Degree of Protection and Safety Requirements.....	111
17.10	Compatibility.....	111
17.11	Weight.....	111



	17.12 Sound pressure level.....	111
18	Exploded drawings.....	112
19	Dimensional drawings.....	139
20	Declaration of Conformity for Machinery.....	145
21	Operating / set-up overview gamma/ XL.....	146
22	gamma/ XL operating menu, overall.....	148
23	Continuous displays and secondary displays.....	155
24	Installation instructions: Retrofitting Relays .....	157
25	Index.....	159

# 1 Identity code

## Product range gamma/ XL

GXLa	Type	
	----	Performance data and type - see nameplate
		<b>Dosing head material</b>
	NP	Clear acrylic
	PV	PVDF
	SS	Stainless steel
		<b>Seal material</b>
	T	PTFE
	F	PTFE, FDA-compliant
		<b>Dosing head design</b>
	0	without bleed valve, without valve spring
	1	without bleed valve, with valve spring
	2	with bleed valve, without valve spring
	3	with bleed valve, with valve spring
	4	without bleed valve, with valve spring for more high-viscosity media (HV)
	7	Self-bleeding with groove (SEK)
		<b>Hydraulic connector</b>
	0	Standard connection in line with technical data
	5	Connector for 12/6 hose, suction side standard
	F	Connector on discharge side for 8/4 hose, standard on suction side
		<b>Diaphragm rupture indicator</b>
	0	without diaphragm rupture indicator
	1	With diaphragm rupture indicator, optical sensor, electrical signal
		<b>Design</b>
	0	Hous. RAL5003 / Hood RAL2003
		<b>Logo</b>
	0	with ProMinent logo
	2	without ProMinent logo
		<b>Electrical connection</b>
	U	100-230 V ± 10%, 50/60 Hz
		<b>Cable and plug</b>
	A	2 m European
	B	2 m Swiss
	C	2 m Australian
	D	2 m USA / 115 V
	1	2 m open end
	..	...
		<b>Relay, pre-set to ...</b>
	0	no relay
		-

Product range gamma/ XL															
												1	1 x changeover contact 230 V AC – 2 A	Fault indicating relay (N/C)	
												4	2 x N/O 24 V DC – 100 mA	as 1 + pacing relay	
												C	1 x N/O 24 V DC – 100 mA, and 1 x 4-20 mA output	As 1 + 4-20 mA output	
												F	With automatic bleed valve	230 V AC	
												G	with automatic bleed valve and relay output	24 VDC	
												..	...		
												<b>Accessories</b>			
												0	no accessories		
												1	with foot and injection valve, 2 m suction line, 5 m metering line		
												2	as 0 + measuring cup		
												3	as 1 + measuring cup		
												<b>Control version</b>			
												0	Manual + external contact with pulse control		
												3	Manual + external contact with pulse control + analogue 0/4-20mA		
												C	As 3 + CANopen		
												E	As 3 + PROFINET®		
												R	As 3 + PROFIBUS® interface, M12		
												<b>Communication</b>			
												0	without interface		
												B	with Bluetooth		
												W	with Wi-Fi		
												<b>Language</b>			
												EN	German		
EN	English														
ES	Spanish														
FR	French														
...	...														

## 2 About This Pump

### About This Pump

Pumps in the gamma/ XL product range are microprocessor-controlled solenoid metering pumps with the following characteristics:

- Simple adjustment of the capacity directly in l/h
- Integrated pressure measurement and display for greater safety during commissioning and in the process
- Bluetooth and Wi-Fi connection for the simple configuration and call-up of process data (optional)
- Capacity adjustment range 1:40,000
- Direct input of the required final concentration with volume-proportional metering tasks in concentration mode
- Virtually wear-free solenoid drive, overload-proof and economical
- Suitable for continuous micro-metering from approx. 5 ml/h, thanks to the regulated solenoid drive
- Detection of hydraulic malfunctions, such as gas in the dosing head, and no or too high back pressure, ensures smooth processes
- External control via potential-free contacts with pulse step-up and step-down
- External control via 0/4-20 mA standard signal, scalable
- Integrated 1-week/1-month timer
- Guaranteed metering by means of automatic bleeding
- Connection to process control systems via a BUS interface, such as PROFIBUS®, PROFINET®, CAN bus or Wi-Fi
- Automatic mode – volume settings only (l/h, ml/contact etc.)
- Non-automatic mode – settings via stroke length and stroke rate

### 3 Safety Chapter




#### 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 – danger zone.

#### Intended Use

- Only use the pump to meter liquid feed chemicals.
- Only use the pump after 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 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 intended for the metering of gaseous media and solids.
- The pump is not intended for the metering of flammable media without implementing suitable protective measures.
- The pump is not intended for the metering of explosive media.
- The pump is not intended for operation in areas at risk from explosion.
- The pump is not intended for exterior applications without the implementation of suitable protective measures.
- The pump should only be operated by trained and authorised personnel, see the following "Qualifications" table.
- You are obliged to observe the information contained in the operating instructions at the different phases of the unit's service life.

### Safety information



#### **WARNING!**

##### **Warning about personal and material damage**

The pump can start to pump, as soon as it is connected to the mains voltage.

- Install an emergency cut-off switch in the pump power supply line or integrate the pump in the emergency cut-off management of the system.



#### **WARNING!**

##### **Warning of personal injury and material damage**

The pump can start pumping as soon as it has cooled down after the error '*temperature*'.

- Take this into account with the pump and your installation.



#### **WARNING!**

##### **Danger of electric shock**

A mains voltage may exist inside the pump housing.

- If the pump housing has been damaged, you must disconnect it from the mains immediately. It may only be returned to service after an authorised repair.



#### **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 danger**

When pumping inflammable media the operator must take suitable safety precautions.



#### **WARNING!**

##### **Danger from hazardous substances!**

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, 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 these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.



**CAUTION!**

**Warning of feed chemical spraying around**

Feed chemical can spray out of the hydraulic components if they are manipulated 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.
- Depressurise the system before commencing any work on hydraulic parts.



**CAUTION!**

**Warning of feed chemical spraying around**

The metering pump can generate a multiple of its rated pressure. Hydraulic parts can rupture if a discharge line is blocked.

- Correctly install a relief valve in the discharge line downstream of the metering pump.



**CAUTION!**

**Warning of feed chemical spraying around**

An unsuitable feed chemical can damage the parts of the pump that come into contact with the chemical.

- 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 ProMinent.



**CAUTION!**

**Danger of injury to personnel and material damage**

The use of untested third party components can result in injury to personnel and material damage.

- Only fit parts to metering pumps that 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.



**CAUTION!**

**Danger from incorrect dosing**

The metering behaviour of the pump changes if a different liquid end size is fitted.

- Reprogram the pump in the 'Menu / Information → Settings → System → Change head type' menu.



### CAUTION!

#### Warning against illegal operation

Observe the regulations that apply where the device is installed.

### Isolating protective equipment


- Covers for the slots for relays and optional modules - see the chapter entitled "Overview of Equipment and Control Elements"

Customers should only remove the cover for the slots for relays and optional modules and/or a relay or optional module in line with the supplementary instructions for the relays and optional modules.

Customer should only remove the dosing head in accordance with the "Repair" chapter.

Only the ProMinent Service department is authorised to open the housing and the hood (housing the control elements).

### Information in the event of an emergency

In an emergency, either disconnect the mains plug, press  [Start/Stop] or press the Emergency Stop switch installed on the customer's side or disconnect the pump from the mains/power supply in line with the Emergency Stop management guidelines for your system.

If feed chemical escapes, also ensure that the pump's hydraulic environment is at atmospheric pressure. Adhere to the material safety data sheet for the feed chemical.

### 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.

**Sound pressure level**

Sound pressure level  $L_{pA} < 70$  dB according to EN ISO 20361

at maximum stroke length, maximum stroke rate, maximum back pressure (water)

## 4 Storage, Transport and Unpacking

### Safety Information



#### **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

Ambient conditions - refer to "Technical Data" chapter.

### Scope of delivery

Compare the delivery note with the scope of delivery:

- Metering pump with mains cable
- Connector kit for hose/pipe connection (optional)
- Product-specific operating instructions with EC Declaration of Conformity
- Optional accessories

## 5 Overview of equipment and control elements

### 5.1 Overview of equipment

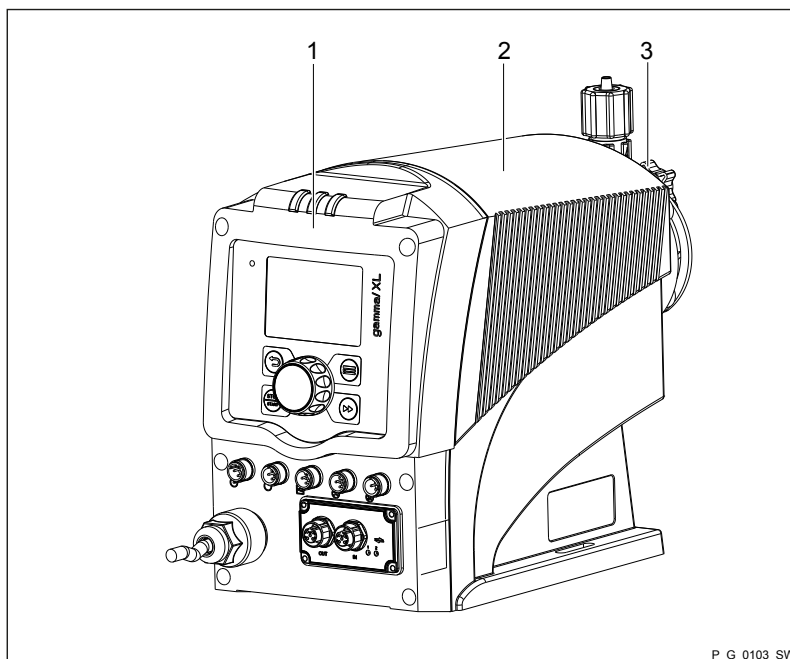


Fig. 2: Overview of equipment, complete

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

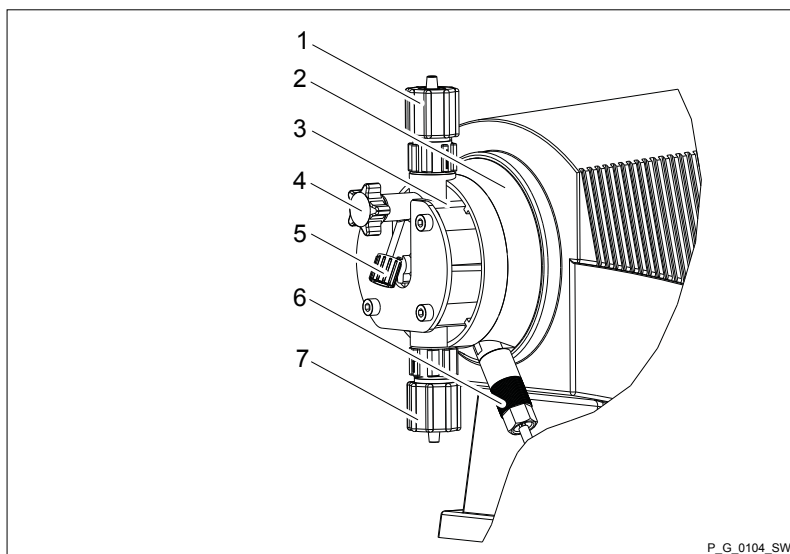


Fig. 3: Liquid end with PV bleed valve

- 1 Discharge valve
- 2 Backplate
- 3 Dosing head
- 4 Bleed valve
- 5 Bypass hose sleeve
- 6 Diaphragm rupture indicator (optional)
- 7 Suction valve



#### **Self-bleeding liquid ends (SER)**

Externally self-bleeding liquid ends with groove (SER) look identical to liquid ends with bleed valve.

## 5.2 Control elements

### Control elements, overview

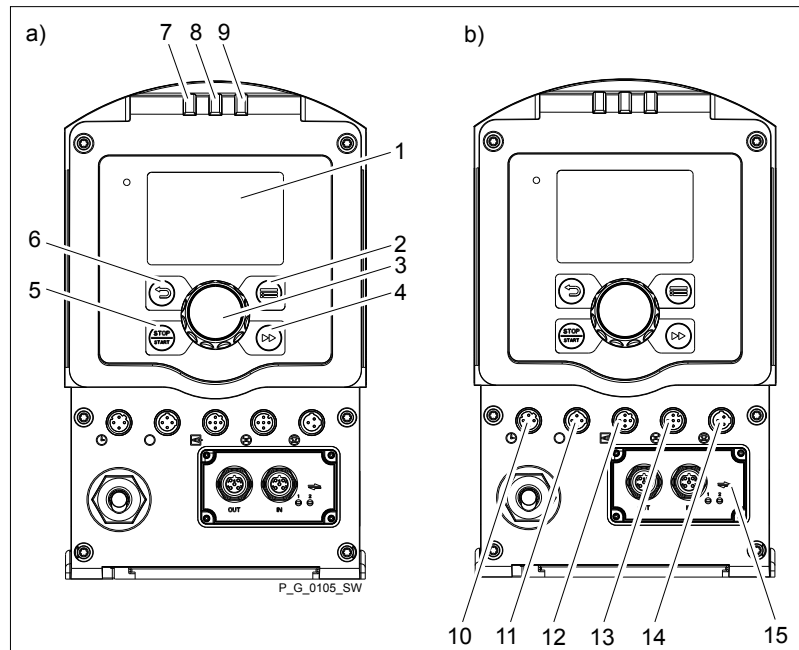


Fig. 4

- 1 LCD screen
- 2 [Menu] key
- 3 Clickwheel
- 4 [Priming] key
- 5 [STOP/START] key
- 6 [Back] key
- 7 Fault indicator (red)
- 8 Warning indicator (yellow)
- 9 Operating indicator (green)
- 10 "Config I/O" terminal
- 11 "Diaphragm rupture indicator" terminal
- 12 "External control" terminal
- 13 "Metering monitor" terminal
- 14 "Level switch" terminal
- 15 Slot for relays and optional modules

### 5.2.1 Control elements



Use this overview to familiarise yourself with the keys and the other control elements on the pump!

Pressure display, identifier and fault displays on the LCD screen

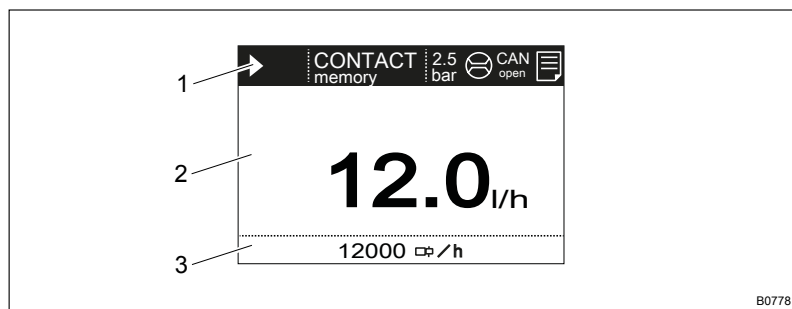


Fig. 5: Construction of continuous display

- 1 Status bar
- 2 Continuous display, central area
- 3 Secondary display

Refer to the chapter entitled "Main displays and secondary displays" in the Appendix for the different main displays and secondary displays.

The LCD screen supports the operation and adjustment of the pump by providing different information and identifiers:

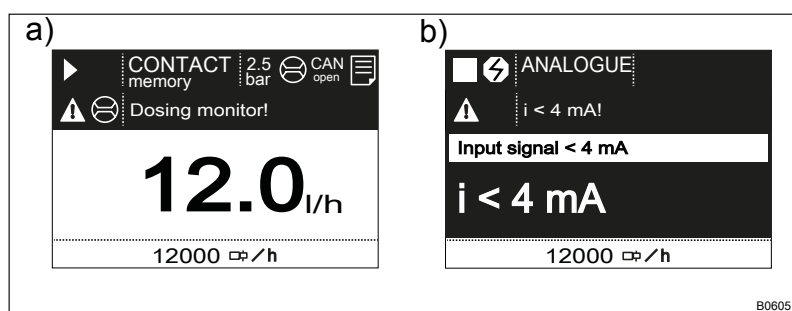


Fig. 6: a) Continuous display with warning message; b) Continuous display with fault message. Explanation of the symbols in the following tables.

The above Figure, Part a) shows that:

















- The pump is in operation
- Is in 'Contact' operating mode with "memory" stroke memory
- The average system pressure is 2.5 bar
- A metering monitor is connected
- A CAN module is being used
- A log entry has been made
- A warning message for the 'metering monitor' is pending
- The capacity of 12.0 l/h has been set
- The stroke rate is 12,000 strokes / h






Tab. 1: Pressure display

Display	Meaning
<b>2.5 bar</b>	Displays the average system pressure

Tab. 2: Identifier and error displays:

Identifier	Meaning
	The pump is working or waiting for a starting signal.

Identifier	Meaning
	The pump was manually stopped using the  [STOP/START] key.
	The pump was remotely stopped (Pause) - via the "External" socket.
	The pump was stopped by an error.
	Only with cyclical batch metering: the pump is waiting for the next cycle.
	Only with 'Access. protect': the pump software is locked.
'AUX'	The pump is currently pumping at auxiliary capacity and/or auxiliary frequency.
'memory'	Only in 'CONTACT' and 'BATCH' operating modes: The "Stroke memory" auxiliary function has been set.
	The pump is in 'ANALOGUE' operating mode. The 'Curve → linear' type of processing is set.
	The pump is in 'ANALOGUE' operating mode. The 'Curve → Upper side band' type of processing is set.
	'Metering → Discharge stroke → optimum' metering profile has been set.
	'Metering → Discharge stroke → fast' metering profile has been set.
	'Metering → Discharge stroke → sine mode' metering profile has been set.
	'Metering → Discharge stroke → continuous' metering profile has been set.
	'Metering → Discharge stroke → DFMa' metering profile has been set.
	'Metering → Discharge stroke → normal' metering profile has been set.
	'Metering → Discharge stroke → HV1' metering profile has been set.
	'Metering → Suction stroke → HV2' metering profile has been set.

Identifier	Meaning
	'Metering → Suction stroke → HV3' metering profile has been set.
	A "Flow Control" metering monitor is connected.
	A diaphragm rupture indicator is connected.
	The pump has created a log about the operation.
	The pump is in the 'Menu' (Set up).









Further explanations can be found in the "Trouble-shooting" chapter.



The pump only shows the metering volume and the capacity in the calibrated state in l or l/h or in gal or gal/h.

## 5.2.2 Key functions

Key	Application	In the continuous displays	In the menu
 [Back]	press	-	Move back to the previous menu point (or a continuous display) - without saving
 [STOP/START]	press	Stop pump,	Stop pump,
		Start pump	Start pump
 [Menu]	press	Move to the menu	Move back to a continuous display
 [Priming]	press	Priming *	Priming *
 [Clickwheel]	press	Start batch (only in 'Batch' operating mode), Acknowledge errors	Move to next menu option (or a continuous display) Confirm entry and save
 [Clickwheel]	turn	Switch between the continuous displays	Change figure or change selection



\* When priming the pump does not run at maximum stroke rate.



*Refer to the "Set-up basics" chapter to adjust figures*



## 6 Functional description

### 6.1 Liquid End

The dosing process is performed as follows: The diaphragm is pressed into the dosing head; the pressure in the dosing head closes the suction valve and the feed chemical flows through the discharge valve out of the dosing head. 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 an electromagnet, controlled by an electronic controller.

#### Drive technology

The drive technology on the gamma/ XL enables the timed progress of the flow to be precisely matched to the requirements of the particular application.

This ensures that the user can set the optimum **discharge stroke** for his application, as required:

Pos.*	Discharge stroke	Application
A.	<i>'optimum'</i>	For maximum precision when metering and the very best results with internal pressure measurement and special functions.
B.	<i>'fast'</i>	For as fast a discharge stroke as possible - the duration of the discharge stroke is dependent on the stroke rate.
C.	<i>'sine mode'</i>	The duration of the discharge stroke is dependent on the stroke rate for a long, sine-shaped pressure stroke.
D.	<i>'continuous'</i>	For a continuous discharge stroke e.g. for continuous metering of smaller volumes. The duration of the discharge stroke is dependent on the stroke rate.
E.	<i>'DFMa'</i>	For optimum operation with a flow meter DulcoFlow® DFMa.

\* see following drawing.

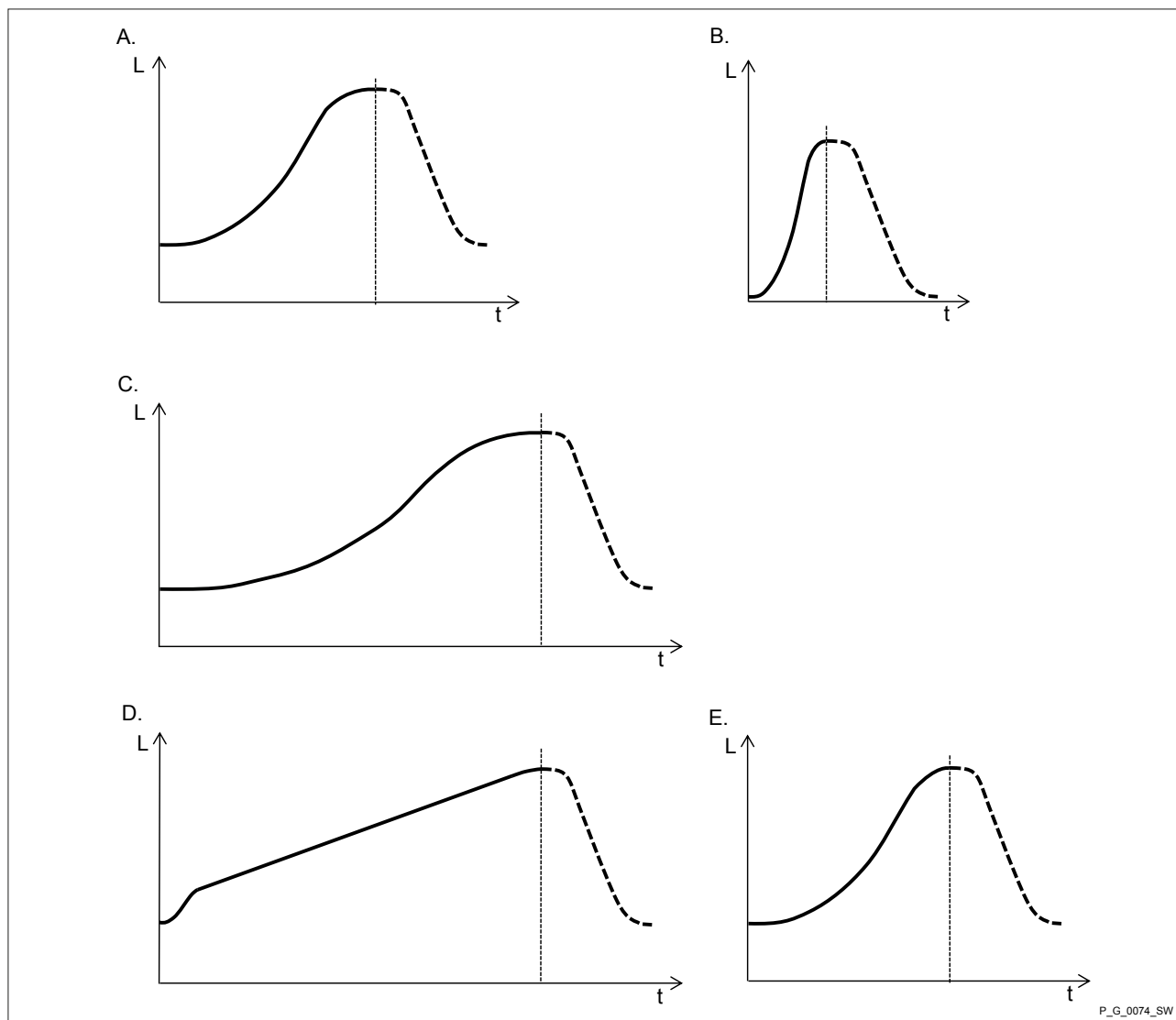


Fig. 7: Discharge stroke metering profiles with stroke  $L$  and time  $t$  (suction stroke shown as a dotted line)

It is possible to selectively also slow the **suction stroke** with all these metering profiles for the discharge stroke - see . In this way, it is possible to prevent the main cause of inaccurate metering with high viscosity feed chemicals, namely the incomplete filling of the liquid end. With gaseous feed chemicals, the slow suction stroke prevents cavitation and consequently increases dosing precision.

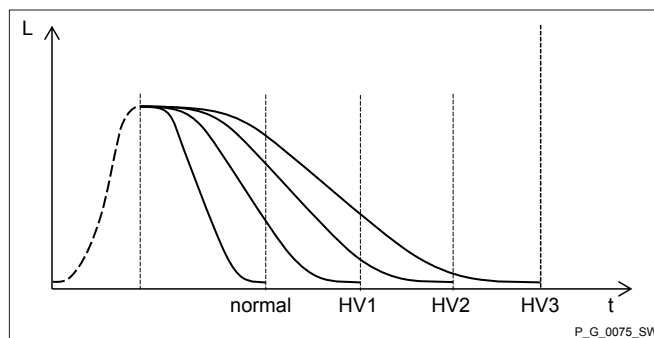


Fig. 8: Suction stroke metering profiles with stroke  $L$  and time  $t$

Normal	Normal suction stroke
HV1	Suction stroke for viscous feed chemical
HV2	Suction stroke for average viscosity feed chemical
HV3	Suction stroke for high-viscosity feed chemical

Oscillations in the back pressure in the metering line, which could lead to undesirable variations in the metering volume, are automatically compensated for by the power end/drive. This results in **dosing precision**, which otherwise could only be achieved with complex control circuits.

## 6.3 Capacity

The capacity that has been set regulates the pump even in *'Automatic'* ON mode.

By contrast, in conventional mode ( *'Automatic'*-OFF), the stroke length and stroke rate determine the capacity. The stroke length can be adjusted between 0 and 100% via the continuous display or the menu. A metering volume of between 30 to 100% is reproduced as being technically sensible. The stroke rate can be set via the menu (not in "Analogue" operating mode) within a range of 0 - 12,000 strokes/h.

## 6.4 Self-Bleeding

### SER types

Self-bleeding liquid ends without bypass are capable of independent priming when a discharge line is connected and diverting any air pockets present into the discharge line. During operation they are also capable of conveying away gases which are produced, independently of the operating pressure in the system.

## 6.5 Operating modes

Operating modes are selected via the "Operating modes" menu.

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

### "Manual" operating mode

*'Manual'* operating mode permits you to operate the pump manually.

### "Contact" operating mode

This operating mode provides the option of controlling the pump externally by means of potential-free contacts (e.g. by means of a contact water meter). The "Pulse Control" option enables you to preselect the number of strokes (a scaling or transfer factor of 0.01 to 99.99) in the *'Settings'* menu.

### "Batch" operating mode

This operating mode provides the option of working with large transfer factors (up to 99,999). Metering can be triggered either by pressing the *[Clickwheel]* or by a pulse received via the "External control" terminal or via a contact or a semiconductor switching element. It is possible to preselect a metering volume (batch) or a number of strokes using the *[Clickwheel]* in the *'Settings'* menu.

### "Analogue" operating mode

The capacity and/or stroke rate is controlled via an analogue current signal via the "External control" socket. The processing of the current signal can be preselected using the control unit.

## 6.6 Functions

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

The following functions can be selected using the '*Settings*' menu:

### "Calibrate" function

The pump can also be operated in a calibrated state in all operating modes if it is to meter extremely precisely. Calibration is to take place at the operating point and is retained over the entire stroke rate range and over a stroke length range of 0 - 100%.

### "Auxiliary capacity" / "Auxiliary frequency" function

This facilitates the switch-over to a fixed adjustable capacity / stroke rate in the '*menu*' via the "External control" terminal.

### "Bleed " function

It permits the pump to pump the gas bubbles out of the liquid end even without a bleed valve (solenoid valve) – depending on the back pressure.

### "Timer" function

This permits a simple timer program to be set up without the need for an additional timer module.

The following functions are available as standard:

### "Flow monitor" function

It monitors whether a stroke has lead to a pressure surge if a metering monitor is connected and if '*Fast*' is set under '*Settings* → *Metering* → *Discharge stroke*' or '*DFMa*' (for the DulcoFlow®). The number of defective strokes, after which the pump is switched off, can be set in the '*Settings*' menu.


### "Level switch" function

Information about the liquid level in the dosing tank is reported to the pump. A two-stage level switch has to be fitted for this purpose, which is connected to the "Level switch" terminal. It is possible to connect a suction lance with continuous level measurement to pumps from 2019 onwards.


### "Pause" function

The pump can be remotely stopped via the "External control" terminal.

### "Stop" function

The pump can be stopped without disconnecting it from the mains/power supply by pressing  [*STOP/START*].

### "Priming" function

Priming can be triggered by pressing  [*Priming*].

## 6.7 Relay (Options)

The pump has several connecting options available:

### "Fault indicating relay" option

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

The function of the relay is programmable via the menu.

The relay can be retrofitted through the slot in the front of the pump – refer to the installation instructions for "Retrofitting relays".

**"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.

The function of the relay is programmable via the menu.

The option can be retrofitted through the slot in the front of the pump – refer to the installation instructions for "Retrofitting relays".

**"Automatic bleed" option**

The "Automatic degassing" option is used for controlled degassing of the liquid end. This option can be retrofitted through the slot in the front of the pump and conversion of the dosing head.

There are two versions:

- Version with only 1 relay – to control the electric bleed valve in the dosing head.
- Version with only 2 relays – one relay to control the electric bleed valve in the dosing head and one relay free for other uses.

**"mA output" option**

The current output I signal indicates the pump's actual calculated metering volume. The relay can be retrofitted through the slot in the front of the pump.

The option also always includes a relay.

## 6.8 LED displays

### Fault indicator (red)

LED display	Colour	lit	briefly goes out	flashes
Fault indicator	red	A fault message is pending	-	undefined operating status
Warning indicator	yellow	A warning message is pending	-	-
Operating display	green	The pump is ready for operation	With each stroke	Stroke rate below 30 strokes / min

## 6.9 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. - Stop
3. - Error, Pause
4. - Auxiliary capacity / Auxiliary frequency
5. - Manual, Analogue, Contact, Batch, Fieldbus

Comments:

- re 1. - "Priming" can take place in any pump mode (providing it is working).
- re 2. - "Stop" stops with the exception of "Priming".
- re 3. - "Error", and "Pause" stop everything apart from "Priming".
- re 4. - "Auxiliary capacity" and/or "Auxiliary frequency" always have priority over the capacity / stroke rate specified by an operating mode listed under 5.

## 7 Assembly



*Refer to the correct dimensional drawings for the pump from the online version of the operating instructions from our website. [www.prominent.com](http://www.prominent.com)*



*Compare the dimensions on the dimensional drawing with those of the pump.*



### **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.



### **Capacity too low**

*The liquid end valves can be disturbed by vibrations.*

- *Secure the metering pump so that no vibrations can occur.*



### **Capacity too low**

*If the valves of the liquid end are not vertical, they cannot close correctly.*

- *Ensure that the suction and discharge valve are upright.*

## 8 Installation, hydraulic

### Safety information



#### CAUTION!

##### Warning of feed chemical spraying around

An unsuitable feed chemical can damage the parts of the pump that come into contact with the chemical.

- 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 ProMinent.



#### CAUTION!

##### Warning of feed chemical spraying around

Pumps which are not fully installed hydraulically can eject feed chemicals from the outlet openings of the discharge valves as soon as they are connected to the mains.

- The pump must first be hydraulically installed and then electrically.
- In the event that you have failed to do so, press the *[STOP/START]* button or press the emergency-stop switch.



#### CAUTION!

##### Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated 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.
- Depressurise the system before commencing any work on hydraulic parts.



#### CAUTION!

##### Danger from rupturing hydraulic components

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

- The discharge lines are to be properly designed.



#### CAUTION!

##### Danger of injury to personnel and material damage

The use of untested third party components can result in injury to personnel and material damage.

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

## 8.1 Installing hose lines

### 8.1.1 Installation of metering pumps without bleed valve

#### Safety information



#### CAUTION!

##### Warning of feed chemical spraying around

The pipes can loosen or rupture if they are not installed correctly.

- Route all hose lines so 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 nozzles that are intended for the hose diameter in question to ensure the long service life of the connections.



#### CAUTION!

##### Danger from rupturing hydraulic components

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

- Always 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.



#### CAUTION!

##### Hazardous feed chemicals can escape

Hazardous or extremely aggressive feed chemicals can escape outside when using conventional bleeding procedures with metering pumps.

- Install a bleed line with return line into the storage tank.



#### CAUTION!

##### Hazardous feed chemicals can escape

Hazardous or extremely aggressive feed chemicals can escape outside in the event that the metering pump is removed from the installation.

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



#### CAUTION!

##### Uncontrolled flow of feed chemical

Feed chemical may press through a stopped metering pump if there is back pressure.

- Use an injection valve or a vacuum breaker.





### CAUTION!

#### Uncontrolled flow of feed chemical

The feed chemical can leak through the metering pump in an uncontrolled manner in the event of excessive priming pressure.

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



*Align the pipes so that the metering pump and the liquid end can simply be removed from the side if necessary.*

### Installing hose lines - NPT, PVT designs

1. ➔ Cut off the ends of the hoses at right angles.
2. ➔ Pull the union nut (2) and clamp ring (3) over the hose (1) - see Fig. 9.
3. ➔ Push the hose end (1) up to the stop over the nozzle (4) and widen, if necessary.



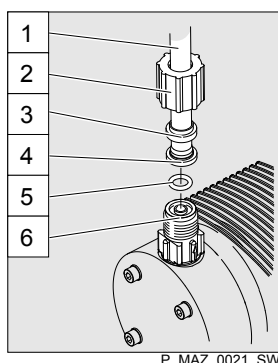
*Ensure that the O-ring and/or the flat seal (5) is sitting properly in the valve (6).*



*Never re-use used PTFE seals.*

*An installation sealed in this way is not watertight. This type of seal is permanently distorted when subjected to pressure.*

4. ➔ Place the hose (1) with the nozzle (4) onto the valve (6).
5. ➔ Clamp the hose connector: Tighten the union nut (2) while simultaneously pressing on the hose (1).
6. ➔ Re-tighten the hose connector: Pull on the hose line (1) briefly, which is fastened to the dosing head and then re-tighten the union nut (2).



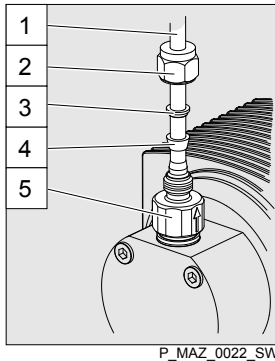
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- |   |                     |
|---|---------------------|
| 1 | Hose                |
| 2 | Union nut           |
| 3 | Clamp ring          |
| 4 | Nozzle              |
| 5 | O-ring or flat seal |
| 6 | Valve               |

Fig. 9: NPT, PVT designs

### Installing stainless steel pipe - SST design

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



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

Fig. 10: SST designs

### Installing hose lines - SST design



#### CAUTION!

##### Warning of feed chemical spraying around

Connections can come loose in the event that hose lines are installed incorrectly on stainless steel valves.

- Only use PE or PTFE hose lines.
- In addition, insert a stainless steel support insert into the hose line.

## 8.1.2 Installation of metering pumps with bleed valve

### Safety information



#### CAUTION!

- All the installation and safety information for metering pumps without bleed valves also apply.

### Installation of the return line

A return line is also connected in addition to the suction and discharge line.

1. ➤ Attach the hose line to the return hose nozzle or to the liquid end bleed valve. PVC hose, soft, 6x4 mm is recommended.
2. ➤ Feed the free end of the return line into the storage tank.
3. ➤ Shorten the return line so that it is not immersed in the feed chemical in the storage tank.

8.2 Basic installation notes

Safety notes



**CAUTION!**  
**Danger resulting from rupturing hydraulic components**  
Hydraulic components can rupture if the maximum permissible operating pressure is exceeded.

- Never allow the metering pump to run against a closed shut-off device.
- With metering pumps without integral relief valve: Install a relief valve in the discharge line.



**CAUTION!**  
**Hazardous feed chemicals can escape**  
With hazardous feed chemicals: Hazardous feed chemical can leak out when using conventional bleeding procedures with metering pumps.

- Install a bleed line with a return into the storage tank.

➔ Shorten the return line so that it does not dip into the feed chemical in the storage tank.

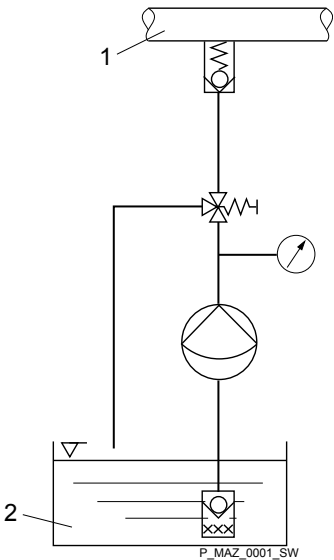


Fig. 11: Standard installation

- 1 Main line
- 2 Storage tank

Legend for hydraulic diagram

Symbol	Explanation	Symbol	Explanation
	Metering pump		Foot valve with filter meshes
	Injection valve		Level switch
	Multifunctional valve		Manometer

## 9 Installation, electrical



**WARNING!**

**Danger of electric shock**

A mains voltage may exist inside the device.

- Before any work, disconnect the device's mains cable from the mains.



**WARNING!**

**Risk of electric shock**

This pump is supplied with a grounding conductor and a grounding-type attachment plug.

- To reduce the risk of electric shock, ensure that it is connected only to a proper grounding-type receptacle.



**WARNING!**

**Risk of electric shock**

In the event of an electrical accident, the pump must be quickly disconnected from the mains.

- Install an emergency cut-off switch in the pump power supply line or
- Integrate the pump in the emergency cut-off management of the system and inform personnel of the isolating option.



**WARNING!**

**Danger of electric shock**

Incompletely installed electrical options can allow moisture into the inside of the housing.

- Fit appropriate modules into the slot on the front of the pump or use the original blank cover to seal it in a leak-tight manner.



**WARNING!**

**Danger of electric shock**

A mains voltage may exist inside the pump housing.

- If the pump housing has been damaged, you must disconnect it from the mains immediately. It may only be returned to service after an authorised repair.



**CAUTION!**

**Risk of short circuiting caused by moist pins**

No moisture must reach the pins of the PROFIBUS® jack.

- A suitable PROFIBUS® plug or protective cap must be screwed onto the PROFIBUS® jack.

**CAUTION!****Material damage possible due to power surges**

Should the pump be connected to the mains power supply in parallel to inductive consumers (such as solenoid valves, motors), inductive power surges can damage the control when it is switched off.

- Provide the pump with its own contacts (Phase) and supply with voltage via a contactor relay or relay.
- Should this not be possible, then switch a varistor (part no. 710912) or an RC gate (0.22 µF/220 Ω, part no. 710802) in parallel.

**CAUTION!****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 the mains voltage switches a solenoid metering pump on and off in a process.

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

→ Install the pump in line with best working practice and in accordance with the operating instructions and applicable regulations.

## 9.1 Supply voltage connector - mains voltage

**WARNING!****Unexpected start-up is possible**

The pump can start pumping and consequently feed chemical may escape as soon as the pump is connected to the mains/power supply.

- Avoid the escape of feed chemical.
- If you have not done so, immediately press *[STOP/START]* or disconnect the pump from the mains voltage e.g. using an Emergency Stop switch.
- Refer to the material safety data sheet for your feed chemical.

**CAUTION!**

If the pump is integrated into a system: Design the system so that potential hazardous situations are avoided by pumps starting up automatically subsequent to unintended power interruptions.

Connect the pump to the mains voltage using the mains cable.

## 9.2 Description of the terminals

### 9.2.1 "Config I/O" terminal

There is an option to transmit the signals of 3 potential-free contacts as inputs I: to the pump via the "Config I/O" terminal or issue contact signals as Outputs O:.

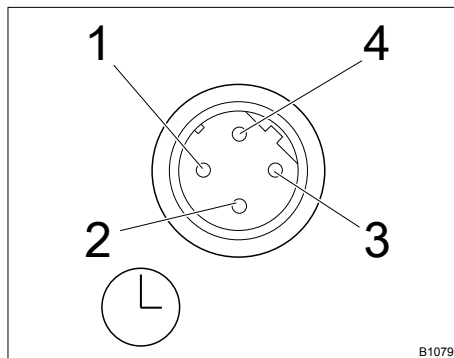


Fig. 12: "Config I/O" terminal, pin assignment

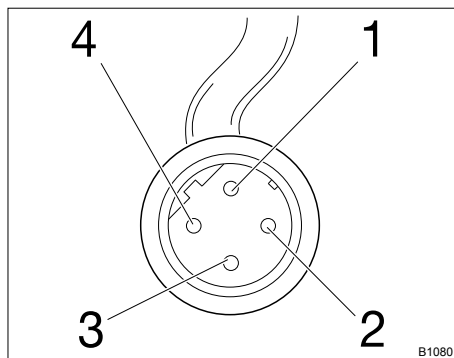


Fig. 13: Plug to "Config I/O" terminal, pin assignment

Tab. 3: Assignment of pins

Pin	Assignment	4-wire cable
1	Config I/O 1	brown
2	Config I/O 2	white
3	Config I/O 3	blue
4	GND	black

## Configured as an input

Parameter	Value
Voltage with open contacts	5 V
Input resistance	10 kΩ
Max. pulse frequency	50 pulses/s
Min. pulse duration	10 ms

Tab. 4: Control via:

Switching element	Specification
potential-free contact	Load: 0.5 mA at 5 V
Semiconductor switch	Residual voltage < 2 V

## Configured as an output

Parameter	Value
Max. pulse frequency	50 pulses/s
Min. pulse duration	10 ms

Tab. 5

Switching element	Specification
NPN output (Open Drain)	30 V max. voltage and 300 mA max. current load per pin



**CAUTION!**  
No protection provided for inductive loads.  
– Provide a free-running diode when controlling a delay.

9.2.2 "External control" terminal

The "external control" terminal is a 5-pole panel terminal. It is compatible with 2- and 4-pin cables.

Only use a 5-pin cable with the "Auxiliary capacity" / "Auxiliary frequency" functions.

Only use a 4-pin or a 5-pin cable with the "mA input" function.

Electrical interface for pin 1 "Pause" - pin 2 "External contact" - pin 5 "Auxiliary capacity / Auxiliary frequency"

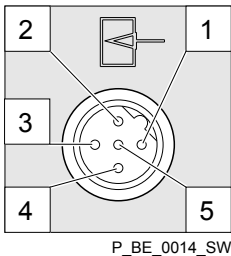


Fig. 14: Pump assignment

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ
Max. pulse frequency	25	pulse/s
Min. pulse duration	20	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": 2 and 3)<sup>1</sup>

Data	Value	Unit
Input apparent ohmic resistance, approx.	120	Ω

<sup>1</sup> At 0.0 ... 0.4 mA (4.4 mA) the metering pump performs its first metering stroke and at 19.6 ... 20.0 mA the pump reaches maximum frequency.

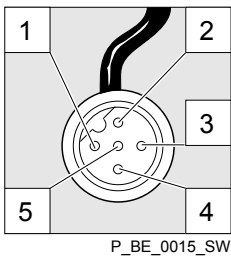


Fig. 15: Cable assignment

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 capacity / Auxiliary frequency	grey	-

\*with identity code characteristic "Control version": 3



Refer to the functional description for the sequence of functions and operating modes.

## "Pause" function

The pump works if:

- Pin 1 and pin 4 are connected to each other and the cable is connected.
- no cable is connected.

The pump does not work if:

- Pin 1 and pin 4 are open and the cable is connected.



### Acknowledge fault with 'Pause'

Certain errors requiring acknowledgement can also be acknowledged using 'Pause' instead of using the [P] key. These are errors like: 'Flow', 'Air lock', 'p-' (as soon as the conditions are in order).

## "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.

## "Analogue" operating mode

The pump capacity and/or stroke rate can be controlled by a current signal. The current signal is connected between pin 3 and pin 4.

Pin 1 and pin 4 must also be connected.

## "Auxiliary capacity" / "Auxiliary frequency" operating mode

The pump works at a pre-set capacity / 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 capacity / auxiliary frequency is factory-preset to maximum capacity / stroke rate.

## 9.2.3 "Level switch" terminal

There is a connecting option for a 2-stage level switch with pre-warning and limit stop or a suction lance with continuous level measurement.

### 9.2.3.1 Suction lance for 2-stage level switch

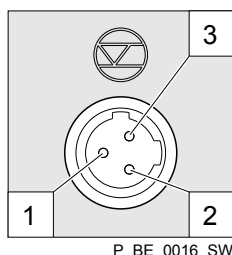


Fig. 16: Pump assignment

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)



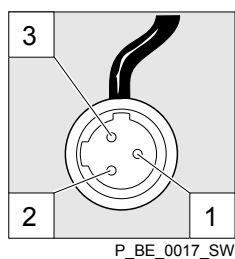


Fig. 17: Cable assignment

### 9.2.3.2 Suction lance with continuous level measurement

Electrical interface

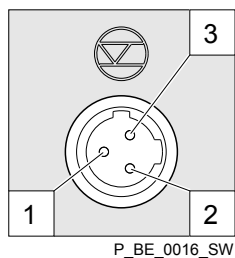


Fig. 18: Pump assignment

Pin	Description	Function
3	5 V supply TX to sensor	5 V (4.85 V...5.25 V DC) feed to the sensor and TX communication interface (from the point of view of the pump).
1	GND	Reference potential
2	RX from sensor	RX communication interface (from the point of view of the pump)

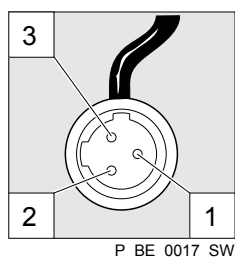


Fig. 19: Cable assignment

Pin	Description
1	5 V supply Sensor + RX
2	GND
3	Sensor TX

### 9.2.4 "Metering monitor" terminal

There is a connection option for a dosing monitor.

Electrical interface

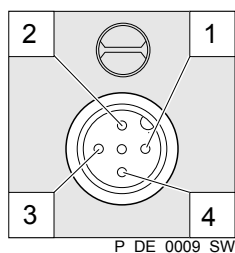


Fig. 20: Pump assignment

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

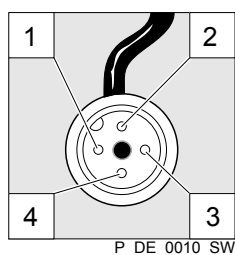


Fig. 21: Cable assignment

Pin	Function	4-wire cable
1	Power supply (5 V)	brown
2	Coding	white
3	Feedback	blue
4	Earth GND	black

## 9.2.5 "Diaphragm rupture indicator" terminal

There is an option to connect a diaphragm rupture indicator.

Electrical interface

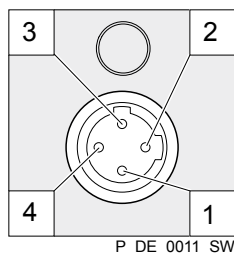


Fig. 22: Pump assignment

Specification	Value
Supply voltage, approx.:	+5 V, loadable with 20 mA (current limit 150 mA)
Power consumption:	min. 10 mA, max. 20 mA (sensor presence detection)
Sensor signal:	potential-free contact (load: 0.5 mA at +5 V) or Semiconductor switch (residual voltage < 0.3 V)

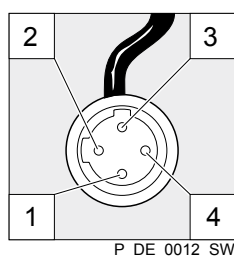


Fig. 23: Cable assignment

Pin	Function	4-wire cable
1	Power supply (5 V)	brown
2	not assigned	white
3	Sensor signal	blue
4	Earth GND	black

## 9.2.6 Relay

### 9.2.6.1 Relay functions

Tab. 6: gamma/ XL GXLa

Identity code	Description	Type	Maximum voltage	Maximum current	Operational lifetime Min. switching operations
0	no relay	-	-	-	-
1	Fault indicating relay, N/C	Changeover contact	230 V AC	6 A	50,000
4	Fault indicating relay, N/C	N/C	24 V	1 A	50,000
	Pacing relay, normally open	N/O	24 V	100 mA	unlimited
C	4-20 mA current output	-	-	-	-
	Fault indicating relay, N/C	N/C	24 V	100 mA	unlimited
F	Automatic bleeding	Changeover contact	230 V AC	6 A	50,000
G	Automatic bleeding	N/O	24 V	1 A	50,000
	Fault indicating relay, N/C	N/C	24 V	100 mA	unlimited

Relay type

You can reprogram the relays to these types:

Menu setting	Effect
Timer	The relay switches when requested by the timer.
Fault	The relay switches in the event of an error message (red LED*).
Warning	The relay switches in the event of a warning message (yellow LED*).
Warning + error (fault indicating relay)	The relay switches in the event of a warning message (yellow LED*) or an error message (red LED*).
Warning + error + stop	The relay switches in the event of a warning message (yellow LED*), when stopped by <i>[Start/Stop]</i> or in the event of a fault message (red LED*).
Pump active	The relay switches as soon as the pump is in standby and not stopped and not in a state like <i>'Pause'</i> or if an error is pending. In the opposite case, the relay switches back again.
Stroke rate** (pacing relay)	The relay switches with every stroke.
Cycle quantity** (pacing relay)	The relay always switches when the set cycle quantity has been reached.
Metering / Batch	The relay changes its state as soon as a batch has been processed.
Degassing***	The relay opens an optionally installed bleed valve as soon as the control activates it.

\* see the "Troubleshooting" chapter

\*\* only use *'Relay 2'* for this relay type (semiconductor relay).

\*\*\* only use *'Relay 1'* for this relay type.

### Relay polarity

You can set here how a relay is to switch.

Menu setting	Effect
N/C	The relay is closed in normal mode and opens with a triggering event. (N/C)
N/O	The relay is open in normal mode and opens with a triggering event. (N/O)

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

A fault indicating relay can be ordered as an option - refer to ordering information in the appendix. It is used to emit a signal when there is a fault with the pump and for the "Liquid level low, 1st stage" warning message and "Liquid level low 2nd stage" fault message.

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

The behaviour is factory-programmed. If another switching function is required, the pump can be reprogrammed in the *'Relay'* menu.

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

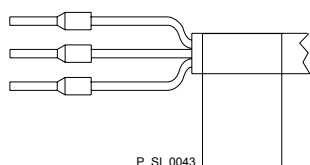


Fig. 24: Cable assignment

## Identity code 1

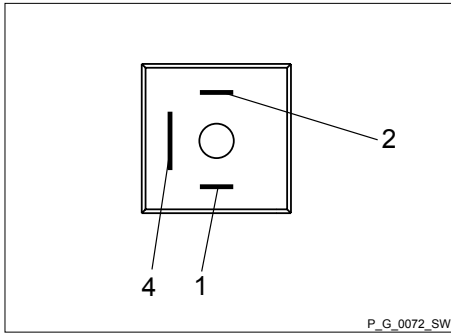


Fig. 25: Pump assignment

To pin	VDE cable	Contact	CSA cable
1	white	N/O (normally open)	white
2	green	N/C (normally closed)	red
4	brown	C (common)	black

### 9.2.6.3 Output for other relays (Identity code 4)

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

The behaviour is factory-programmed. If another switching function is required, the pump can be reprogrammed in the 'Relay' menu.

The fault indicating/pacing relay can be retrofitted and is operational once attached to the relay board - refer to the "Retrofitting relays" supplementary instructions.

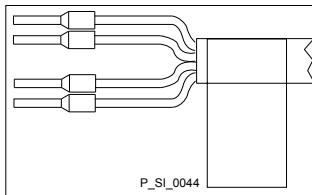


Fig. 26: Cable assignment

#### 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

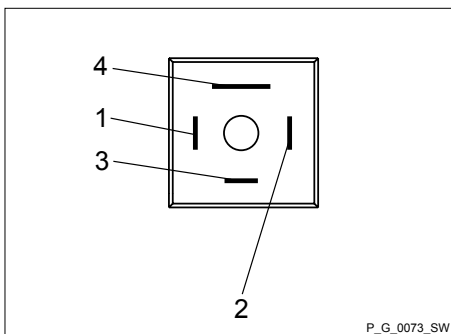


Fig. 27: Pump assignment

To pin	VDE cable	Contact	Relay
1	yellow	N/O (normally open)	Relay 1
4	green	C (common)	Relay 1
3	white	N/O (normally open)	Relay 2
2	brown	C (common)	Relay 2

### 9.2.6.4 Output "Current output plus relay" (identity code C)

A relay combined with a current output can optionally be ordered. The relay either switches off the pump as a fault indicating relay in the event of a fault on the pump and with "Liquid level low 1st stage" warning message and "Liquid level low 2nd stage" fault messages or is used as a pacing relay.

The behaviour is factory-programmed. If another switching function is required, the pump can be reprogrammed in the 'Relay' menu.

The variable to be signalled for the current output can be selected in the 'ANALOGUE OUTPUT' menu.

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

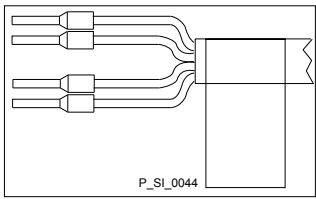


Fig. 28: Cable assignment

Electrical interface  
for current output

Data	Value	Unit
Open circuit voltage:	8	V
Current range:	4 ... 20	mA
Ripple, max.:	80	µA ss
Load, max.:	250	Ω

for semiconductor switch ("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 c

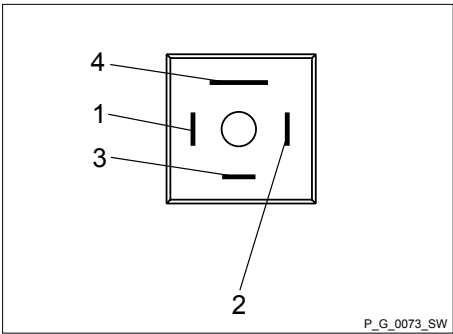


Fig. 29: Pump assignment

To pin	VDE cable	Contact	Relay
1	yellow	"+"	Current output
4	green	"-"	Current output
3	white	N/C (normally closed) or N/O (normally open)	Relay
2	brown	C (common)	Relay

## 10 Basic set-up principles



- Please also refer to all the overviews covering "Operating/set-up overview" and "Operating menu for gamma/ XL, complete" in the appendix and the "Overview of equipment and control elements" and "Control elements" chapters.
- The pump exits the menu and returns to a continuous display if [Menu] is pressed or no key is pressed for 60 seconds.

### 10.1 Basic principles for setting up the control



Fig. 30: Please read

Fig. 31 shows using the "Language" example how to set up something - in turn:

- Sequence of displays
- The path derived from this
- The path as presented in the operating instructions

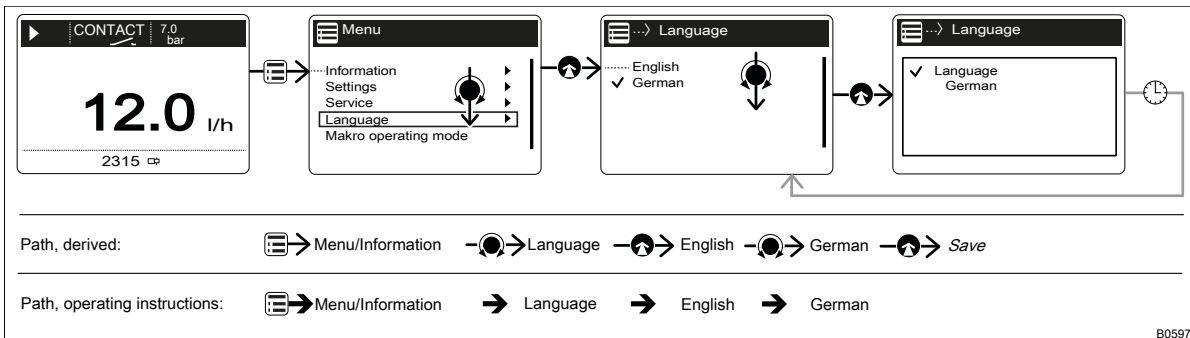


Fig. 31: "Setting up the language": As an example of set-up and path displays

Tab. 7: Legend:

Symbol	Explanation
	Press [Menu]
	Turn the [Clickwheel]
	Press the [Clickwheel]

#### "Setting up the language" in detail

1. ➤ To access the 'Menu': press the [Menu] key.  
⇒ The cursor immediately points to 'Information'.
2. ➤ To switch from 'Information' to 'Language': turn the [Clickwheel].
3. ➤ To return to the 'Language' menu: press the [Clickwheel].  
⇒ The cursor points to a language.
4. ➤ To switch to 'Deutsch': turn the [Clickwheel].
5. ➤ To save: press the [Clickwheel].  
⇒ The software shows a display by way of confirmation.  
After 2 seconds, it returns to the higher-level 'Menu'.
6. ➤ To complete the setting: press [Menu].  
Alternatively: wait 60 seconds or exit the 'Menu' via the [Menu] key or using 'End'.

## Confirming an entry

- ➔ Briefly press the [Clickwheel].
- ⇒ The software switches to the next menu point or back to the menu and saves the entry.

## Exiting a menu option without confirming it

- ➔ Press [Back].
- ⇒ The software switches to the next menu point or back to the menu without saving anything.

## Returning to a continuous display

- ➔ Press [Menu].
- ⇒ The software cancels the entry and switches to a continuous display without saving anything.

## Changing adjustable variables

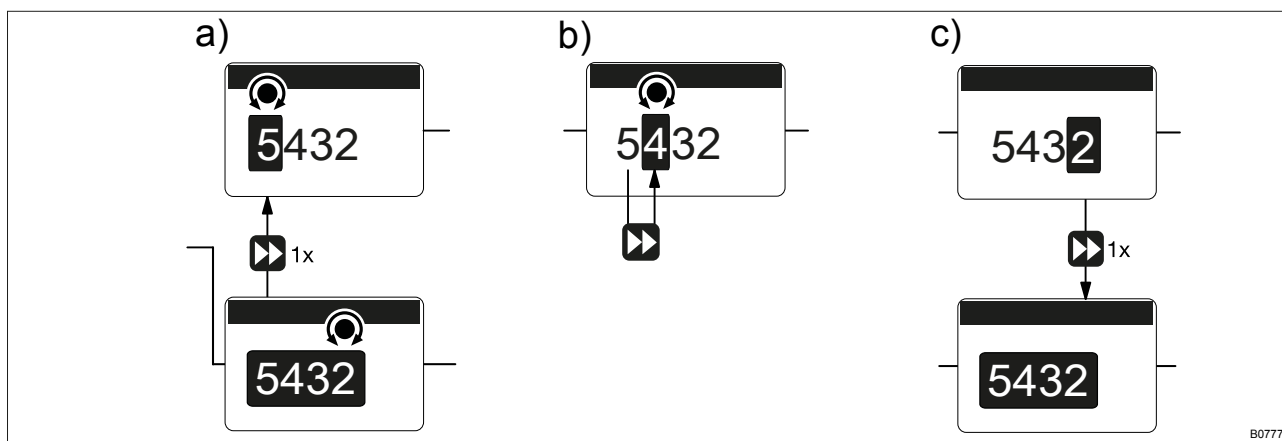


Fig. 32: a) Changing from one figure to its initial figures; b) Changing the figure; c) Returning from the last figure to the (complete) figure (to correct a wrong figure, for example).

## Changing a (complete) number

- ➔ Turn the [Clickwheel].
- ⇒ The value of the figure highlighted is raised or lowered.

## Changing figures

1. ➔ To adjust the value of a figure digit-by-digit, press [Priming].  
⇒ The first figure is highlighted - see Figure above, point a)
2. ➔ To adjust the value of a figure, turn the [Clickwheel].
3. ➔ To move to the next figure, press [Priming] - see above Figure, point b).
4. ➔ To run through the figures again, if necessary (possibly because of an incorrect figure), when you get to the last figure press [Priming] again - see above Figure, point c).  
⇒ Now you can start from the beginning again.

### Confirming adjustable variables

- ➔ Press the *[Clickwheel]* 1x.
- ⇒ The software saves the entry.

## 10.2 Checking adjustable variables

### Continuous displays

Before adjusting the pump, you can check the current settings of the adjustable variables:

- ➔ Simply turn the *[Clickwheel]* if the pump is showing a continuous display.
- ⇒ Each time the *[Clickwheel]* engages when you turn it, you will see a different continuous display.



*The number of continuous displays depends on the identity code, the selected operating mode and the connected additional devices – see overview of "Continuous displays" in the appendix.*

### Secondary displays


The lowest line of a continuous display shows different information (which cannot be adjusted in the secondary display) - see "Continuous displays and secondary displays" overview in the appendix.


You can access secondary displays via any continuous display as follows:

1. ➔ Press the *[Clickwheel]* for 3 seconds.
  - ⇒ A frame appears around the secondary display.
2. ➔ Providing there is a frame, you will see a different secondary display each time the *[Clickwheel]* engages when turned.

When you reach the secondary display you wish, leave the *[Clickwheel]* and wait briefly.

## 10.3 Changing to Setting mode


In a continuous display, if you press  'Menu', the pump in Setting mode changes to 'Menu'. For more information refer to the following chapter entitled "Set up / Menu".

If under 'Access protect.' only 'Menu' or 'All' has been set up (top right  lock symbol), then after pressing the *[Clickwheel]*, first enter the 'Password'.



## 11 Set up / 'Menu'



- Refer to all overviews covering "Operating/set up overview" and "Operating menu gamma/ XL, complete" in the appendix and in the chapters "Overview of equipment" and "Control elements".
- The pump exits the menu and returns to a continuous display if  [Menu] is pressed or no key is pressed for 60 seconds.

The 'Menu' is sub-divided as follows:

- 1 - 'Information'
- 2 - 'Settings'
- 3 - 'Timer'
- 4 - 'Service'
- 5 - 'Language'

### 11.1 'Information'

 → 'Menu / Information → ...'

The 'Information' provides information on your pump and certain parameters and counters. The number and type can depend on the pump settings.

### 11.2 'Settings'

 → 'Menu / Information → Settings → ...'


The 'Settings' menu generally includes these setting menus:

- 1 - 'Operating mode'
- 2 - 'Automatic'
- 3 - 'Stroke length'
- 4 - 'Dosing'
- 5 - 'Concentration'
- 6 - 'Calibration'
- 7 - 'System'
- 8 - 'Inputs/outputs'
- 9 - 'Config I/O'
- 10 - 'Bleeding'
- 11 - 'Priming time'
- 12 - 'Set time'
- 13 - 'Date'

#### 11.2.1 'Operating mode'

 → 'Menu / Information → Settings → Operating mode → ...'


### 11.2.1.1 'Manual'

 → 'Menu / Information' → Settings → Operating mode → Manual'

'Manual' operating mode allows you to operate the pump manually.

The capacity and/or stroke rate and stroke length can be set in the continuous displays in this operating mode.

### 11.2.1.2 'Contact'

 → 'Menu / Information' → Settings → Operating mode → Contact → ...'

'Contact' operating mode allows you to trigger individual strokes or a series of strokes.

You can trigger the strokes via a pulse sent via the "External control" terminal.

The purpose of this operating mode is to convert the incoming pulses into strokes with a step-down (fractions) or small step-up or also 1:1.



#### CAUTION!

The pump maintains the stroke rate when changing over from 'Manual' operating mode to 'Contact' operating mode.



*The maximum stroke rate can be set in 'Contact' operating mode. It should normally be set to 12,000 strokes/hour.*

### Contact - adaptive


If the gaps between the pulses (e.g. from contact water meter) slowly change, you can set the pump to 'Adaptive → On' - the pump will then meter more evenly.

### Memory - Pulses not yet processed

You can also activate the 'Memory' function extension ("memory" identifier). When 'Memory' is activated, the pump adds up the remaining strokes, which could not be processed, up to the maximum capacity of the stroke memory of 999,999 strokes. If this maximum capacity is exceeded, the pump goes into fault mode.



#### CAUTION!

- Only with 'Memory' - 'off': If you press  [STOP/START] or empty the contact memory ('Menu / Information' → Service → Clear counters) or the "Pause" function is activated, the 'Memory' is cleared.

### ('Automatic' 'Off') factor

The number of strokes per pulse depends on the factor which you can input. By using a factor you can multiply incoming pulses by a factor between 1.01 to 99.99 or reduce them by a factor of 0.01 to 0.99:

Number of strokes executed = factor x number of incoming pulses

Table of examples

	Factor	Pulse (sequence)	Number of strokes (sequence)
<b>Step-up*</b>			
	1	1	1
	2	1	2
	25	1	25
	99.99	1	99.99
	1.50	1	1.50 (1 / 2)
	1.25	1	1.25 (1 / 1 / 1 / 2)
<b>Step-down**</b>			
	1	1	1
	0.50	2	1
	0.10	10	1
	0.01	100	1
	0.25	4	1
	0.40	2.5 (3 / 2)	(1 / 1)
	0.75	1.33 (2 / 1 / 1)	(1 / 1 / 1)

Tab. 8: \* Explanation of the conversion ratio

With a factor of 1	... 1 stroke is executed per 1 pulse
With a factor of 2	... 2 strokes are executed per 1 pulse
With a factor of 25	... 25 strokes are executed per 1 pulse

Tab. 9: \*\* Explanation of step-down

With a factor of 1	... 1 stroke is executed per 1 pulse.
With a factor of 0.5	...1 stroke is executed after 2 pulses.
With a factor of 0.1	...1 stroke is executed after 10 pulses.
With a factor of 0.75	...1 stroke is executed once after 2 pulses, then 1 stroke is executed twice after 1 pulse, and then again 1 stroke after 2 pulses etc.



*If a remainder is obtained when dividing by the factor, then the unit adds the remainders together. As soon as this sum reaches or exceeds "1", the pump executes an additional stroke. Therefore on average during the metering operation, the resultant number of strokes precisely matches the factor.*


**Metering volume ( 'Automatic' 'On' )**

Analogue applies to the 'Metering volume' and to the 'Factor'.

**Contact water meter**

Using "Pulse control" you can ideally adapt the pump to the relevant process, for example in conjunction with contact water meters.

### 11.2.1.3 'Batch'

 → 'Menu / Information' → Settings → Operating mode → Batch → ...'

The 'Batch' operating mode enables you to pre-select large metering volumes.

You can only select whole numbers but no fractions as the number of strokes (figures 1 to 99,999).

You can trigger the strokes using the [Clickwheel] if you have already switched to the 'Push' continuous display. You can also trigger them via a pulse using the "External control" terminal.




*The stroke rate can be set in 'Batch' operating mode. It should normally be set to 12,000 strokes/hour.*

### Memory - remaining strokes not yet processed

You can also activate the 'Memory' function extension ("memory" identifier). When 'Memory' is activated, the pump adds up the remaining strokes, which could not be processed, up to the maximum capacity of the stroke memory of 999,999 strokes. If this maximum capacity is exceeded, the pump goes into fault mode.




#### CAUTION!

- The pump maintains its stroke rate when changing over from 'Manual' operating mode to 'Batch' operating mode.
- When you press  [STOP/START] or the "Pause" function is activated, the 'Memory' is cleared.



*In operation, the batch size can be changed more easily by using the "Batch size" continuous display.*

### 11.2.1.4 'Analogue' (optional)

 → 'Menu / Information' → Settings → Operating mode → Analogue → ...'

The secondary display "Signal current" indicates the incoming current.

You can select 5 types of current signal processing:

- '0 - 20 mA'
- '4 - 20 mA'
- 'Linear curve'
- 'Lower side band'
- 'Upper side band'

#### '0 - 20 mA'

At 0 mA the pump is stationary –

At 20 mA the pump works at maximum stroke rate.

**'4 - 20 mA'**

At 4 mA the pump is stationary –

At 20 mA the pump works at maximum stroke rate.

With current signals of less than 3.8 mA, an error message appears and the pump stops (e.g. if a cable has broken).

**'Linear curve'**

The symbol "Linear curve" appears on the LCD screen. You can enter any pump stroke rate behaviour proportional to the current signal. For this purpose, enter any two points P1 ( $I_1$ ,  $F_1$ ) and P2 ( $I_2$ ,  $F_2$ ) ( $F_1$  is the stroke rate at which the pump is to operate at current  $I_1$ ,  $F_2$  is the stroke rate at which the pump is to operate at current  $I_2$ ...); this defines a straight line and thus the behaviour is specified:

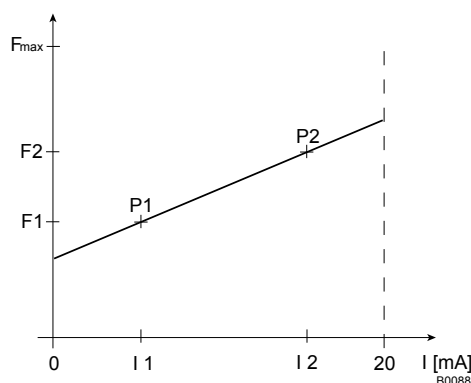


Fig. 33: Frequency-current diagram for "Linear curve"



Plot a diagram similar to the one above – with values for ( $I_1$ ,  $F_1$ ) and ( $I_2$ ,  $F_2$ ) – so that you can set the pump as desired!



The smallest processable difference between  $I_1$  and  $I_2$  is 4 mA ( $\| I_1 - I_2 \| \geq 4 \text{ mA}$ ).

**Error processing**

In the 'Error message' menu item, you can activate an error process for these types of processing.

**'Lower side band'**

Using this type of processing, you can control a metering pump using the current signal as shown in the diagram below.

However, you can also control two metering pumps for different feed chemicals via a current signal (e.g. one acid pump and one alkali pump using the signal of a pH sensor). To do this, connect the pumps electrically in series.

**Error processing**

In the 'Error message' menu item, you can activate an error process for these types of processing.

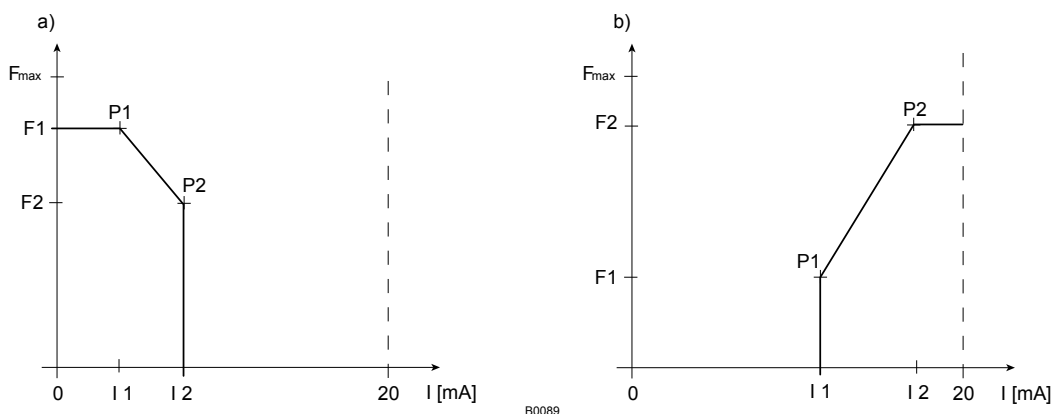


Fig. 34: Frequency-current diagram for a) Lower side band, b) Upper side band

#### 'Upper side band'

Using this processing type, you can control a metering pump using the current signal as shown in the diagram above.

Everything functions according to the 'Lower side band' type of the processing.

### 11.2.2 'Automatic'

☰ → 'Menu / Information → Settings → Automatic → ...'

In the 'Automatic' menu, you can set whether the unit is to meter automatically or conventionally.

With 'Automatic' - 'on', you set direct values, such as capacity, metering volume or dosing time, instead of stroke length and stroke rate. Other selection points then appear in the operating menu - refer to the chapter "Operating menu gamma/ XL, complete" (in the appendix) for the selection points highlighted with a "\*"1.

In 'Automatic' - 'on' metering mode, the gamma/ X specifies the stroke length and the stroke rate according to the conditions determined in order to meter the set capacity.



'Automatic' - 'on' and 'Automatic' - 'off' metering modes are completely independent of each other. That is to say that 'Automatic' - 'off' metering mode does not carry over settings from 'Automatic' - 'on'.

Tab. 10: Setting ranges

	'Automatic' - 'on'	'Automatic' - 'off'
Manual, continuous	1:2,000	1:2,000
Manual, discontinuous	1:40,000	1:40,000

### 11.2.3 'Stroke length'

☰ → 'Menu / Information → Settings → Stroke length → ...'

The menu does not appear with 'Automatic' 'on'!


In the 'Stroke length' menu, you can enter the stroke length manually.




In operation, the stroke length can be changed more easily by using the "Stroke length" continuous display:

- Turn the [Clickwheel] to return to the "Stroke length" continuous display.
- Press the [Clickwheel] and then turn it to set the stroke length.
- Press the [Clickwheel] to save the stroke length.

## 11.2.4 Dosing

 → 'Menu / Information → Settings → Metering → ...'

### 11.2.4.1 'Discharge stroke'

 → 'Menu / Information → Settings → Metering → Discharge stroke → ...'

In the 'Settings' - 'Discharge stroke' sub-menu, you can precisely match the pump metering flow over time to the requirements of the particular application.

This ensures that the user can set the optimum **discharge stroke** for his application, as required:

Pos.*	Discharge stroke	Application
A.	'optimum'	For maximum precision when metering and the very best results with internal pressure measurement and special functions.
B.	'fast'	For as fast a discharge stroke as possible - the duration of the discharge stroke is dependent on the stroke rate.
C.	's fast'	For as fast a discharge stroke as possible - the duration of the discharge stroke is dependent on the stroke rate.
D.	'sine mode'	The duration of the discharge stroke is dependent on the stroke rate for a long, sine-shaped pressure stroke.
E.	'continuous'	For a continuous discharge stroke e.g. for bottling processes. The duration of the discharge stroke is dependent on the stroke rate.
F.	'DFMa'	For optimum operation with a flow meter DulcoFlow® DFMa.

\* see following drawing.

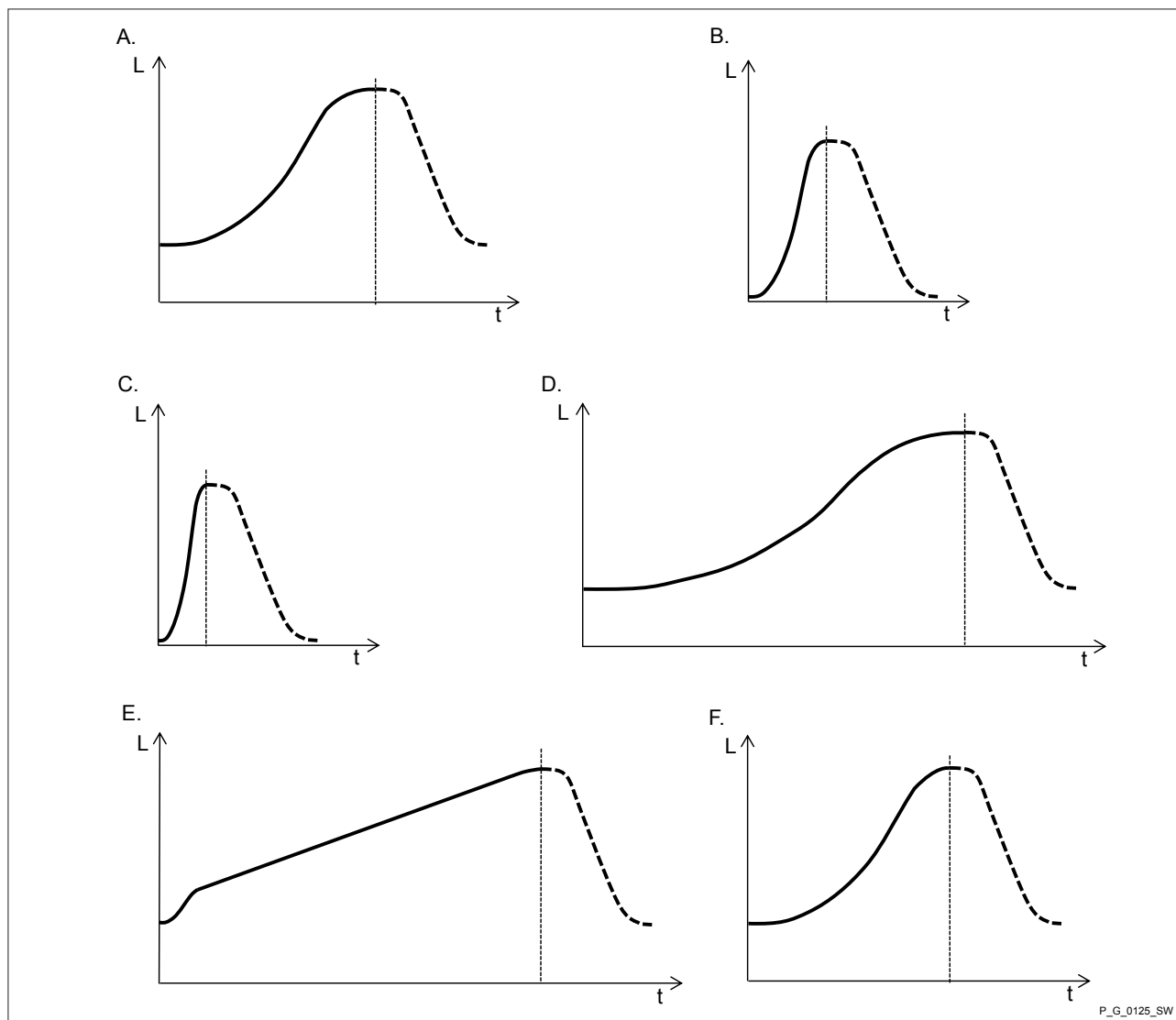


Fig. 35: Discharge stroke metering profiles with stroke  $L$  and time  $t$  (suction stroke shown as a dotted line)

#### 11.2.4.2 'Suction stroke'

☰ → 'Menu / Information → Settings → Metering → Suction stroke → ...'

It is possible to selectively also slow the **suction stroke** with all these metering profiles for the discharge stroke - see . In this way, it is possible to prevent the main cause of inaccurate metering with high viscosity feed chemicals, namely the incomplete filling of the liquid end. With gaseous feed chemicals, the slow suction stroke prevents cavitation and consequently increases dosing precision.



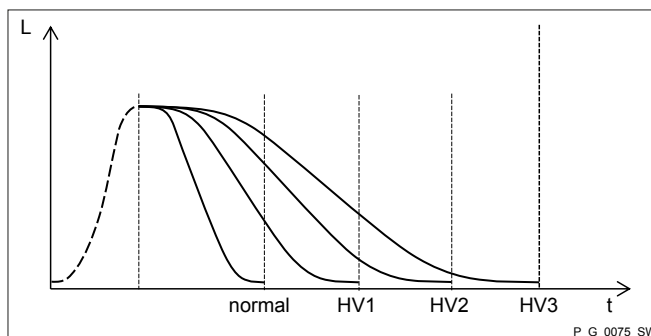


Fig. 36: Suction stroke metering profiles with stroke  $L$  and time  $t$

- Normal Normal suction stroke  
 HV1 Suction stroke for viscous feed chemical  
 HV2 Suction stroke for average viscosity feed chemical  
 HV3 Suction stroke for high-viscosity feed chemical



- Slowing down the suction stroke leads to a lower stroke rate and thus to a lower capacity.

'Suction stroke' setting	Maximum stroke rate Strokes/min
Normal	200
HV1	160
HV2	120
HV3	80

#### 11.2.4.3 'Pressure stage'

→ 'Menu / Information → Settings → Metering → Pressure stage → ...'

You can use the programmable 'Pressure stage' function to reduce the nominal pressure of the pump, thereby minimising the risk of lines rupturing.

The switch-off pressure of the permanently active overpressure monitoring falls at the same time as the pressure stage - see .


Tab. 11: Nominal pressures depending on the size of the liquid ends and the pressure stages

Pressure stage /	4	7	10	16	25
Size of liquid end					
2508	X	X	X	-	X
1608	X	X	X	X	-
1612	X	X	X	X	-
1020	X	X	X	-	-
0730	X	X	-	-	-
0450	X	-	-	-	-

**Switch-off pressure**


Switch-off pressure: Pressure above which the unit is switched off for the medium term in the event of excess pressure = Pressure state plus 10 ... 20 %.

**11.2.4.4 'Monitoring'**

 → 'Menu / Information → Settings → Metering → Monitoring → ...'

**11.2.4.4.1 'Air lock'**

 → 'Menu / Information → Settings → Metering → Monitoring → Air lock → ...'

Should a message and the "Air lock" symbol  appear, this may mean that there is gas in the liquid end (if 'Warning' or 'Error' was set in the 'Air lock' sub-menu).

**11.2.4.4.2 'Air sensitivity'**

 → 'Menu / Information → Settings → Metering → Monitoring → Air sensitivity → ...'

Using the 'Air sensitivity' programmable function, you can adjust the sensitivity of air detection a little to receive as few incorrect alarms as possible.

*Tab. 12: There are 3 levels of sensitivity:*

normal	maximum sensitivity
average	average sensitivity
weak	lowest sensitivity. Only use at pressures of < 2 bar.

**11.2.4.4.3 Message with overpressure**

You can have the pump output a message in the event of overpressure using the programmable 'Message with overpressure' function.

**11.2.4.4.4 Message when no pressure**

You can have the pump output a message in the event of no pressure using the programmable 'Message with no pressure' function.

**11.2.4.4.5 Cavitation**

You can have the pump output a message in the event that it identifies cavitation using the programmable 'Cavitation' function.

### 11.2.4.5 Compensation

Only with 'Automatic' OFF operating mode: Using the 'Compensation' programmable function, you can minimise the influence of back pressure oscillations and thus achieve a high level of dosing precision.



*With difficult hydraulic conditions, it may be better to switch off the 'Compensation' function.*

### 11.2.5 Concentration

→ 'Menu / Information' → Settings → Concentration → ...'

The desired mass concentration of feed chemical that will subsequently be required in the dissolving medium (e.g. the main flow) can be entered directly in the "Concentration" continuous display.

The principle of entering the concentration:

1. Select the operating mode.
2. Set the data for the feed chemical and dissolving medium in the 'Set up' - 'Concentration' menu.
3. Set the desired concentration in the "Concentration" continuous display.



- The "Concentration" continuous display only appears, if:
  - the pump is calibrated.
  - the 'Concentration' menu was run through in the operating mode used.
  - and 'Concentration control' was switched to 'active' - in the operating mode being used.
- The "Concentration" continuous display switches to the display mode "%" at concentrations above 999.99 ppm.
- When changing between operating modes, the pump saves the settings for each operating mode - providing it is connected to supply voltage.
- If the pump is to display the concentration as a volume concentration, enter "1.00" kg/l for the density of the feed chemical.

#### 11.2.5.1 'Manual' operating mode (settings for the 'Concentration' function)

→ 'Menu / Information' → Settings → Concentration  
→ Concentration control → Flow of main medium → ...'

The "Concentration input" in 'Manual' operating mode is intended for metering a substance into pipework containing a medium flowing at a constant rate ('main flow') in such a way that it has a specific mass concentration in the flow.

**CAUTION!****Danger of too high concentrations**

The metering pump can continue to meter if the flow falls or stops entirely.

- Take system-based precautions to prevent the metering pump from continuing to meter in these circumstances.

The prerequisites are that:

- the flowing medium has the same density as water ( $1 \text{ kg/l} \hat{=} \text{g/cm}^3$ )
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid:  $1.26 \text{ kg/l} \hat{=} \text{g/cm}^3$ )
- The measurement unit for the liquid volume is set in the 'System → Volume unit' menu.

**Procedure****CAUTION!**

The precision of the concentration is strongly dependent on:


- the precision of the metering pump calibration.
- the precision of the inputs.

1. ➤ Calibrate the metering pump if it is not yet calibrated - see chapter 'Settings'- 'Calibration' chapter.
2. ➤ Check whether the metering pump is set to 'Automatic' - 'on' metering mode.
3. ➤ Select 'Manual' - 'Operating mode' (possible settings from other operating modes remain saved.).
4. ➤ Select 'Concentration' in the 'Set up' menu.
5. ➤ Set 'active' in the 'Concentration control' menu item and press the [Clickwheel].
6. ➤ Set the 'Main medium flow' (in the pipework) and then press the [Clickwheel].
7. ➤ Set the 'Feed chemical mass concentration' and press the [Clickwheel].
8. ➤ Set the (mass) 'Feed chemical density' and press the [Clickwheel].  
⇒ The 'Concentration' menu appears.
9. ➤ Press [Menu] [≡].  
⇒ A continuous display appears.
10. ➤ Press the [Clickwheel] to go to the "Concentration" continuous display (ppm or %).
11. ➤ Enter the required mass concentration of the feed chemical in the main flow by pressing and turning the [Clickwheel].

Tab. 13: Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Flow in m <sup>3</sup> /h	0000.1	9999.9	0000.1
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

## 11.2.5.2 'Contact' operating mode (settings on the 'Concentration' function)

 → 'Menu / Information' → Settings → Concentration  
→ Concentration control → Contact gap → ...'

The "Concentration input" in 'CONTACT' operating mode is intended for metering a substance into pipework containing a medium flowing at a variable rate in such a way that it has a specific mass concentration in the flow.

**CAUTION!****Danger of too high concentrations**

The metering pump can continue to meter if the flow falls or stops entirely.

- Take system-based precautions to prevent the metering pump from continuing to meter in these circumstances.


The prerequisites are that:

- the flowing medium has the same density as water ( $1 \text{ kg/l} \triangleq \text{g/cm}^3$ )
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid:  $1.26 \text{ kg/l} \triangleq \text{g/cm}^3$ )
- a contact water meter is hydraulically installed and connected to the external input of the metering pump.
- The measurement unit for the liquid volume is set in the 'System → Volume unit' menu.

**Procedure****CAUTION!**

The precision of the concentration is strongly dependent on:

- the precision of the metering pump calibration.
- the precision of the inputs.

1. ➤ Calibrate the metering pump if it is not yet calibrated - see chapter 'Settings' - 'Calibration' chapter.
2. ➤ Check whether the metering pump is set to 'Automatic' - 'on' metering mode.
3. ➤ Select 'Contact' - 'Operating mode' and simply confirm the associated menu items with the [Clickwheel] (possible settings from other operating modes remain saved.)
4. ➤ Select 'Concentration' in the 'Set up' menu.
5. ➤ Set 'active' in the 'Concentration control' menu item and press the [Clickwheel].
6. ➤ Set the 'Contact gap' and press the [Clickwheel].
7. ➤ Set the (mass) 'Feed chemical concentration' and press the [Clickwheel].
8. ➤ Set the (mass) 'Feed chemical density' and press the [Clickwheel].  
⇒ The 'Concentration' menu appears.
9. ➤ Press [Menu] .  
⇒ A continuous display appears.
10. ➤ Press the [Clickwheel] to go to the "Concentration" continuous display (ppm or %).
11. ➤ You can enter the desired mass concentration using the [Clickwheel].

Tab. 14: Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Contact gap in l/contact	000.10	999.99	000.01
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

### 11.2.5.3 'Batch' operating mode (settings for the 'Concentration' function)

☰ → 'Menu / Information' → Settings → Concentration  
 → Concentration control → Volume of main medium → ...'

The "Concentration input" in 'Batch' operating mode, is intended for metering a substance into the medium in a storage tank so that it then has a defined mass concentration in the storage tank (when batching a solution – do not forget to stir!).

#### The prerequisites are that:

- the medium in the storage tank has the same mass density as water (1 kg/l  $\triangleq$  g/cm<sup>3</sup>)
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 1.26 kg/l  $\triangleq$  g/cm<sup>3</sup>)
- The measurement unit for the liquid volume is set in the 'System' → 'Volume unit' menu.

#### Procedure



#### CAUTION!

The precision of the concentration is strongly dependent on:

- the precision of the metering pump calibration.
- the precision of the inputs.

1. ➤ Calibrate the metering pump if it is not yet calibrated - see 'Set up' - 'Calibration' chapter.
2. ➤ Check whether the metering pump is set to 'Automatic' - 'on' metering mode.
3. ➤ Select 'Batch' - 'Operating mode' and simply confirm the associated menu items with the [Clickwheel] (possible settings from other operating modes remain saved.)
4. ➤ Select 'Concentration' in the 'Set up' menu.
5. ➤ Set 'active' in the 'Concentration control' menu item and press the [Clickwheel].
6. ➤ Set the 'Main medium volume' of the medium in the storage tank and press the [Clickwheel].
7. ➤ Set the (mass) 'Feed chemical concentration' and press the [Clickwheel].
8. ➤ Set the (mass) 'Feed chemical density' and press the [Clickwheel].  
 ⇨ The 'Concentration' menu appears.
9. ➤ Press [Menu] ☰.  
 ⇨ A continuous display appears.
10. ➤ Press the [Clickwheel] to go to the "Concentration" continuous display (ppm or %).

11. You can enter the desired mass concentration using the [Clickwheel].

Tab. 15: Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Volume in l	0000.1	9999.9	0000.1
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

#### 11.2.5.4 'Analogue' operating mode (settings on the 'Concentration' function)

☰ → 'Menu / Information' → Settings → Concentration  
→ Concentration control → Max. flow of main medium → ...'

The "Concentration input" in 'Analogue' operating mode is intended for metering a substance into pipework containing a medium flowing at a variable rate in such a way that it has a specific mass concentration in the flow.



#### CAUTION!

##### Risk of incorrect concentrations

- After adjusting, check whether the concentration at various flows corresponds to the required result.

The prerequisites are that:

- the flowing medium has the same density as water ( $1 \text{ kg/l} \triangleq \text{g/cm}^3$ )
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid:  $1.26 \text{ kg/l} \triangleq \text{g/cm}^3$ )
- a flow meter with analogue output is hydraulically installed and connected to the external input of the metering pump.
- The measurement unit for the liquid volume is set in the 'System' → 'Volume unit' menu.

#### Procedure




#### CAUTION!

The precision of the concentration is strongly dependent on:

- the precision of the metering pump calibration.
- the precision of the inputs.

1. Calibrate the metering pump if it is not yet calibrated - see chapter 'Settings' - 'Calibration' chapter.
2. Check whether the metering pump is set to 'Automatic' - 'on' metering mode.
3. Select 'Analogue' operating mode and confirm with the [Clickwheel].
4. Set '0...20 mA' or '4...20 mA' in the 'Select analogue' menu item and press the [Clickwheel].
5. Select 'Concentration' in the 'Set up' menu.
6. Set 'active' in the 'Concentration control' menu item and press the [Clickwheel].

7. ➤ Set the 'Max. main medium flow' (in the pipework) and press the [Clickwheel]. (It is then assigned to the current value of 20 mA).
8. ➤ Set the (mass) 'Feed chemical concentration' and press the [Clickwheel].
9. ➤ Set the (mass) 'Feed chemical density' and press the [Clickwheel].  
⇒ The 'Concentration' menu appears.
10. ➤ Press [Menu] .  
⇒ A continuous display appears.
11. ➤ Press the [Clickwheel] to go to the "Concentration" continuous display (ppm or %).
12. ➤ You can enter the desired mass concentration using the [Clickwheel].

**CAUTION!**

- Note the decimal point.
- The mass concentration is affected by changes in the stroke rate and the stroke length.
- The pump limits the upper value of the mass concentration, because otherwise the incremental jumps when adjusting would be unacceptably large. Adjust the stroke length as necessary - do not set it under 30%.




*The least significant figures of the value in the continuous display cannot be changed at will using the [Arrow keys], rather only in incremental jumps resulting from the input data.*

*As necessary, change the stroke length and adjust the concentration; in doing so the pump compensates via the stroke rate.*

Tab. 16: Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Max. flow in m <sup>3</sup> /h	0000.1	9999.9	0000.1
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

## 11.2.6 Calibration

 ➔ 'Menu / Information ➔ Settings ➔ Calibration ➔ ...'

**Calibration - precision**

*Normally the pump does not have to be calibrated.*

*However, the pump should be calibrated for precise metering.*

*With individual pumps in the product range, the capacity can systematically deviate by -5% to +10% from the specified capacity. A reproducibility of  $\pm 2$  % from the specified capacity remains as a deviation after calibration.*



**Calibration influences the menu**

In 'Auto' - 'off' dosing mode: Some menus only appear if the pump has been calibrated.

**Calibration using a calibration factor**

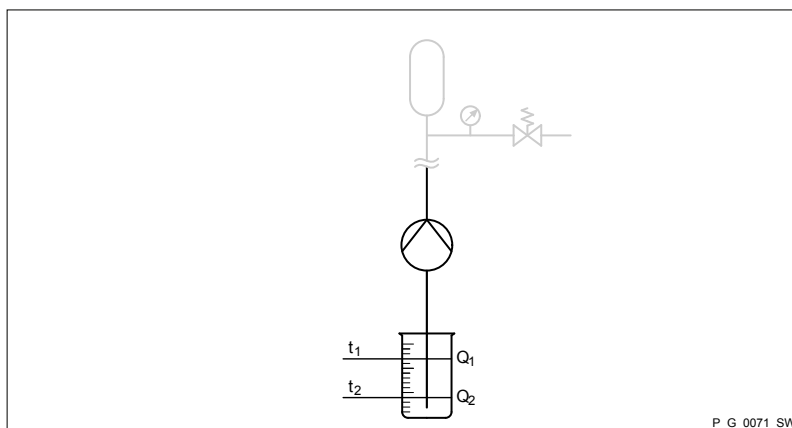
1. ➤ Select the 'Menu / Information → Settings → Calibration → Calibration factor' menu and press the [Clickwheel].  
⇒ The 'Calibration factor' menu item appears.
2. ➤ Use the [Clickwheel] to enter the required 'Calibration factor'.  
⇒ The 'Calibration factor' menu item appears for confirmation.



'Calibr. factory' = Actual value (measured) / Setpoint (required)

**Calibration****WARNING!**

If the feed chemical is hazardous, take appropriate safety precautions when performing the following calibration instructions. Observe the material safety data sheet for the feed chemical!


**Preparation**

1. ➤ Use the [Clickwheel] to scroll through the continuous display to check whether litres or gallons have been selected.
2. ➤ If the incorrect volume unit has been selected, correct it in the 'Menu / Information → Settings → System → Volume unit' menu.
3. ➤ Check whether the capacity or stroke rate in the continuous display is not too low for calibration.
4. ➤ Lead the suction hose into a measuring cylinder containing the feed chemical – make sure that the discharge hose is installed permanently (operating pressure, ...!).
5. ➤ Prime the feed chemical (press [▶▶]) [Priming] if the suction hose is empty.

### Calibration process

1. ➤ Record the level in the measuring cylinder.
2. ➤ Select the *'Menu / Information → Settings → Calibration → Calibration'* menu and press the *[Clickwheel]*.
  - ⇒ The *'Start calibration'* (PUSH) menu item appears.
3. ➤ To start calibration, press the *[Clickwheel]*.
  - ⇒ The *'Calibrate ...'* menu item appears, the pump starts to pump and indicates the number of strokes.
4. ➤ After a reasonable number of strokes (a minimum of 200), use the *[Clickwheel]* to stop the pump.
  - ⇒ The *'Calibration ended'* menu item appears. It requests you to enter the calibration volume.
5. ➤ Determine the required metering volume (difference between initial volume - remaining volume in the measuring cylinder).
6. ➤ Use the *[Clickwheel]* to enter this volume in the *'Calibration ended'* menu item and close.
  - ⇒ The pump switches to the *'Calibration result'* menu item - the pump is calibrated.
7. ➤ Press the *[Clickwheel]*.
  - ⇒ The pump returns to the *'Menu / Information → Settings'* menu.

## 11.2.7 System

 ➤ *'Menu / Information → Settings → System → ...'*

The *'System'* menu splits into the following sub-menus:

- 1 - *'Dosing head'*
- 2 - *'Volume unit'*
- 3 - *'Pressure unit'*
- 4 - *'Pressure adjustment'*
- 5 - *'Start behaviour'*

### 11.2.7.1 'Dosing head'

 ➤ *'Menu / Information → Settings → System → Dosing head → ...'*



#### CAUTION!


- Should a different liquid end size be fitted, then the pump must be reprogrammed in the *'Dosing head'* sub-menu.
- Reprogram the pump to *'No dosing head'* for demonstration purposes or if operating without feed chemical.

### 11.2.7.2 Volume unit

 ➤ *'Menu / Information → Settings → System → Volume unit → ...'*


You can select another unit for the volume in the *'Volume unit'* sub-menu.

### 11.2.7.3 Pressure unit

 → 'Menu / Information → Settings → System → Pressure unit → ...'

In the 'Pressure unit' sub-menu, you can select another unit for the pressure.

### 11.2.7.4 Pressure adjustment

 → 'Menu / Information → Settings → System → Pressure adjustment → ...'

You can adjust the pressure value, which the pump displays in the 'Pressure adjustment' sub-menu, if it is to differ from the pressure in the discharge line.



*There is no 'Pressure adjustment' sub-menu with pumps with SER dosing heads.*

Requirements:

- A manometer is installed in the discharge line.
- Everything is set on the pump.

**1.** ➤ Shift to the 'Pressure adjustment' sub-menu.

⇒ The 'Start pump' menu item appears.

**2.** ➤ Use the [Clickwheel] to confirm 'Yes'.

⇒ The pump starts up.

The 'Calibration pressure' menu item appears.

**3.** ➤ The 'Calibration pressure' menu item shows at the top the pressure value that the pump is missing. Below that it displays an adjustable pressure value.


**4.** ➤ Use the [Clickwheel] to enter the pressure value from the manometer as soon as the pressure value is stable.

**5.** ➤ Use the [Clickwheel] to confirm this pressure value.



⇒ The pump stops.

'Pressure adjustment' is now complete.


### 11.2.7.5 Start behaviour

 → 'Menu / Information → Settings → System → Start behaviour → ...'

You can specify the start behaviour of the pump once the supply voltage has been switched on in the 'Start behaviour' sub-menu.

Start behaviour	Description
'always STOP'	The pump always wakes up in "Manual stop via the  [STOP/START] key" mode. It can only be started by pressing  [STOP/START].
'always on'	The pump always starts immediately.
'last status'	The pump always adopts the last status it had before the supply voltage was switched off.


## 11.2.8 Inputs/outputs

 → 'Menu / Information → Settings → Inputs/outputs → ...'

The 'Inputs/outputs' menu splits into the following sub-menus:

- 1 - 'Auxiliary capacity' / 'Auxiliary frequency'
- 2 - 'Relay1' (optional)
- 3 - 'Relay2' (optional)
- 4 - 'Flow monitor' (only if connected)
- 5 - 'Diaphragm rupture' (only if connected)
- 6 - 'Pause input' (Option)
- 7 - 'Level monitor'

### 11.2.8.1 'Auxiliary capacity' / 'Auxiliary frequency'

 → 'Menu / Information → Settings → Inputs/Outputs → Auxiliary capacity / Auxiliary frequency → ...'

The programmable 'Auxiliary capacity' / 'Auxiliary frequency' function enables switch-over to an additional capacity / stroke rate that can be fixed in the 'Auxiliary capacity' / 'Auxiliary frequency' menu.

It can be activated via the "External control" terminal. If 'Auxiliary capacity' / 'Auxiliary frequency' is being used, then the identifier "AUX" appears on the LCD screen.

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

### 11.2.8.2 'Relay1 (optional)'

 → 'Menu / Information → Settings → Inputs/outputs → Relay1 → ...'




The setting options for the 'Relay' function only exist if a relay is fitted.

Tab. 17: Relay, physical and pre-set to ...

Identity code specification	Relay, physical	Pre-set to ...
1	1 x changeover contact 230 V – 8 A	Fault indicating relay, N/C
4	2 x N/O 24 V – 100 mA	Fault indicating relay, N/C, and pacing relay

**Relay type**

You can reprogram the relays to these types:

Menu setting	Effect
Timer	The relay switches when requested by the timer.
Fault	The relay switches in the event of a fault message (red LED*).
Warning	The relay switches in the event of a warning message (yellow LED*).
Warning + error	The relay switches in the event of a warning message (yellow LED*) or a fault message (red LED*).
Warning, error + stop	The relay switches in the event of a warning message (yellow LED*), when stopped by  [Start/Stop] or in the event of a fault message (red LED*).
Pump active	The relay switches as soon as the pump is in standby and not stopped and not in a state like 'Pause' or if an error is pending. In the opposite case, the relay switches back again.
Stroke rate**	The relay switches with every stroke.
Cycle quantity	The relay always switches when the set metering volume is exceeded.
Metering / Batch	The relay changes its state as soon as a batch has been processed.
Bleeding	The relay opens an optionally installed bleed valve as soon as the control activates it.

\* see the "Troubleshooting" chapter

\*\* only use 'Relay 2' for this relay type (semiconductor relay).

You can set in the associated menu for certain events whether they are to be signalled as an error or warning (or not) (level, metering stroke, cavitation, ...).

The relays can also switch with programmed errors - refer to the "Troubleshooting" chapter.

**Relay polarity**

You can set here how a relay is to switch.


Menu setting	Effect
N/C	The relay is closed in normal mode and opens with a triggering event. (N/C)
N/O	The relay is open in normal mode and opens with a triggering event. (N/O)

**11.2.8.3 'Relay2 (optional)'**


 → 'Menu / Information → Settings → Inputs/outputs → Relay2 → ...'

## Relay cycle quantity

You can set the metering volume for which the pacing relay is to switch once here.

For more information on 'Relay2' - see  Chapter 11.2.8 'Inputs/outputs' on page 64.






## 11.2.8.4 mA output

 → 'Menu / Information' → Settings → Inputs/outputs → mA output → ...

You can enter here which signal is to be output similar to the pump capacity and as an mA signal and how the pump is to respond. The following can be selected one after the other - Table display:

1. 'mA output'	2. 'Select the analogue signal'	3. 'Capacity at 20 mA'	4. 'Behaviour, mA output'	5. 'Behaviour 23 mA'	6. 'Behaviour 3.6 mA'
'0...20 mA'	'Strokes / hour'	-	'No change'	-	-
'4...20 mA'			'Behaviour, mA output'	'Passive'	'Passive'
				'Fault'	'Fault'
				'Warning'	'Warning'
				'Warning + error'	'Warning + error'
				'Warning + error + stop'	'Warning + error + stop'
				'Bleeding'	'Bleeding'
	'Litre / hour at 20 mA'	'xx.xx l/h'			

The following can be selected one after the other - Displayed as instructions:

1.  Select the current range in the 'mA output' display.
2.  In the 'Select the analogue signal' display, select which of the pump's capacity parameters is to be signalled by the mA output.
3.  Only with 'Litre / hour at 20 mA': Select the capacity (Litre / hour) in the 'Capacity at 20 mA' display, which is to be used for 20 mA (you thereby scale your mA range).
4.  In the 'Behaviour mA output' display, select whether the mA output is to signal something or not ( 'No change' ).
5.  In the 'Behaviour 23 mA' display, select which pump behaviour the mA output is to signal by 23 mA. 'Behaviour 3.6 mA' acts in a similar way.




The behaviour selected under 'Behaviour 23 mA' has a higher priority when signalling than the one selected under 'Behaviour 3.6 mA'.

## 11.2.8.5 'Flow control'

 → 'Menu / Information' → Settings → Inputs/outputs → Flow control → ...



The setting options for the 'Flow control' function are only available if a flow control is electrically installed. The symbol for flow control appears: .


A metering monitor, such as a Flow Control (also DulcoFlow®), can register the individual pressure impacts of the pump and report them back to the pump.

The pump switches to fault mode if this feedback is missing in a sequence, as set under 'Error tolerance'.


It is possible to switch the function on and off under 'Activation'.

Under 'at Auxiliary', it is possible to set whether the function is to be deactivated with auxiliary frequency.

#### 11.2.8.6 'diaphragm rupture'

 → 'Menu / Information' → Settings → Inputs/outputs → Diaphragm rupture → ...'



The setting options for the 'Diaphragm rupture' function only exist if a diaphragm rupture indicator is electrically installed. The symbol for diaphragm appears .

In the 'Diaphragm rupture' sub-menu you can select whether the pump generates a warning message or an error message in the event of a diaphragm rupture.

#### 11.2.8.7 'Pause input'

 → 'Settings' → Inputs/outputs → Pause → ...'

In the 'Pause' menu you can select whether the pump switches to 'Pause' with a "normally-open (N/O)" or "normally-closed (N/C)" input contact signal.

#### 11.2.8.8 'Level monitor'

 → 'Settings' → Inputs/outputs → Level monitoring → ...'

You can select in the 'Level monitoring' menu which measuring principle is to be used for level monitoring:

- '2-stage'
- 'continuous'

##### 11.2.8.8.1 2-stage

In the 'Level warning' sub-menu, you can select for a two-stage level switch whether the pump switches to 'Level warning' with an 'N/C' or 'N/O' input contact signal.

In the 'Level error' sub-menu, you can select for a two-stage level switch whether the pump switches to 'Error' with an 'N/C' or 'N/O' input contact signal.







**11.2.8.8.2      Continuous****Calibration**

The ProMinent suction lance with continuous level measurement can measure the liquid level in a 30-litre canister with 5% precision. The relevant secondary display of the gamma/ XL indicates the liquid level or the liquid level can be signalled by bus to the control panel.

You can calibrate continuous level measurement in the '*Calibrate*' sub-menu.





**Electrodes**

You can calibrate the '*Electrodes*' in this sub-menu – something that is not normally necessary. If the feed chemical has a dielectric constant  $\epsilon_r$  below 30, you can try to get level measurement running.

1.  Select '*Electrodes*' under '*Calibrate*'.  
⇒ The '*Calibration "Air"*' display appears.
2.  Remove the level gauge from the feed chemical.
3.  Press the [*dial*].  
⇒ The '*Calibration "Medium"*' display appears.
4.  Immerse the level measurement in the feed chemical up to the holding claws.
5.  Press the [*dial*].  
⇒ The calibration process is completed.
6.  Check whether the level measurement is working as expected.




**Percent level**

Use '*Percent level*' in this sub-menu to recalibrate the level measurement if you wish to work with another maximum liquid level.


1.  Select '*Percent level*' under '*Calibrate*'.  
⇒ The '*Calib. "Liquid level"*' display appears.
2.  Immerse the level measurement in the feed chemical.
3.  Use the [*dial*] to set the required percentage for this level and press the [*dial*].  
⇒ The application switches back to the Start menu.
4.  Check whether the level measurement is working as expected.

**Configure**

You need to enter the warning thresholds for continuous level measurement and the required unit in the '*Configure*' sub-menu.

1.  Enter the '*Warning threshold level*' as a % and press the [*dial*].
2.  Enter the '*Fault threshold level*' as a % and press the [*dial*].
3.  Select the '*Unit level*' for the "continuous level" secondary display: '*Percent*' or '*Litre*' and press the [*dial*].

**11.2.9      Config I/Os**

 ⇒ '*Menu / Information*' ⇒ *Settings* ⇒ *Config I/Os* ⇒ ...'

The '*Config I/Os*' menu is used to assign functions to the "Config I/O" (-  
⚡ '*Control elements, overview*' on page 16) connector pins .



## Config I/O input

You can configure the pins as an input – for the timer.

## Config I/O output

The pins can be configured as outputs (timer, warning, error, auxiliary,...).

It is also possible to use '*Selective errors*' or '*Selective warning*' to issue very specific errors or warnings (diaphragm rupture, defective metering strokes, air in the dosing head, ...).

## 11.2.10 Bleeding

 → 'Menu / Information' → Settings → Bleeding → ...'

The '*Bleeding*' function is used for controlled bleeding of the liquid end.

The software solution is always in the pump control. The pump calls up the '*Priming*' function for bleeding. The pump can therefore pump the gas bubbles out of the liquid end even without a bleed valve (solenoid valve) – depending on the back pressure.

If the pump has "Automatic bleed" via the "relay identity code option (retro-fittable), the pump can be bled via a bleed relay.

There are 2 hardware options for automatically bleeding the discharge side:

- via ProMinent's bleed module in the liquid end.
- via a customer implemented bleed facility in the discharge line.




*The relay - "Relay" – "with automatic bleed" - changes its switching status for the period during which the pump is priming.*

The '*Bleed*' function can be triggered in 4 ways:

- 1 - Not ( '*Off*' ).
- 2 - '*Periodically*' by an internal signal - defined by '*Cycle*' and '*Duration*'.
- 3 - By the '*Air lock*' internal signal
- 4 - If one of the two signals occurs ( '*Both*' ).

Detailed explanation:

- 1 - If '*Off*' has been selected in the menu, this function is deactivated.
- 2 - If '*Periodic*' was selected in the menu, then the control unit periodically triggers the bleed procedure with an adjustable '*cycle*' (10 ... 1440 min = 24 h) and an adjustable '*duration*' (5 ... 300 s = 5 min).

Bleeding is always triggered at the start of a period. A bleed process is also started by  [ STOP/START ] or by connecting the pump to mains voltage.





- 3 - If '*Air lock*' has been selected in the menu, the '*Air lock*' internal signal triggers the bleed procedure.


If the signal appears again within 8 minutes of the bleed procedure being carried out, the control unit repeats the bleed procedure up to a maximum of 3 times. However if the signal still appears, then an error message is generated, which has to be acknowledged via the [dial].

In the event of an '*Air lock*' the option of a direct error or warning message disappears for the '*Air lock*' signal. The corresponding menu branch in the '*Settings*' menu is also hidden. The signal is only available for the '*Bleed*' function.

- 4 - If '*Both*' has been selected in the menu, then each trigger can trigger a bleed process.

### Sequence of the bleed procedure (automatic):


1. ➤ The pump control stops the normal metering operation - the  "Stop Pause" symbol appears on the LCD screen.
2. ➤ Only with bleed relay: After 1 s, the pump control opens the bleed valve on the liquid end (via the bleed relay and the solenoid valve).
3. ➤ 1 s later, the pump starts to run at a high stroke rate (like during priming) - the "Air lock" symbol  appears on the LCD screen instead of the "Stop Pause" symbol.
4. ➤ The pump operates in this way for the total set time.
5. ➤ Once the set time has elapsed, the pump stops – the "Stop Pause" symbol  appears on the LCD screen again.
6. ➤ Only with bleed relay: After 1 s the pump control closes the liquid end bleed valve.
7. ➤ After 1 s the "Stop Pause" symbol  disappears and the pump recommences normal operation.

If the pump was in the "Stop" state at the time of triggering ( [STOP/START], Pause, Error), the start of the bleed procedure is delayed - until this state has been cleared.

If the pump switched to "Stop" state during the bleed procedure, the pump control jumps immediately to phases 5 and 6. - see above. This definitely cancels the bleed procedure. As soon as the "Stop" state is cleared, the bleed procedure starts from the beginning.


## 11.2.11 'Priming time'

 ➔ 'Menu / Information ➔ Settings ➔ Priming time ➔ ...'

In the 'Priming time' menu, you can select how long the metering pump is to prime once  [Priming] has been pressed.




*In operation, the stroke length can be changed more easily using the "Priming time" display:*

- Press  [Priming] - the pump starts to prime.
- Turn the [Clickwheel] to set the priming time.
- Press the [Clickwheel] to save the priming time.

## 11.2.12 'Set time'

 ➔ 'Menu / Information ➔ Settings ➔ Set time ➔ ...'

You can set the time in the 'Set time' menu.


1. ➤ Use the dial to adjust a figure.
2. ➤ Use  [Priming] to move to the next figure.

Under 'Auto. Summertime' you can select whether you wish to change over to 'Summertime'.

You can also input when the pump is to change to and from 'Summertime'.


Check under 'Location' whether the pump is also set to its own 'hemisphere' of the world.

### 11.2.13 'Date'

 → 'Menu / Information → Settings → Date → ...'

You can set the date in the 'Date' menu.

## 11.3 Timer

 → 'Menu / Information → Timer → ...'




– Please first read this chapter to get an overview. You will then understand the timer better when working through the chapter.

The timer gamma/ XL can do the following at predefined times and intervals or event-dependent:

- open / close the relays
- switch the level of a Config I/O output
- be triggered by the level at a Config I/O input
- start a delayer
- switch operating mode
- operate the pump work at a defined capacity or stroke rate / stroke length
- stop / start the pump
- trigger a batch ( 'Batch (time)')

### 11.3.1 Activation / deactivation

 → 'Menu / Information → Timer → Activation → ...'




You can only program the timer when 'Activation' is set to 'inactive'.

➔ To program the timer, set 'Activation' to 'inactive'.

⇒ The first line of the timer menu 'Timer status' then shows 'Inactive'.

➔ To activate the timer, set 'Activation' to 'active'.

⇒ The first line of the timer menu 'Timer status' then displays 'active'.


The timer starts working - the timer identifier  is visible in the continuous display.



When 'Activation' is set to 'active', the timer software generates the state of the pump which the pump would have precisely had at this time if it had been set to 'active' without any interruption.

Delayed, linked actions are unaffected by this.

### 11.3.2 Setting the timer

 → 'Menu / Information' → Timer → Set timer → ...'

You can create commands (also known as "program lines") for a timer program in the 'Set timer' menu.

You can create up to 99 commands (program lines).

Create the command as follows:

- 1 - Create a 'new' command (program line)
- 2 - Select the 'Triggering event' (trigger) and the time and/or interval if necessary
- 3 - Select 'Action' and a value, if necessary
- 4 - Check the command
- 5 - Create the next command – if necessary

The following administration functions are available to manage the commands (program lines):

- 1 - Reprogram program line ( 'New' )
- 2 - Check program line ( 'Show' )
- 3 - Change program line ( 'Change' )
- 4 - Delete individual program line ( 'Delete' )
- (5 - Delete the entire program ( 'Clear all' one level higher))



#### CAUTION!

The pump does not perform any plausibility check.

Please ensure before using that the timer actually does what you expect of it. Please consider the consequences for your system.



#### CAUTION!

A program set up in 'Automatic' - 'on' metering mode will not function in 'Automatic' - 'off' metering mode and vice versa.



#### CAUTION!

If you wish to use automatic summer time adjustment ( 'Settings' - 'Time' ) avoid any triggering events between 02:00 a.m. and 03:00 a.m.



#### **Restriction with day numbers**

*If you wish to start an action of a certain day of each month, note that the timer only permits days 01 - 28.*



#### **Using Config I/Os**

*If you wish to use Config I/Os as inputs or outputs, you first need to configure them as a 'Timer input' or 'Timer output' under 'Menu / Information' → Settings → Config I/Os → ...'.*

## 11.3.2.1 Reprogram program line ( 'new' )

**CAUTION!**

If the 'Timer status' is set to 'active', the pump can neither be set nor programmed!

To do so, set the 'Timer status' under 'Activation' to 'inactive'.

## 11.3.2.1.1 Principle design of a program line

In principle, an (imaginary) program line / instruction is set up as follows:

Time event (trigger)		Action	
workdays 1 (Mo-Fr)	Time of day 12:00	Manual	20.00 l/h

This corresponds to the following instruction:

WHEN triggering event, THEN action

The **time event (trigger)** defines what action or at what time an action is to take place.

The **action** defines which type of action is to take place.

The finished program line/ instruction looks like this:

Instruction 03/05

workdays 1 (Mo-Fr)  
12:00  


---

Manual  
20.00 l/h

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**Example**

Time event (trigger)		Action	
workdays 1 (Mo-Fr)	Time of day 12:00	Manual	20.00 l/h

The example means:

When it is 12:00 on a workday, then the pump is to work in 'Manual' mode at 20.00 l/h.

Tab. 18: Time events (triggers)

Time events (triggers)	Description	Remark
Time	Switching time reached	For more information - see <a href="#">Chapter 11.3.2.1.3 'Selecting time events and switching point'</a> on page 75
'Init'	Thus declared is started at the beginning of the program process	Defined starting conditions - see <a href="#">Chapter 11.3.2.1.2 'Init' Initial conditions'</a> on page 75

Time events (triggers)	Description	Remark
'Delayer'	Delay time of delayer D: xx expired	-
'Config I/O' input	0/1 contact at input I: x	Connector pins on the very left of the pump *

\*refer to "Overview of equipment" chapter

The 'Config I/O' inputs first need to be assigned to the timer under 'Menu / Information → Settings → Config I/Os → ...'.

You can select an action and also a value:

Tab. 19: Action

Action	Description	Value
'Manual'	Switch over in this operating mode	Litre/h ( 'Capacity' )
'Manual'	Switch over in this operating mode	Litre/h *1 ( 'Capacity' )
		Strokes/h *2 ( 'Metering rate' ) + 'Stroke length'
'Stop'	Stop pump	--
'Relay 1 **'	Have the relay switch to status ...	open closed
'Relay 2 **'	Have the relay switch to status ...	open closed
'Contact'	Switch over in this operating mode	--
'Batch (input)'	Switch over in this operating mode	--
'Analogue'	Switch over in this operating mode	--
'Start delayer'	Activate a delayer	
'Frequency *2'	The pump runs at this stroke rate	Strokes/h ( 'Metering rate' )
'Config I/O 1'	Switch the level of the Config I/O 1 output to ...	open closed
'Config I/O 2'	Switch the level of the Config I/O 2 output to ...	open closed
'Config I/O 3'	Switch the level of the Config I/O 3 output to ...	open closed

\*1: only available in 'Automatic' operating mode - see Chapter 'Settings' - 'Automatic'

\*2: only available, if metering is done traditionally/conventionally - see chapter 'Settings' - 'Automatic'

\* refer to the "Overview of equipment" chapter and 'Menu / Information → Settings → Config I/Os → ...'

\*\* Option; needs to be assigned to the 'Timer' (under 'Settings → Inputs/Outputs → Relay → Relay type' - refer to this chapter of the operating instructions under 'Settings')

Tab. 20: Selected value ranges

Description	Value range
Line numbers	01 ... 99
Day (date)	01 ... 28
Time of day (hours)	00 ... 23
seconds	0001 ... 9999
No. of delayer D:	01 ... 15

## 11.3.2.1.2 'Init' Initial conditions

Using the triggering event 'Init' initial conditions can be set at the beginning of a program sequence.

## Example

triggering event (trigger)		Action	
Init	-	Relay 2	closed
Init	-	Contact	-

The example means:

As soon as the programme is started (via 'Timer → Activation → active' or mains voltage on), 'Init' sets 'Relay 2' to 'closed' and the 'Operating mode' to 'Contact'.

## 11.3.2.1.3 Selecting time events and switching point

The cyclic time events periodically trigger actions. That is why a program line consists of a cycle and a switching point.

The **cycle** specifies after which time the action is to be repeated.

The **switching time** specifies when the action is to take place.

## Example

Time events (triggers)		Action
Cycle	Switching time	
workdays 1 (Mo-Fr)	Time of day 12:00	Manual

Tab. 21: Cyclic time events

Cycle	Time
'hourly'	hourly at mm Minute
'daily'	daily at the time mm.ss, Monday to Sunday
'workdays 1 (Mo-Fr)'	daily at the time mm.ss, Monday to Friday
'workdays 2 (Mo-Sa)'	daily at the time mm.ss, Monday to Saturday
'Weekend (Sa+Su)'	daily at the time mm.ss, Saturday and Sunday
'weekly'	weekly at the time mm.ss on day xxxxxx.
'monthly'	monthly at the time mm.ss on the day dd. Day* of the month

\* Value range is restricted to 01 to 28 days.

**CAUTION!**

If you wish to use automatic summer time adjustment ( 'Settings' - 'Time') avoid in principle any time events between 02:00 and 03:00.



*A time event lets you trigger an action precisely to the minute.*

*If the action is to be triggered precisely to the second, then you need to set up your programming on a delayer.*

#### 11.3.2.1.4 Delayer

A delayer allows you to delay an action with regard to a time event (trigger).

Delayers can be both time events and also actions.

##### Example of a program

No.	Time event (trigger)		Action	
01	Config I/O 1	close	Start Delayer 1	-
02	Config I/O 1	close	Start Delayer 2	-
03	Config I/O 1	close	Start Delayer 3	-
04	Init	-	Stop	-
05	Delayer 1	after 60 sec	Config I/O 2	close
06	Delayer 2	after 120 sec	Manual	100 strokes / min, 60% stroke length
07	Delayer 3	after 180 sec	Stop	-
08	Delayer 3	after 180 sec	Config I/O 2	open

The example means:

A flank at 'Config I/O 1' means that ...:

- after 60 s output 'Config I/O 2' is closed,
- after a further 60 s, the pump pumps in 'Manual' operating mode at 100 strokes / min and 60% stroke length,
- stops after a further 60 s and output 'Config I/O 2' opens again.

A program line with a time event 'Delayer' X thus also includes the element 'Delay time'.

The 'Delay time' specifies by which time the start of the selected action is to be delayed (1 s 9,999 s = approx. 2 h 45 min).

The delayer itself must first have been called up by a time event as an action. You can use 15 different delayers.



- With the time event 'Delayer' X, you can trigger an action precisely to the second.
- The clock of the gamma/ XL has an accuracy of  $\pm 1$  s/24 h.



## 11.3.2.1.5 Inputs

A 0/1 contact signal, for example at pin 1 of the 'Config I/O' terminal can be a triggering event.

## Example

Time events (triggers)	Action	
Config I/O 1	Relay 2	open

The example means:

If an 0/1 contact signal is closed between Pin 1 of the 'Config I/O' connector and Pin 4, then the 'Relay 2' should switch to 'open' status.

## 11.3.2.1.6 Outputs

The timer can output a 1/0 contact signal e.g. between pin 3 of the 'Config I/O' connector and pin 4.

## Example

Time events (triggers)		Action
Cycle	Switching time	
workdays 1 (Mo-Fr)	Time of day 12:00	Config I/O 3

The example means:

At 12:00 on workdays, the timer outputs a 1/0 contact signal e.g. between pin 3 of the 'Config I/O' connector and pin 4

## 11.3.2.2 1 time event - several actions

You can assign 1 time event to several actions. To do so, always use the same cycle and the same switching time! :

## Example

No.	Time event (trigger)		Action	
01	workdays 1 (Mo-Fr)	Time of day 12:00	Stop	-
02	workdays 1 (Mo-Fr)	Time of day 12:00	Batch (input)	50 strokes
03	workdays 1 (Mo-Fr)	Time of day 12:00	Relay 1	-closed
04	-	-	...	.



- For details on the sorting sequence of the program lines see ↗ 'Sorting sequence' on page 78.
- The timer program can have a maximum of 99 program lines.

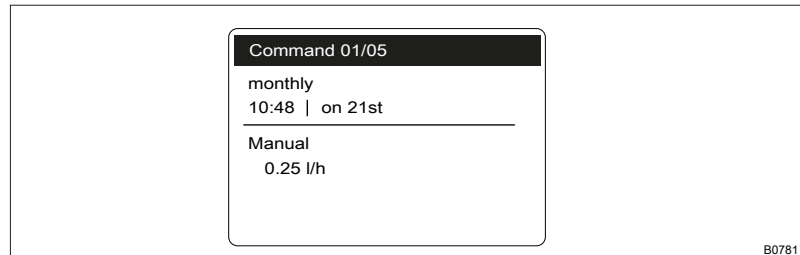
### 11.3.2.3 Check program lines ( 'Show' )

☰ → 'Menu / Information → Timer → Set timer → Show'

'Show' lets you check individual program lines / instructions.

1. ➤ Press the [Clickwheel] on a program line / instruction.

⇒ This display appears:



Above the line Time event (trigger) and possible value  
Below the line Action and value, if required

2. ➤ Turn the [Clickwheel].

⇒ Scroll from instruction to instruction.

The number of the program line or instruction (and the number of the last program line or instruction) appears at the top in the dark bar.

3. ➤ Pressing the [Clickwheel] returns you to 'Set timer'.



*As the timer software automatically sorts the program lines, the numbers of the program lines can change if you change something.*

### Sorting sequence

The timer software automatically sorts every newly programmed program line / instruction after completing it (press the [Clickwheel]) below the other program lines.

The 1st sorting criterion is the type of **time event (trigger)** (for the sequence refer to ☞ *Further information on page 73* and ☞ *Further information on page 75*).

Time-dependent program lines are ordered below each other initially after the **Switching point** (2nd sorting criterion)

then after the length of the **Cycle** (3rd sorting criterion).

The 4th sorting criterion is the type of **action** (see also the programming examples at the end of these instructions).

A purely time-controlled timer program will also run in this sequence.

### 11.3.2.4 Change program lines ( 'Change' )

☰ → 'Menu / Information → Timer → Set timer → Change'




1. ➤ Use the [Clickwheel] to select the required program line / instruction according to its number and press the [Clickwheel].

2. ➤ Click through the instruction and change it.

⇒ The timer software sorts a changed program line / instruction after completion with the [Clickwheel] possibly differently in between the other program lines (Rules - see ☞ *'Sorting sequence' on page 78*).

### 11.3.2.5 Delete individual program lines ( 'Delete' )

 → 'Menu / Information → Timer → Set timer → Delete'

1.  Use the [Clickwheel] to select the required program line / instruction according to its number.
2.  The program line will be deleted as soon as you press the [Clickwheel].
  - ⇒ The timer software re-sorts the remaining programme lines (Rules - see  'Sorting sequence' on page 78).




#### **Delete all program lines**

The option to delete all program lines is to be found one level higher in the menu:

 → 'Menu / Information → Timer → Clear all'

### 11.3.3 Clear all

 → 'Menu / Information → Timer → Clear all → ...'

Use the 'Clear all' menu to clear all instructions (the entire program).

### 11.3.4 Examples

Requirements:

- You have already worked with the pump type
- The time has been set (possible set under 'Settings → Set time → Time' Only possible with 'Timer status'- 'Inactive').

**Example of "Weekday metering"****Task:**

The pump is to meter 2 litres every half hour every weekday (Mon-Fri) between 8:00 and 11:00:

**Solution:**

As you define switching times with the timer, you need to first define the switching points at 08:30, 09:30 and 10:30.



To meter 2 litres, the pump needs to work in 'Manual' 'operating mode' for 10 min at a 'Capacity' of 12,000 l/h. A 'Capacity' of 12,000 l/h is thereby added to the switching points.

You also need to define the switching times to stop the pump at 08:40, 09:40 and 10:40 - paired with the 'Halt' action.


Tab. 22: Program as program lines / instructions

No.	Time event		Action		Comment
		Switching time		Capacity	
01	workdays 1 (Mo-Fr)	08:30	Manual	12,000 l/h	Meter at 12,000 l/h
02	workdays 1 (Mo-Fr)	08:40	Stop	-	Stop
03	workdays 1 (Mo-Fr)	09:30	Manual	12,000 l/h	Meter at 12,000 l/h
04	workdays 1 (Mo-Fr)	09:40	Stop	-	Stop
05	workdays 1 (Mo-Fr)	10:30	Manual	12,000 l/h	Meter at 12,000 l/h
06	workdays 1 (Mo-Fr)	10:40	Stop	-	Stop

**How to enter the program lines / instructions:**

1. To program the timer, set  → 'Menu / Information' → 'Timer' → 'Activation' to 'inactive'.  
⇒ The first line of the timer menu 'Timer status' then shows 'Inactive'.
2. Always enter the program / instructions from the table, above, into the newly created instruction under 'Timer' → 'Set timer' → 'new' → '...' (Do not get irritated: the timer program automatically sorts the instructions).
3. To activate the timer, set 'Activation' to 'active'.  
⇒ The first line of the timer menu 'Timer status' then displays 'active'.  
The timer starts working - the timer identifier  is visible in the continuous display.
4. Test your programming!  
The secondary display "Timer" can help here, which shows the next instruction and the remaining time. (To access this secondary display, press the [Clickwheel] in a continuous display until a long series of small circles appears below - immediately turn the [Clickwheel] to navigate to the last circle and press the [Clickwheel].)  
The continuous display itself shows information on the current status of the pump in the dark bar.

***If something has been entered incorrectly:***

- Either press  in the current program line and enter the correct values
- or search for the program line in 'CHANGE' (automatic sorting!). Now press the [Clickwheel], allow the program to run through the program lines again and enter the values correctly
- or use 'delete' to select the program line and delete
- or delete everything using 'clear all' (one level higher)

**Example - to avoid errors**

The example is intended to provide the programmer with a couple of "programming obstacles" that he might not immediately see:

Com-mand	Time event	Additional param-eter	Action	Additional param-eter	Comment
01	Config I/O 1	Input, reacts when closing	Start Delayer 1		When a contact closes between pins 1 and 4 at "Config I/O" connector, this starts delayer 1
02	Config I/O 1	Input, reacts when closing	Start Delayer 2		When a contact closes between pins 1 and 4 at "Config I/O" connector, this starts delayer 2
03	Config I/O 1	Input, reacts when closing	Start Delayer 3		When a contact closes between pins 1 and 4 "Config I/O" connector, this starts delayer 3
04	Init		Stop		Pump stops as soon as the timer is activated
05	Delayer 1	after 60 sec	Close Config I/O 2		Pins 2 and 4 of the "Config I/O" connector act like a normally closed contact – enabling you to control a device
06	Delayer 2	after 120 sec	Manual	12,000 l/h and 80% stroke length	Pump runs after 120 s at 12,000 strokes/h and 80% stroke length
07	Delayer 3	after 180 sec	Stop		Pump stops after 180 s
08	Delayer 3	after 180 sec	Open Config I/O 2		Pins 2 and 4 of the "Config I/O" connector act like a normally open contact – enabling you to control a device

**Explanations:**

- If 1 time event (trigger) is to trigger 3 actions that are to have delays of different lengths, then you need to start 3 delayers and not just 1 - see instructions 01 to 03.
- If several actions are to be performed after the same delay time, then you need to write exactly as many instructions – with the same time event (instructions 07 and 08).
- If, for example, you are using 'Delayer 1' - '60 s' and 'Delayer 1' - '120 s', then the action is never performed after the second (longer delay time because the delayer has been activated after the smaller delay time and becomes inactive.
- Without 'Init' - 'Halt' (instruction 04) it would remain unclear whether the pump alone runs by 'Activation' of the timer.

Activating the timer namely deletes all causes for stop: If the pump has previously been manually stopped, for example in 'Manual' operating mode at 12 l/h, then it suddenly pumps at 12 l/h when the timer is activated, which cannot be seen from the timer program.

- If a contact at 'Config I/O 1' cannot start the program, then it may be due to the fact that the contact is not defined as a "Timer input" (in the 'Menu / Information → Settings → Inputs/Outputs → ...' menu).

In the same way, 'Config I/O 2' (instruction 08) would have to be defined here as a "Timer output".

### 11.3.5 Timer information

#### "Config I/O" terminal

There is an option to feed the signals of up to 3 external potential-free contacts as inputs to the pump via the "Config I/O" connector or issue up to 3 contact signals as outputs (total of inputs + outputs = 3).

Pin assignment - see chapter entitled "Installation, electrical" - "Description of the connectors".

The function of the pins must be assigned under 'Settings → Config I/Os'.

#### Status as soon as the programmed pump is connected to the mains voltage:

The timer software now generates the state of the pump which the pump would have precisely had at this time if it had not been disconnected from the mains voltage.

This relates to linked or non-delayed actions.

#### Effective settings after switching between Timer 'active' and 'inactive':

The timer settings are saved and become effective again when 'inactive' switches to 'active'.

The operating mode settings are saved and become effective again when 'active' is switched to 'inactive'.

#### Storage period of your programming:

The pump stores your programming for up to 20 years.

(The calibration and timer data are maintained for up to 100 years).

The time is retained without mains voltage for approx. 2 years.

### 11.3.6 Typical pitfalls Timer functional faults

Problem	Possible cause of fault	Remedy
The pump starts pumping unexpectedly.	The timer deletes every "Manual" stop when activated - see "Timer behaviour on start"	Enter an 'Init' instruction with 'Halt' action.
The timer does not react to a contact signal at the corresponding pin of the "Config I/O" terminal.	Config I/O was not configured as "Config I/O" - "Input" in the 'Menu / Information → Settings → Inputs/Outputs → ...' menu.	Configure Config I/O as "Config I/O" - "Input" in the 'Menu / Information → Settings → Inputs/Outputs → ...' menu.

Problem	Possible cause of fault	Remedy
The timer does not set a Config I/O output.	Config I/O was not configured as "Timer I/O" - "Input" in the 'Menu / Information → Settings → Inputs/Outputs → ...' menu.	Configure Config I/O as a "Timer" - "Input" in the 'Menu / Information → Settings → Inputs/Outputs → ...' menu.
A 'Delayer' does not trigger an 'Action'.	Different delay times have been defined for the same 'Delayer' but this delayer is stopped and becomes inactive after the shortest delay time.	Create a further 'Delayer' for the longer delay time.

### 11.3.7 Brief explanation of selected functions

#### Time event (trigger)

An event can be triggered either time-dependent or event-controlled.

- 1 - Time events (really time-dependent) are processed precisely to the minute.
- 2 - Initialisation ( 'Init' ) is executed at the start of the program ( 'Timer → Activation → active' or when mains voltage is connected) to obtain a defined status of the system.
- 3 - "Config I/O" inputs can trigger something if the input potential changes from 1 to 0 or with a falling edge or if the potential-free contact is closed.
- 4 - Delayers can trigger an action as soon as their time has expired.

#### Actions

These are the 'Actions' which the timer executes as soon as a 'time event' has occurred.

#### Initialisation

When 'Activation' is set to 'active', the timer software generates the state of the pump which the pump would have precisely had at this time if it would have been set to 'active' without any interruption.

This does not relate to delayed, linked actions.

Using the initial commands ( 'Init' ), a defined switch-on state can be programmed. Initial commands have priority over time commands.

#### Outputs

Those relays which were connected with the relay option are designated as outputs. Up to 2 relays can be fitted.

Pins 1 - 3 of the "Config I/O" terminal can be inputs and outputs. That can be programmed.

#### Inputs

Pins 1 - 3 of the "Config I/O" terminal can be inputs and outputs. That can be programmed.

#### Delayer

Delayers are started event- or time-controlled. Upon expiry of the delay time, the delayer itself can trigger any actions.



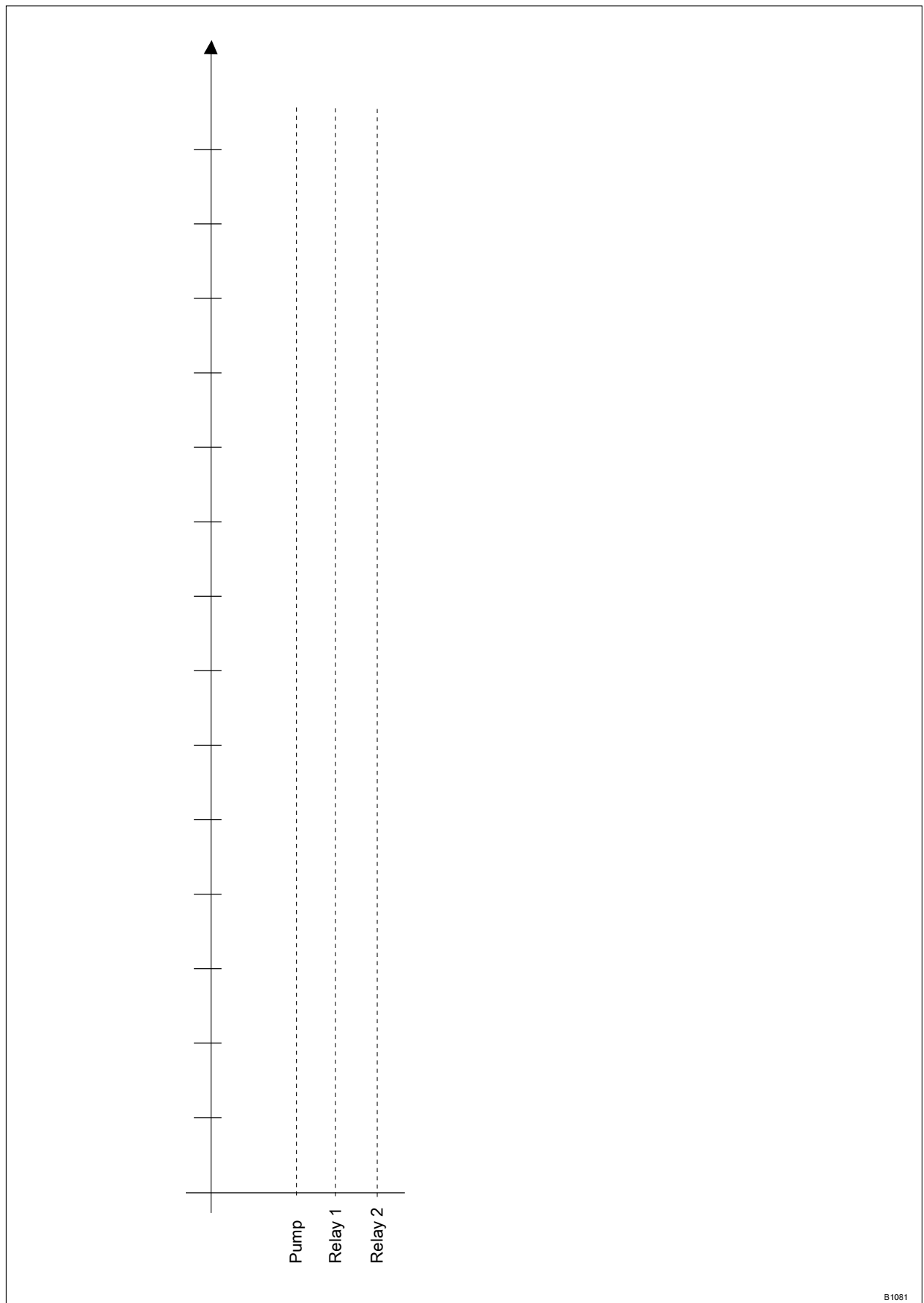
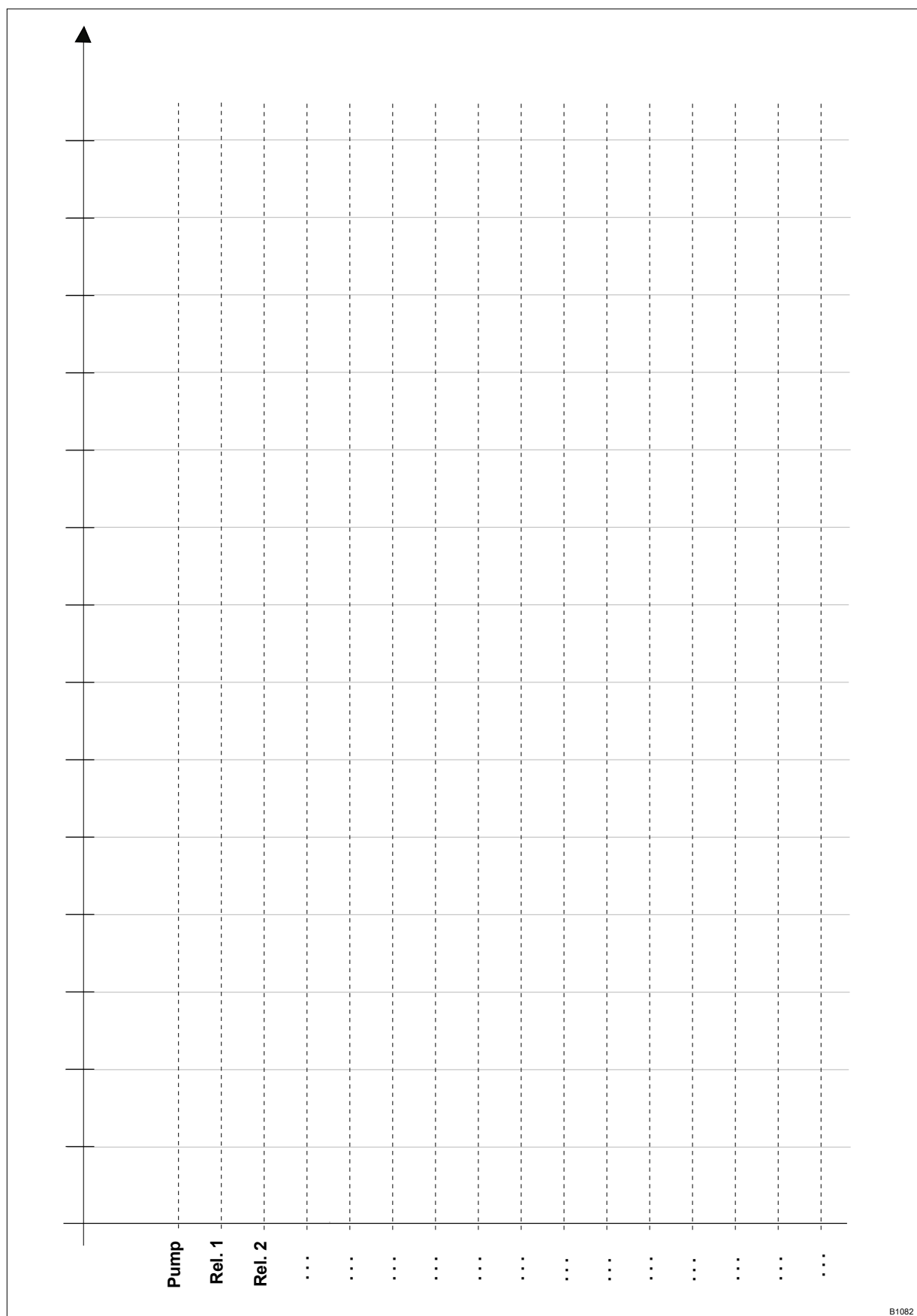


Fig. 37: Bar chart - Template



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Fig. 38: Switching times - Template

*Tab. 23: Discard program lines / instructions about the program (Line 09 = example)*

### 11.4 'Service'

☰ ➔ 'Menu / Information ➔ Service ➔ ...'

### 11.4.1 'Access protection'

☰ → 'Menu / Information → Service → Access protect → ...'

You can lock parts of the setting options here.

The following locking options are available:

Selection	Point ①	Point ②
'none'	-	-
'Lock menu'	X	-
'Lock all'	X	X

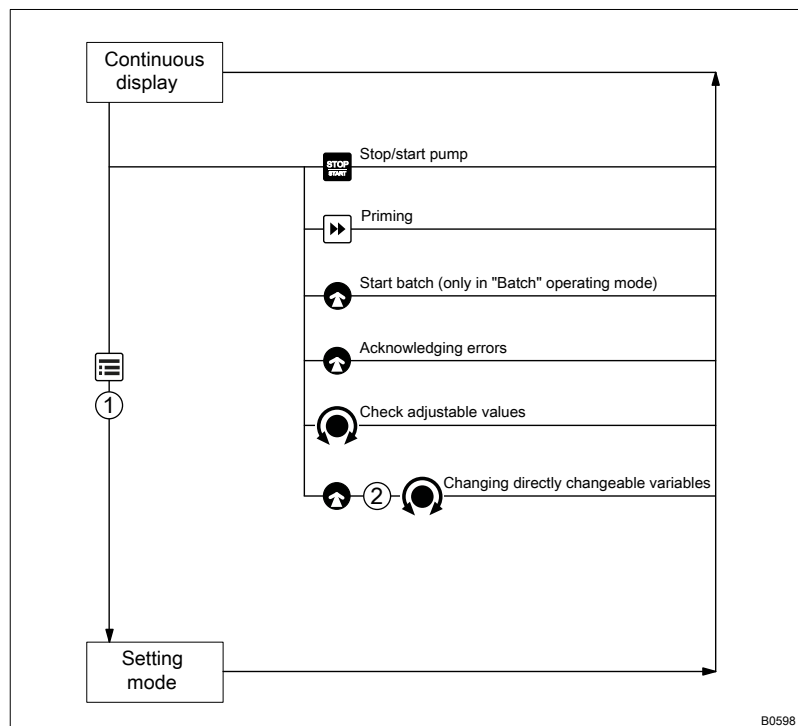



Fig. 39

If you have set a 'Password' - see below, then the identifier  will appear after 1 minute in the top left and the specified areas will be locked, if no key has been pressed in the meantime.

Both locks use the same 'Password'.

### 11.4.2 'Password'

☰ → 'Menu / Information → Service → Password → ...'

You can enter a password of your choice in the 'Change password' menu.

### 11.4.3 'Clear counter'

☰ → 'Menu / Information → Service → Clear counter → ...'

You can reset the counter to "0" in the 'Clear counter' menu:

- 'Stroke counter' (total number of strokes)
- 'Volume counter' (total litres)
- 'Contact memory'
- 'All'

➡ To clear: exit the menu by briefly pressing the [Clickwheel].

The values have increased since commissioning of the pump, the last calibration or the last deletion.

## 11.4.4 'Error log book'

☰ ➔ 'Menu / Information ➔ Service ➔ Error log book ➔ ...'

You can view the list of 'Log book entries' here.

A 'Filter' helps with the overview.



*If you need more detailed log book entries:*

*The metering pump gamma/ XL with Bluetooth functionality can display a more extensive log file with pump-related events and e-mail it using a Bluetooth-compatible Android smart device and the "gamma/ XL" app.*

### 11.4.4.1 Log book entry - Detailed view

Press the [Clickwheel] to obtain more information about a log book entry.

Tab. 24: Information on the detailed view

Line	Information
1	Date/time
2	Type of entry (fault, warning ...)
3	Total operating time, total number of strokes
4	Switching-on duration, stroke rate since switching on
5	Room temperature, status information on the error (for developers)

## 11.4.5 'Diaphragm replacement'

☰ ➔ 'Menu / Information ➔ Service ➔ Diaphragm replacement ➔ ...'

You can move the slide rod into the "replacement position" here with 'To replacement position' to enable the diaphragm to be replaced more easily.

## 11.4.6 'Display'

☰ ➔ 'Menu / Information ➔ Service ➔ Display ➔ ...'


You can set the 'Contrast' and the 'Brightness' of the LCD screen here.

#### 11.4.7 'Factory setting'

 → 'Menu / Information → Service → Factory setting → ...'


You can reset the pump to its factory settings here with 'Yes'  
The password is 1812.

#### 11.4.8 Diaphragm part number: XXXXXXXX

 → 'Menu / Information → Service  
→ Diaphragm part number: XXXXXXXX → ...'

You can read off the part number (order number) of the correct diaphragm here.

#### 11.4.9 Spare parts kit part number: XXXXXXXX

 → 'Menu / Information → Service  
→ Spare parts kit part number: XXXXXXXX → ...'

You can read off the part number (order number) of the correct spare parts kit here.

#### 11.5 'Language'

 → 'Menu / Information → Language → ...'

You can select the desired operating language in the 'Language' menu.

## 12 Operation



### WARNING!

#### Fire hazard with flammable media

Only with combustible media: These may start to burn when combined with oxygen.

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

This chapter describes all the operating options in a continuous display (several symbols and the pressure display appear at the top in the black bar) for the trained person at the pump.



- Please also refer to the "Operating/Setting Overview" and "Continuous Displays and Secondary Displays" overviews at the end of the operating instructions and also the "Overview of Equipment and Control Elements" chapter.


### 12.1 Manual operation

#### Stop/start pump

Stop the pump: Press  [STOP/START].

Start the pump: Press  [STOP/START] again.

#### Priming

Press  [Priming].

Turn the [Clickwheel] to extend or shorten the priming time during priming.

#### Starting a batch

In 'Batch' operating mode: Press the [Clickwheel] in the 'Push' continuous display.

#### Acknowledging errors




Press the [Clickwheel] to acknowledge error messages that require acknowledgement.


#### Checking adjustable variables

In a continuous display: Another continuous display will appear each time the [Clickwheel] engages when turned. (The number depends on the configuration).

#### Changing directly changeable variables

##### Changing a variable in the relevant continuous display:

1.  Press the [Clickwheel].  
⇒ The variable can be changed (highlighted).
2.  Turn the [Clickwheel].  
⇒ The variable is changed.
3.  Press the [Clickwheel].  
⇒ The variable is saved (the highlighting disappears).

If the "lock" - "lock all" has been set - see  'Set Up Overview of the gamma/X' on page 92, first enter the 'Password' after pressing the [Clickwheel].

## List of directly changeable variables:

- Capacity
- Stroke rate
- Stroke length
- Factor
- Contact volume
- Batch dosing time
- Concentration

## Set Up Overview of the gamma/ X

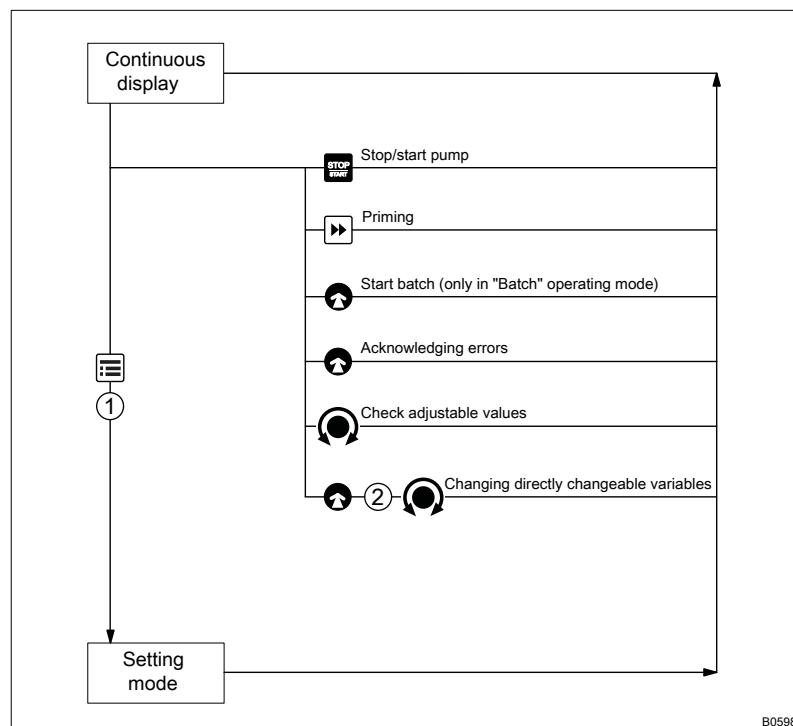


Fig. 40: Control options using keys and locking options

- ⬆ Press [Clickwheel]
- ⬇ Turn [Clickwheel]
- ① "Lock menu"
- ② "Lock all"



# 13 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.

**WARNING!****Fire hazard with flammable media**

Only with flammable media: They can be ignited by oxygen.

- 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 can spray out of the hydraulic components if they are manipulated 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.
- Depressurise the system before commencing any work on hydraulic parts.



*Third-party spare parts for the pumps may result in problems when pumping.*

- Only use original spare parts.
- Use the correct spare parts kits. In the event of doubt, refer to the exploded views and ordering information in the appendix.

**Standard liquid ends:**

Interval	Maintenance work	Personnel
Quarterly*	<ul style="list-style-type: none"> <li>■ Check the metering diaphragm for damage** - refer to "Repair".</li> <li>■ Check that the hydraulic lines are fixed firmly to the liquid end.</li> <li>■ Check that the discharge valve and suction valve are fitted tightly.</li> <li>■ Check that the entire liquid end is leak-tight - particularly around the leakage hole - refer to Fig. 41.</li> <li>■ Check that the flow is correct: Press ►► [Priming] to allow the pump to prime briefly.</li> <li>■ Check that the electrical connectors are intact.</li> <li>■ Check the integrity of the housing.</li> <li>■ Check that the dosing head screws are tight.</li> </ul>	Technical personnel

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

Under heavy loading (e.g. continuous operation): Shorter intervals.

\*\* Check the metering diaphragm frequently with feed chemicals that put particular pressure on the diaphragm, e.g. those containing abrasive additives.

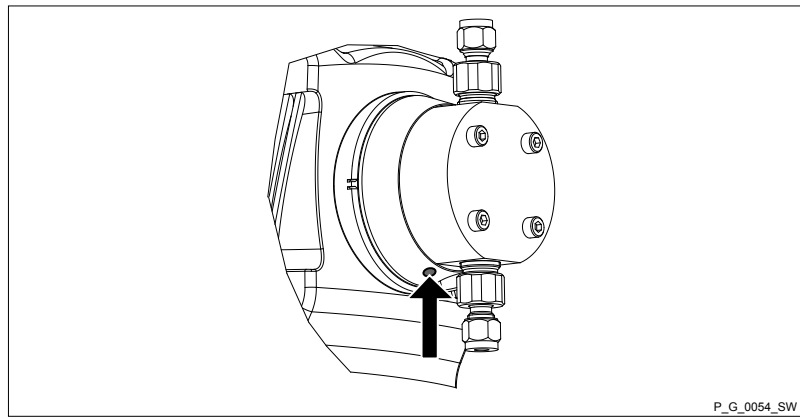


Fig. 41: The leakage hole

### Liquid ends with bleed valve:

Interval	Maintenance work
Quarterly*	<p>In addition:</p> <ul style="list-style-type: none"> <li>■ Check that the bypass line is fixed firmly to the liquid end.</li> <li>■ Check that the bleed valve is tight.</li> <li>■ Check the discharge and bypass line for kinks.</li> <li>■ Check that the bleed valve is operating correctly.</li> </ul>

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

Under heavy loading (e.g. continuous operation): Shorter intervals.

### Tightening torque

Data	Value	Unit
Tightening torque for screws:	4.5 ... 5.0	Nm

## 14 Carrying out repairs

### Safety information



#### **WARNING!**

##### **Danger of electric shock**

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

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

- Replacement of damaged mains connection lines
- Replacement of fuses
- Replacement of electronic control



#### **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**

Parts that come into contact with the feed chemical are exposed and touched during repair work.

- Protect yourself against the feed chemical in case it is hazardous. Read the safety data sheet on the feed chemical.



#### **CAUTION!**

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

Feed chemical can spray out of the hydraulic components if they are manipulated 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.
- Depressurise the system before commencing any work on hydraulic parts.



#### **WARNING!**

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

Only with flammable media: They can be ignited by oxygen.

- 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, ...).

## 14.1 Replacing the diaphragm



*The order no. (part number) of the appropriate diaphragm or the spare parts kit can be found at the end of the 'Service' menu.*

- If necessary take protective measures.
  - Adhere to the material safety data sheet for the feed chemical.
  - Prevent the escape of feed chemical.
  - Ensure that the system is at atmospheric pressure.
1. ➤ Empty the liquid end (turn the liquid end upside down and allow the feed chemical to run out; flush out with a suitable medium; flush the liquid end thoroughly when using hazardous feed chemicals!)
  2. ➤ Set up ➔ 'Service ➔ Diaphragm replacement ➔ To replacement position'
- ⇒ The pump moves the diaphragm away from the backplate.



*Now leave the pump connected to the mains/ power supply so that this state is maintained.*

3. ➤ Unscrew the hydraulic connectors on the discharge and suction side.
4. ➤ With types with coarse/fine bleed valve: Firstly remove the coarse/ fine bleed valve (grip), then lift off the cover of the liquid end with a screw driver.

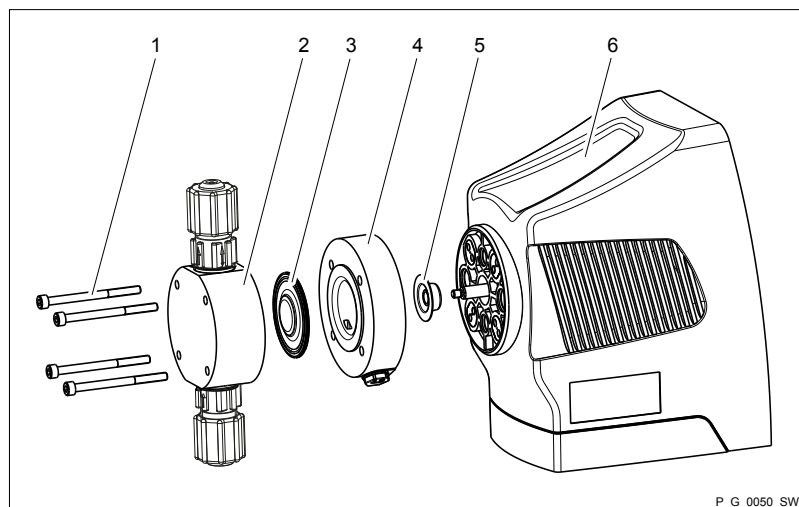


Fig. 42: Partially exploded view of liquid end

- 1 Screws
- 2 Dosing head
- 3 Diaphragm
- 4 Backplate
- 5 Safety diaphragm
- 6 Pump housing

5. ➤ Remove the screws (1).
6. ➤ Remove the dosing head (2) plus screws (1) from the pump - see figure
7. ➤ Loosen the diaphragm (3) from the drive axle with a gentle backwards turn in an anticlockwise direction.
8. ➤ Unscrew the diaphragm (3) completely from the drive axle.
9. ➤ Remove the backplate (4) from the pump housing (6).
10. ➤ Check the condition of the safety diaphragm (5) and replace if necessary.
11. ➤ Push the safety diaphragm (5) onto the drive axle only until it lies flush with the pump housing (6) and no further!
12. ➤ Tentatively screw the new diaphragm (3) onto the drive axle up to the stop - ensure that this is successful, otherwise the pump will subsequently not meter correctly!
13. ➤ Unscrew the diaphragm (3) again.
14. ➤ Place the backplate (4) on the pump housing (6).



**CAUTION!**


- Make sure that the leakage hole points downwards when the pump is subsequently fitted - see figure in the "Maintenance" chapter!
- Place the backplate (4) immediately into the correct position on the pump housing (6)! Do not twist the backplate on the pump housing to prevent the safety diaphragm (5) becoming warped!

15. ➤ Place the diaphragm (3) into the backplate (4).



**CAUTION!**

- Do not over-tighten the diaphragm (3) in the following step!
- Ensure that the backplate (4) remains in its position so that the safety diaphragm does not become warped!

16. ➤ Hold the backplate (4) firmly and screw the diaphragm (3) in a clockwise direction until it is sitting tightly.
17. ➤ Place the dosing head (2) with the screws (1) onto the diaphragm (3) and the backplate (4) - ensure that the suction connector points downwards when the pump is in its subsequent fitting position.
18. ➤ Set up  ➔ 'Service ➔ Diaphragm replacement ➔ Back'  
⇒ The pump moves the diaphragm back to the backplate.
19. ➤ Gently tighten the screws (1) and then tighten them diagonally. See below for the tightening torque.
20. ➤ With types with coarse/fine bleed valve: Allow the cover of the liquid end to rest in the dosing head, then press the grip of the bleed valve into the coarse/fine bleed valve.



*Check the tightening torque of the screws after 24 hours of operation!*

**Tightening torque**

Data	Value	Unit
Tightening torque for screws:	4.5 ... 5.0	Nm

## 14.2 Cleaning the Diaphragm Rupture Indicator



### **WARNING!**

#### **Warning of unnoticed escape of feed chemical**

After the diaphragm rupture indicator has been triggered, any residue of feed chemical residues can interfere with it.

- After the diaphragm rupture indicator has been triggered, clean and test it.

1. ➤ First replace the liquid end diaphragm - see above!
2. ➤ Unscrew the diaphragm rupture indicator using an SW 14 open-ended spanner.
3. ➤ Clean the diaphragm rupture indicator with suitable liquid - if possible using water (polysulphone material).
4. ➤ Test the connected diaphragm rupture indicator: fully immerse the tapered section at the front in water.
  - ⇒ The continuous display indicates a diaphragm rupture.
5. ➤ Thoroughly dry the diaphragm rupture indicator.
  - ⇒ The continuous display no longer indicates a diaphragm rupture.
6. ➤ Screw the clean and dry diaphragm rupture indicator into the hole until hand-tight and liquid-tight - without using tools!

## 14.3 Cleaning valves



### **Warning of faulty operation**

*Refer to the exploded drawings in the appendix when working on the unit.*



*The order no. (part number) of the appropriate spare parts kit can be found at the end of the 'Service' menu.*

# 15 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.



### CAUTION!

#### Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated 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.
- Depressurise the system before commencing any work on hydraulic parts.



### WARNING!

#### Fire hazard with flammable media

Only with flammable media: They can be ignited by oxygen.

- 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, ...).

## 15.1 Faults without a fault message

### Faults without a fault message

Fault description	Cause	Remedy	Personnel
Pump does not prime in spite of full stroke motion and bleeding.	Minor crystalline deposits on the ball seat due to the valves drying out.	Take the suction hose out of the storage tank and thoroughly flush out the liquid end.	Technical personnel
	Serious crystalline deposits on the ball seat due to the valves drying out.	Dismantle the valves and clean them - refer to the "Repair" chapter.	Technical personnel
Fluid escapes from the backplate.	The screws in the dosing head are too loose.	Tighten the screws in the dosing head crosswise - refer to the "Repair" chapter for the tightening torque.	Instructed personnel
	The metering diaphragm is not leak-tight.	Replace the diaphragm - refer to the "Repair" chapter.  If a diaphragm rupture has been indicated, clean the diaphragm rupture indicator - refer to the "Repair" chapter.	Technical personnel

Fault description	Cause	Remedy	Personnel
Green LED display (operating indicator) does not light up.	The wrong mains voltage or no mains voltage is connected.	The specified mains voltage as per the voltage specification can be found on the nameplate.	Electrician

## 15.2 Faults with error message

### 15.2.1 Fault messages on the LCD screen

In the event of a fault:

- the red LED display lights up.
- an identifier and a message appear on the LCD screen.
- the pump stops.

Fault description	Cause	Remedy	Personnel
No. 0: The identifier  appears followed by the message 'System error'.	System or EPROM error	Return the pump to ProMinent.	
No. 1: The identifier  appears followed by the message 'Input signal < 4 mA'.	The pump is in 'Analogue' operating mode, a fault behaviour has been programmed in the 'Analogue' menu and the control current has fallen below 4 mA.	Eliminate the cause of the low control current or switch the programming of the fault behaviour to 'off' - see chapter "Set Up"->"Settings"->"Operating mode"->"Analogue".	Technical personnel
No. 2: The identifier  appears followed by the message 'Input signal > 20 mA'.	The pump is in 'Analogue' operating mode, a fault behaviour has been programmed in the 'Analogue' menu and the control current has risen above 20 mA.	Eliminate the cause of the high control current or switch the programming of the fault behaviour to 'off' - see chapter "Set Up"->"Settings"->"Operating mode"->"Analogue".	Technical personnel
No. 3: The identifier  appears followed by the message 'Level error!'	The fluid level in the storage tank has reached "Liquid level low 2nd stage".	Top up the storage tank.	Technical personnel
No. 4: The identifier  appears followed by the message 'Diaphragm rupture'.	The diaphragm is broken.	Replace the diaphragm and clean the diaphragm rupture indicator, refer to the "Repair" chapter.	Technical personnel
No. 5: The identifier  appears followed by the message 'Defective stroke metering'.	The dosing monitor reported more defective strokes than was set in the 'Inputs/Outputs' menu.	Press the [Clickwheel]. Investigate and clear the cause.	Technical personnel
No. 6: The identifier  appears followed by the message 'Sensor error'.	Sensor faulty	Return the pump to ProMinent.	
No. 7: The identifier  "Temperature" appears followed by the message 'Temperature' and the pump remains idle.	The ambient temperature is too high or too low.	Change the ambient temperature. The pump starts up automatically.	Technical personnel
	The temperature is too high.	Rectify the cause. The pump starts up automatically.	Technical personnel
No. 9: The identifier  appears followed by the message 'Solenoid not connected'.	The solenoid is not connected.	Return the pump to ProMinent.	
No. 10: The identifier  appears followed by the message 'Parameter incorrect!'	An incorrect parameter has been entered.	Correct the parameter.	Technical personnel
No. 11: The identifier  and the message 'Overload' appear.	The pump has detected too high a back pressure.	Rectify the cause.	Technical personnel














Fault description	Cause	Remedy	Personnel
No. 12: The identifier  and the message 'Overload' appear.	The current is too high.	Rectify the cause.	Technical personnel
No. 13: The identifier  and the message 'Mains voltage' appear.	The mains voltage is too high or too low or not connected.	Rectify the cause.	Technical personnel
No. 14: The identifier  appears followed by the message 'Air in dosing head'.	Gas bubbles in the liquid end (leaks, gaseous medium, cavitation).	Bleed the liquid end and rectify the cause. Seal the system or slow the suction stroke.	Technical personnel
No. 15: The identifier  appears followed by the message 'Bleeding unsuccessful'.	Automatic bleeding was unsuccessful	Eliminate the causes.	Technical personnel
No. 16: The identifier  appears followed by the message 'Memory overflow'.	The stroke tank has overflowed.	Remedy the cause (such as too low a factor, too high a contact frequency ...), then:  Press the [Clickwheel] (think of the consequences for the process!).	Technical personnel
No. 17: The identifier  appears followed by the message 'Control signal < Imin'.	The pump is in 'Analogue' operating mode-"xx side band", a fault behaviour has been programmed in the 'Analogue' menu and the control current has fallen below 4 mA.	Eliminate the cause of the low control current or  switch the programming of the fault behaviour to 'off' - see chapter "Set Up"- "Settings"- "Operating mode"- "Analogue".	Technical personnel
No. 18: The identifier  appears followed by the message 'Control signal > Imax'.	The pump is in 'Analogue' operating mode-"xx side band", a fault behaviour has been programmed in the 'Analogue' menu and the control current has risen above 20 mA.	Eliminate the cause of the high control current or  switch the programming of the fault behaviour to 'off' - see chapter "Set Up"- "Settings"- "Operating mode"- "Analogue".	Technical personnel
No. 20: The identifier  and the message 'Module missing' appear.	The optional module is missing.	Insert the optional module.	Technical personnel
	Communication between the optional module and pump electronics is not working.	Return the pump to ProMinent.	
No. 21: The identifier  and the message 'Module communication' appear.	The bus contact between the optional module and control room has been disconnected.	Rectify the cause (cable, control room ...)	Technical personnel
No. 22: The identifier  and the message 'Internal CAN-bus' appear.	The associated heartbeat message was no longer received by the power unit for a certain period of time (power unit no longer reached?)	Rectify the cause.	Technical personnel

## 15.2.2 Warning messages on the LCD screen

In the event of a warning:

- the yellow LED display lights up!
- an identifier and a message appear on the LCD screen.

Fault description	Cause	Remedy	Personnel
No. 0: 'Level' and the identifier  appear.	The fluid level in the storage tank has reached "Liquid level low 1st stage".	Top up the storage tank.	Instructed personnel

Fault description	Cause	Remedy	Personnel
No. 1: The identifier  appears followed by the message 'Diaphragm rupture'.	The diaphragm is broken.	Replace the diaphragm and clean the diaphragm rupture indicator, refer to the "Repair" chapter.	Technical personnel
No. 2: The identifier  appears followed by the message 'Defective stroke metering'.	The dosing monitor reported more defective strokes than was set in the 'Inputs/Outputs' menu.	Press the <i>[Clickwheel]</i> . Investigate and clear the cause.	Technical personnel
No. 3: The identifier  appears followed by the message 'Invalid metering volume'.	The set metering volume in concentration mode cannot be metered.	Adapt the metering parameters.	Technical personnel
No. 4: The identifier  appears followed by the message 'Invalid parameter'.	A set parameter is invalid.	Adjust the parameter.	Technical personnel
No. 5: The identifier  appears followed by the message 'Fan warning'.	The fan is faulty or not connected.	Return the pump to ProMinent.	
No. 6: The identifier  appears followed by the message 'System warning'.	An internal system warning or an incorrect solenoid assignment has been detected.	Return the pump to ProMinent.	
No. 7: The identifier  appears followed by the message 'Air in dosing head'.	Gas bubbles in the liquid end (leaks, gaseous medium, ...)	Bleed the liquid end and rectify the cause. Seal the system or slow the suction stroke.	Technical personnel
No. 8: The identifier  and the message 'Overload' appear.	The pump has detected too high a back pressure.	Rectify the cause.	Technical personnel
No. 10: The identifier  and the message 'Negative pressure' appear.	The pump has detected too low a back pressure.	Rectify the cause.	Technical personnel
No. 11: The identifier  appears followed by the message 'Cavitation'.	Cavitation in the liquid end.	Adapt the metering parameters.	Technical personnel

## 15.2.3 All other faults

Please contact the responsible ProMinent branch or representative!

## 15.3 Log book

### 15.3.1 Fault messages in the log book



For more information on the 'ERROR' messages - refer to the chapter "Fault messages on the LCD screen".

Tab. 25: Errors

Log book no.	Description	Acknowledge?
0	System, EEPROM error*	X
1	The pump is in 'Analogue' operating mode, a fault behaviour has been programmed in the 'Analogue' menu and the control current has fallen below 4 mA.	-
2	The pump is in 'Analogue' operating mode, a fault behaviour has been programmed in the 'Analogue' menu and the control current has risen above 20 mA.	-

Log book no.	Description	Acknowledge?
3	The fluid level in the storage tank has reached "Error level".	-
4	The diaphragm is broken.	-
5	The metering monitor reports more defective strokes than were set in the ' <i>Inputs/Outputs</i> ' menu.	X
6	Fault on the sensor for the stroke length.*	-
7	The ambient temperature is too high or too low. The temperature is too high.	-
9	Fault on the magnet.*	-
10	An incorrect parameter has been entered.	-
11	The pump has detected too high a back pressure.	X
12	The mains voltage is too high.	X
13	The mains voltage is too low or not connected.	-
14	Gas bubbles in the liquid end (leaks, gaseous medium, cavitation).	X
15	Automatic bleeding was unsuccessful.	X
16	The stroke tank has overflowed.	X
17	The pump is in ' <i>Analogue</i> ' operating mode-"xx side band", a fault behaviour has been programmed in the ' <i>Analogue</i> ' menu and the control current has fallen below 4 mA.	-
18	The pump is in ' <i>Analogue</i> ' operating mode-"xx side band", a fault behaviour has been programmed in the ' <i>Analogue</i> ' menu and the control current has risen above 20 mA.	-
19	The pump has detected too low a back pressure.	X
20	The optional module is missing. Communication between the optional module and pump electronics is not working.*	-
21	The bus contact between the optional module and control room has been disconnected.	-
22	The associated heartbeat message was no longer received by the power unit for a certain period of time (power unit no longer reached?)	-
23	Version error *	-

\* Please get in touch with the ProMinent head office with this fault.

### 15.3.2 Warning messages in the log book



For more information on the '*WARNING*' messages - refer to the chapter "*Warning messages on the LCD screen*".




Tab. 26: Warnings

Log book no.	Description
0	The fluid level in the storage tank has reached "Liquid level low 1st stage".
1	The diaphragm is broken.
2	The metering monitor reports more defective strokes than were set in the ' <i>Inputs/Outputs</i> ' menu.

Log book no.	Description
3	The metering volume cannot be metered.
4	A set parameter is invalid.
5	The fan is faulty or not connected.
6	An internal system warning or an incorrect solenoid assignment has been detected.
7	Gas bubbles in the liquid end (leaks, gaseous medium, cavitation).
8	The pump has detected too high a back pressure.
9	The pump cannot meter the capacity it has calculated from the settings.
10	The pump has detected too low a back pressure.
11	Cavitation in the liquid end.

### 15.3.3 Event messages in the log book

Tab. 27: Events

Log book no.	Description
0	Head change position is active – dongle was inserted.
1	Parameter menu called up – dongle was inserted.
2	Air gap measured – dongle was inserted.
3	Automatic bleed was enabled.
4	The pump was reset to factory settings.
5	The pump was calibrated.
6	 [START/STOP] was pressed.
7	 [Priming] was pressed.
8	 [Menu] was pressed.
9	The diaphragm was replaced.
10	The timer performed an action.
11	A relay has triggered.
12	An CRC error has been detected in the EEPROM data. Log book: [hh ll 00 00] hh – MSB address ll – LSB address [00 00 rr ss] ss – Struct rr – Result
13	The metering volume cannot be metered. In 'Contact' operating mode, e.g. by too fast a contact sequence.
14	The pump has been booted and is operational.

### 15.3.4 Log book entry - Detailed view

Press the *[Clickwheel]* to obtain more information about a log book entry.

*Tab. 28: Information on the detailed view*

Line	Information
1	Date/time
2	Type of entry (fault, warning ...)
3	Total operating time, total number of strokes
4	Switching-on duration, stroke rate since switching on
5	Room temperature, status information on the error (for developers)

## 16 Decommissioning and disposal

### Decommissioning

**WARNING!****Danger from chemical residue**

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

- It is mandatory that the safety information in the "Storage, transport and unpacking" chapter are read before shipping or transport.
- Thoroughly clean the liquid end and the housing of chemicals and dirt. Adhere 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**

Only with flammable media: They can be ignited by oxygen.

- 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 can spray out of the hydraulic components if they are manipulated 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.
- Depressurise the system before commencing any work on hydraulic parts.

***Danger of damage to the device***

*Take into account the information in the "Storage, transport and unpacking" chapter if the system is decommissioned for a temporary period.*

1. ➤ Disconnect the pump from the mains.
2. ➤ Drain the liquid end by turning the pump upside down and allowing the feed chemical to run out.

3. ➔ Flush the liquid end with a suitable medium; flush the dosing head thoroughly when using hazardous feed chemicals!

## Disposal



### WARNING!

#### Eye injury from compression spring

A compression spring is fitted in the pump in the drive magnet, which could cause eye injuries when opened.

- Do not dismantle the pump to dispose of it.



### CAUTION!

#### Risk to the environment from the battery

There is a battery in the pump, which can have a toxic effect on the environment.

- Separate the battery from the remaining parts.
- Note the pertinent regulations currently applicable in your country!



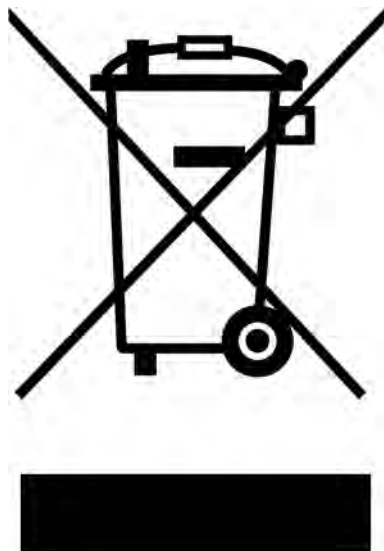
### CAUTION!

#### Environmental hazard due to electronic waste

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

- Note the pertinent regulations currently applicable in your country!

## 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.

## 17 Technical data

### 17.1 Performance data

gamma/ XLat 200 strokes/minute and  
100% stroke length

Liquid end type	Minimum pump capacity			Max. stroke rate	Connector size <sup>3</sup> Outside Ø x inside Ø	Suction lift*	Priming lift**	Permissible priming pressure suction side	Weight
	bar	l/h	ml/stroke	Strokes/min	mm	m water column	m water column	bar	kg
2508	25	8	0.67	200	8x4 **	5	3.5 - 3.0	8	11 <sup>2</sup> / 10
1608	16	8	0.67	200	8x5**	5	3.5 - 3.0	8	11 <sup>2</sup> / 10
1612	16	12	1	200	8x5	6	3.0 - 2.5	8	11 <sup>2</sup> / 10
1020	10	20	1.7	200	12x9	5	3.5 - 3.0	5	11 <sup>2</sup> / 10 10 / 11 <sup>2</sup>
0730	7	30	2.5	200	12x9	5	4.0 - 3.5	3	11 <sup>2</sup> / 10
0450	4	50	4.2	200	G3/4-DN 10	3	2.5 - 2.5	2	11 <sup>2</sup> / 10
0280	2	80	6.7	200	G3/4-DN 10	2	3.0 - 3.0	1	11 <sup>2</sup> / 10

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

\*\* - With stainless steel design 6 mm connector width

<sup>2</sup> - With stainless steel design

gamma/ XL metering pumps with dosing heads for higher-viscosity media (HV) have a 10-20% lower capacity and are not self-priming. Connector G 3/4-DN 10 with hose nozzle d16-DN10.

#### Design of connectors

Material	Connector	Design
plastic	8 – 12 mm	Hose squeeze connector
	DN 10	d16 DN 10 hose nozzle
Stainless steel	6 – 12 mm	Swagelok system
	DN 10	Rp 3/8 insert

### 17.2 Accuracy

#### 17.2.1 Standard Liquid End

Data	Value	Unit
Capacity range of the series	-5 ... +10	% *
Reproducibility	±2	% **



\* - at max. stroke length and max. operating pressure for all material versions

\*\* - at constant conditions and min. 30 % stroke length

## 17.2.2 Self-Bleeding Liquid End

As the self-bleeding liquid end is used with outgassing media and when operating with air bubbles, no dosing accuracy or reproducibility can be provided.

The recommended minimum stroke length with self-bleeding dosing pumps is 50 %.

## 17.3 Viscosity

The metering behaviour of the pump can be matched to the viscosity of the feed chemical.

Viscosity in mPa	"Dosing" setting	Suction stroke slowing	Max. stroke rate	Remarks
0...50	"normal"	none	200	
50...200	"HV1"	slight	160	
200...500	"HV2"	medium	120	for valves with springs
500...1000	"HV3"	Maximum	80	for valves with springs

For the adjustment for slowing the suction stroke dependent upon the feed chemical viscosity - see the "Adjustment" chapter.

## 17.4 Material specifications

### Liquid ends

Design	Dosing head	Suction/pressure connector	Ball seat	Seals	Valve balls
NPT	Clear acrylic	PVDF	PVDF	PTFE	Ceramic
PVT	PVDF	PVDF	PVDF	PTFE	Ceramic
SST (8-12 mm)	Stainless steel 1.4404	Stainless steel 1.4404	Ceramic	PTFE	Ceramic
SST (DN10)	Stainless steel 1.4404	Stainless steel 1.4404	PTFE with carbon	PTFE	Ceramic

Diaphragm with PTFE coating.

### Pump

Design	Housing	Hood	Transparent cover	Electronics
all	Polyphenyl ether (PPE with fibreglass)	Polyphenyl ether (PPE with fibreglass)	Polycarbonate	Electronic components

## 17.5 Electrical data

Design: 100 - 230 V  $\pm 10\%$ , 50/60 Hz

Specification	Value
Nominal power, approx.	78 W
Switch on peak current, (within approx. 50 ms falling prevention)	8 ... 4 A T 3.15 A *

\* 250 V (1.5kA), Order no. 732414

Fuses must have VDE, UL and CSA certification.

## 17.6 Temperatures

Pump, fully assembled

Data	Value	Unit
Storage and transport temperature:	-10 ... +50	°C
Ambient temperature in operation (power end/drive and control):	-10 ... +45	°C

Liquid end, long-term\*

Data	Value	Unit
Liquid end temperature	-10 ... +40	°C **

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

\*\* with PVT and SST: -10 ... +50 °C

Liquid end, short-term\*

Material version	Value	Unit
NPT	60	°C
PVT	120	°C
SST	120	°C

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

## 17.7 Climate

Data	Value	Unit
Maximum air humidity *:	95	% rel. humidity

\* non-condensing

Exposure in a humid and alternating climate:

FW 24 according to DIN 50016

## 17.8 Altitude of site

Data	Value	Unit
Altitude of site , max.:	2000	m above NHN

## 17.9 Degree of Protection and Safety Requirements

### Degree of protection

Protection against accidental contact and humidity:  
IP 65 according to DIN EN 60529

### Safety requirements

Degree of protection:  
1 - mains power connection with protective earth conductor

## 17.10 Compatibility

Some hydraulic parts of the delta® are identical to those of the Beta® and gamma/ X.

There is substantial compatibility of the following components and accessories to pumps in the product ranges Beta® and gamma/ X:

- Control cable gamma/Vario 2-, 4- and 5-wire for the "External" function
- Level switch 2-stage (gamma / Vario / Beta®)
- Metering line cross-sections
- Standard connector kit for gamma
- Dosing tank
- Overall height (distance between the suction and pressure connector)
- Identical use of accessories, such as back pressure valves, multifunctional valves, dosing monitor and flushing equipment

## 17.11 Weight

Material version	Weight
	kg
NPT	10
PVT	10
SST	11

## 17.12 Sound pressure level

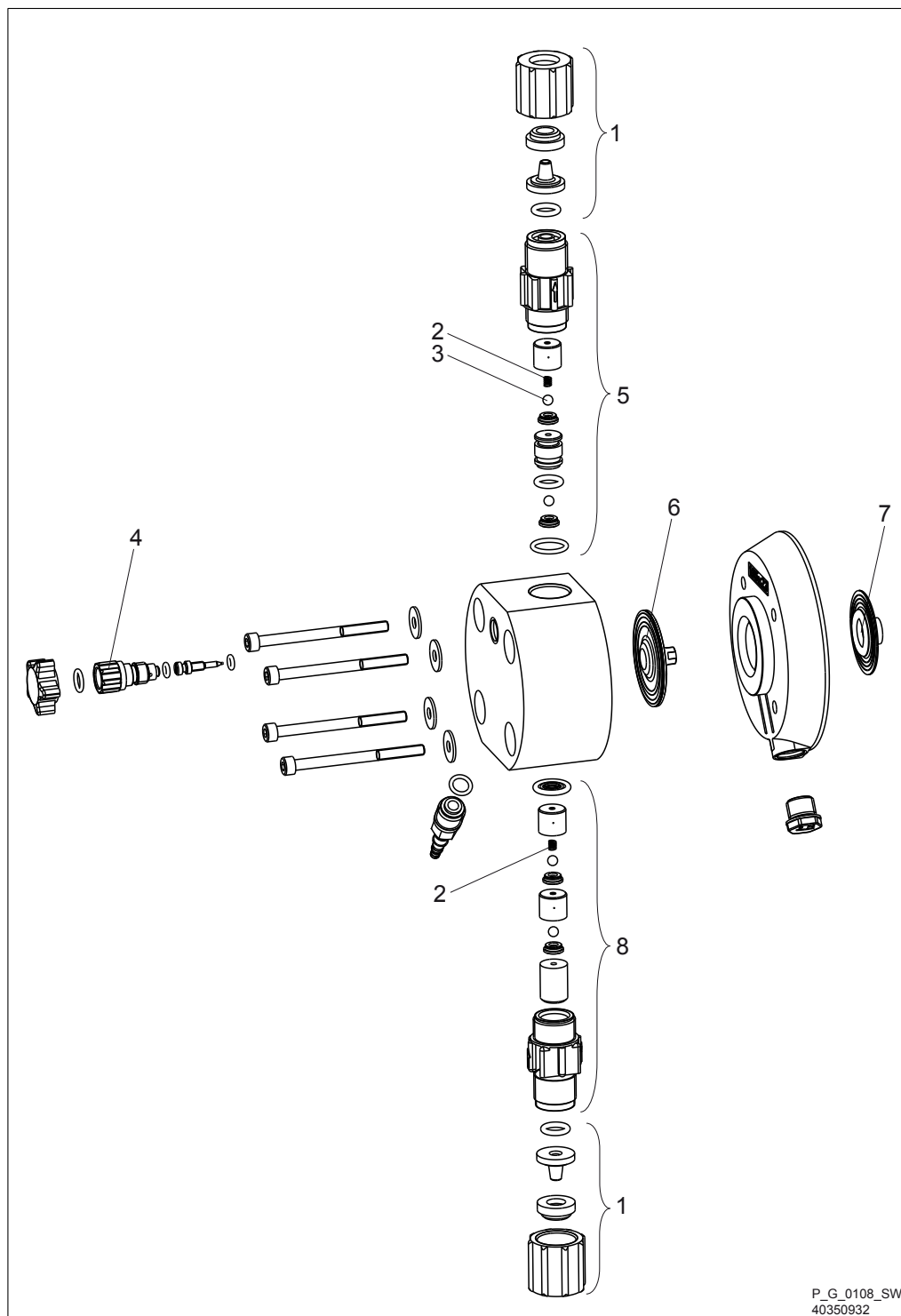
### Sound pressure level

Sound pressure level LpA < 70 dB in accordance with EN ISO 20361:2010-10

at maximum stroke length, maximum stroke rate, maximum back pressure (water)

## 18 Exploded drawings

Liquid end of gamma/ XL 1608 / 2508  
NP\_2



Tab. 29: Spare parts for liquid end gamma/ XL 1608 / 2508 NP\_2

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

**Liquid end gamma/ XL NPT2**

	<b>1608</b>	<b>2508</b>
Liquid end with bleed valve	1096276	1096277
Spare parts kit	1030225	1095912
Diaphragm	1030353	1030353

**Liquid end gamma/ XL NPE2**

	<b>1608</b>	<b>2508</b>
Liquid end with bleed valve	1096278	1096279
Spare parts kit	1030620	1033172
Diaphragm	1030353	1030353

**Liquid end gamma/ XL NPB2**

	<b>1608</b>	<b>2508</b>
Liquid end with bleed valve	1096282	1096283
Spare parts kit	1030611	1033171
Diaphragm	1030353	1030353

## Liquid end of gamma/ XL 1612 - 0730 NP\_2

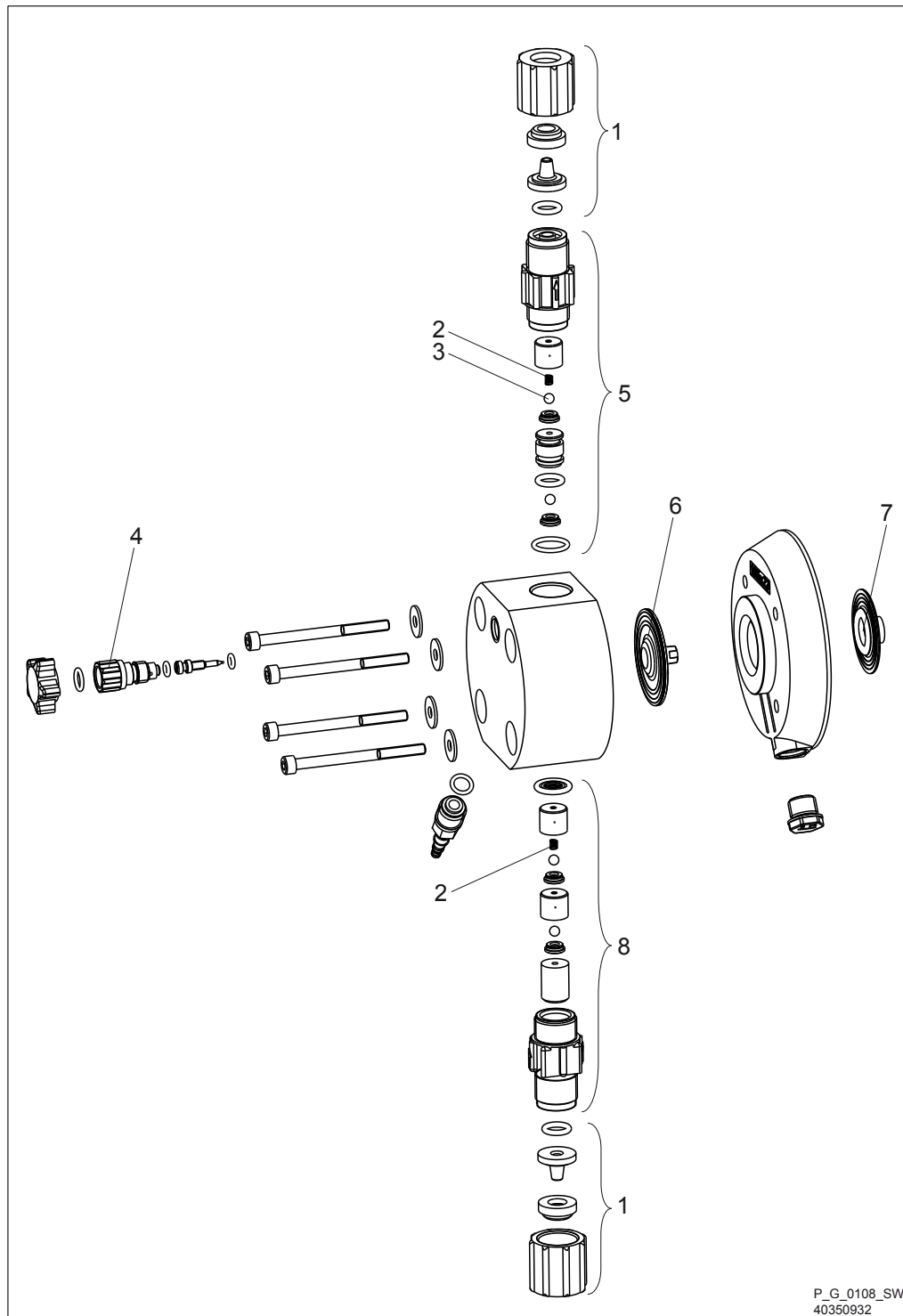


Fig. 43: @

Tab. 30: Spare parts for liquid end gamma/ XL 1612 - 0730 NP\_2

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

**Liquid end gamma/ XL NPT2**

	<b>1612</b>	<b>1020</b>	<b>0730</b>
Liquid end with bleed valve	1096275	1096273	1096274
Spare parts kit	1027081	1027082	1095626
Diaphragm	1000248	1000249	1045456

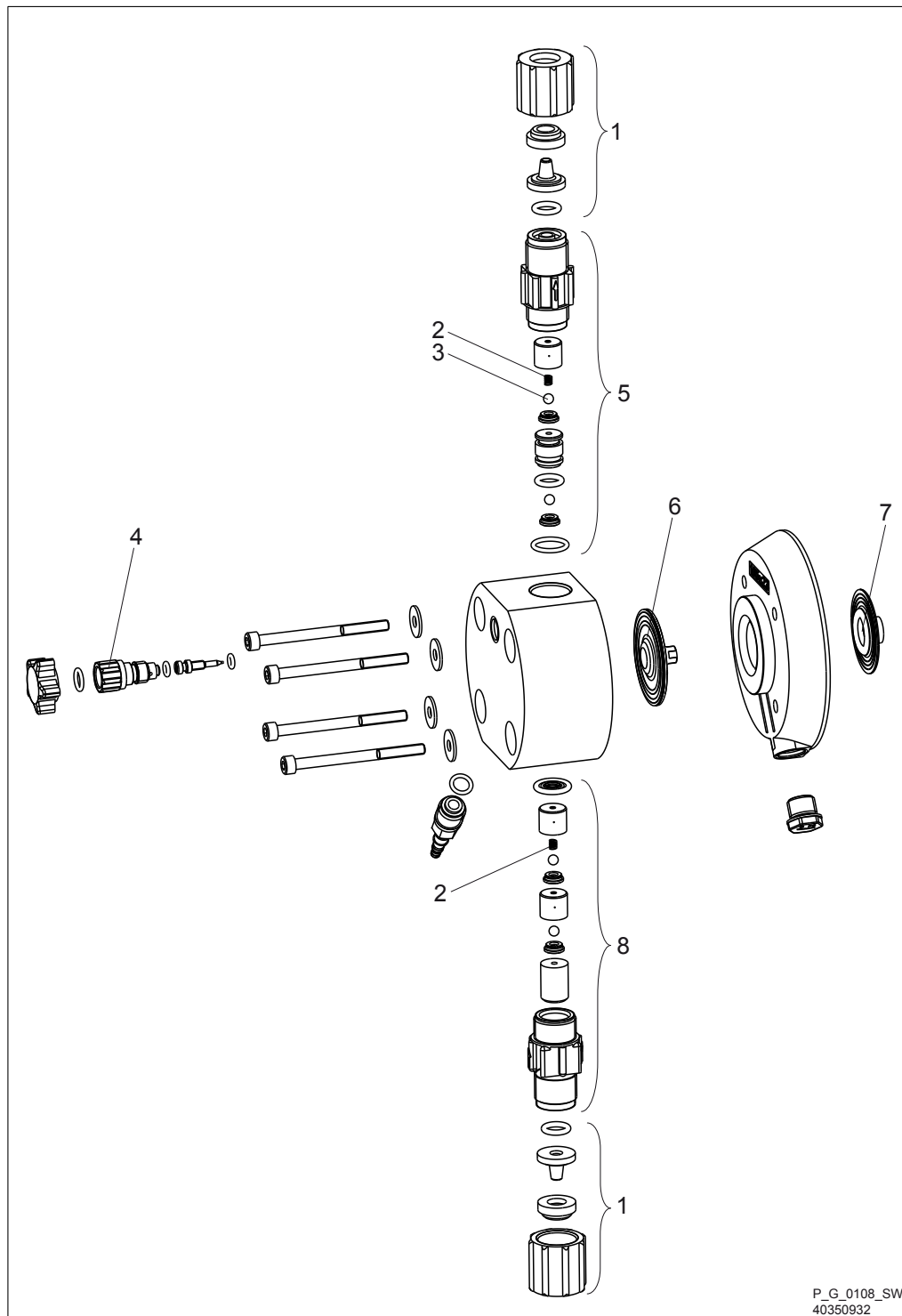
**Liquid end gamma/ XL NPE2**

	<b>1612</b>	<b>1020</b>	<b>0730</b>
Liquid end with bleed valve	1096270	1096261	1096260
Spare parts kit	1030536	1030537	1030621
Diaphragm	1000248	1000249	1045456

**Liquid end gamma/ XL NPB2**

	<b>1612</b>	<b>1020</b>	<b>0730</b>
Liquid end with bleed valve	1096268	1096269	1096263
Spare parts kit	1030525	1030526	1030612
Diaphragm	1000248	1000249	1045456

## Liquid end of gamma/ XL 1608 NPT7 SER



Tab. 31: Spare parts for liquid end gamma/ XL 1608 NPT7, self-bleeding SER

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve



## Liquid end gamma/ XL NPT 7

	1608
Liquid end with bleed valve	1096271
Spare parts kit	1047831
Diaphragm	1030353

## Liquid end of gamma/ XL 1612 - 0730 NPT7 SER

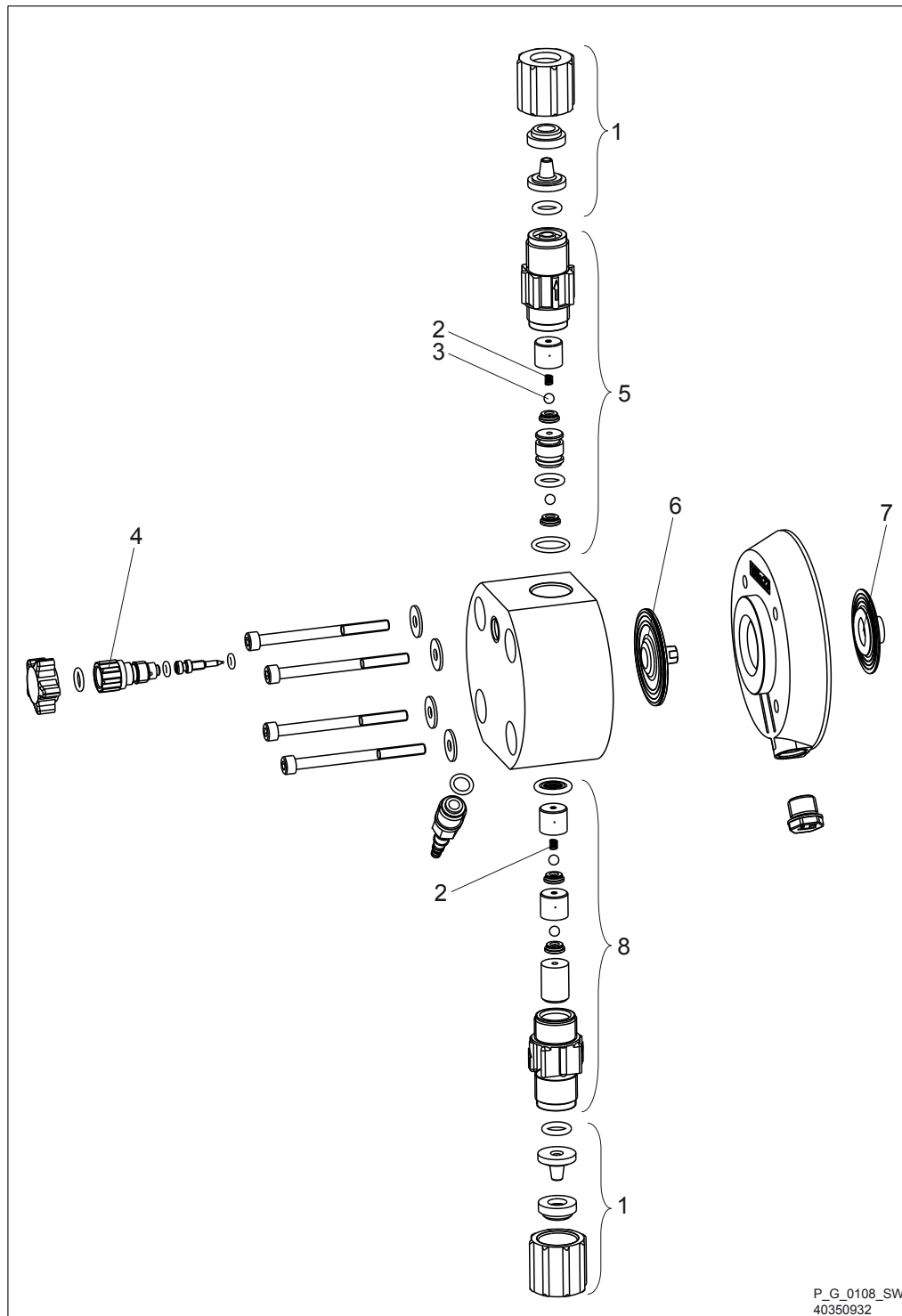


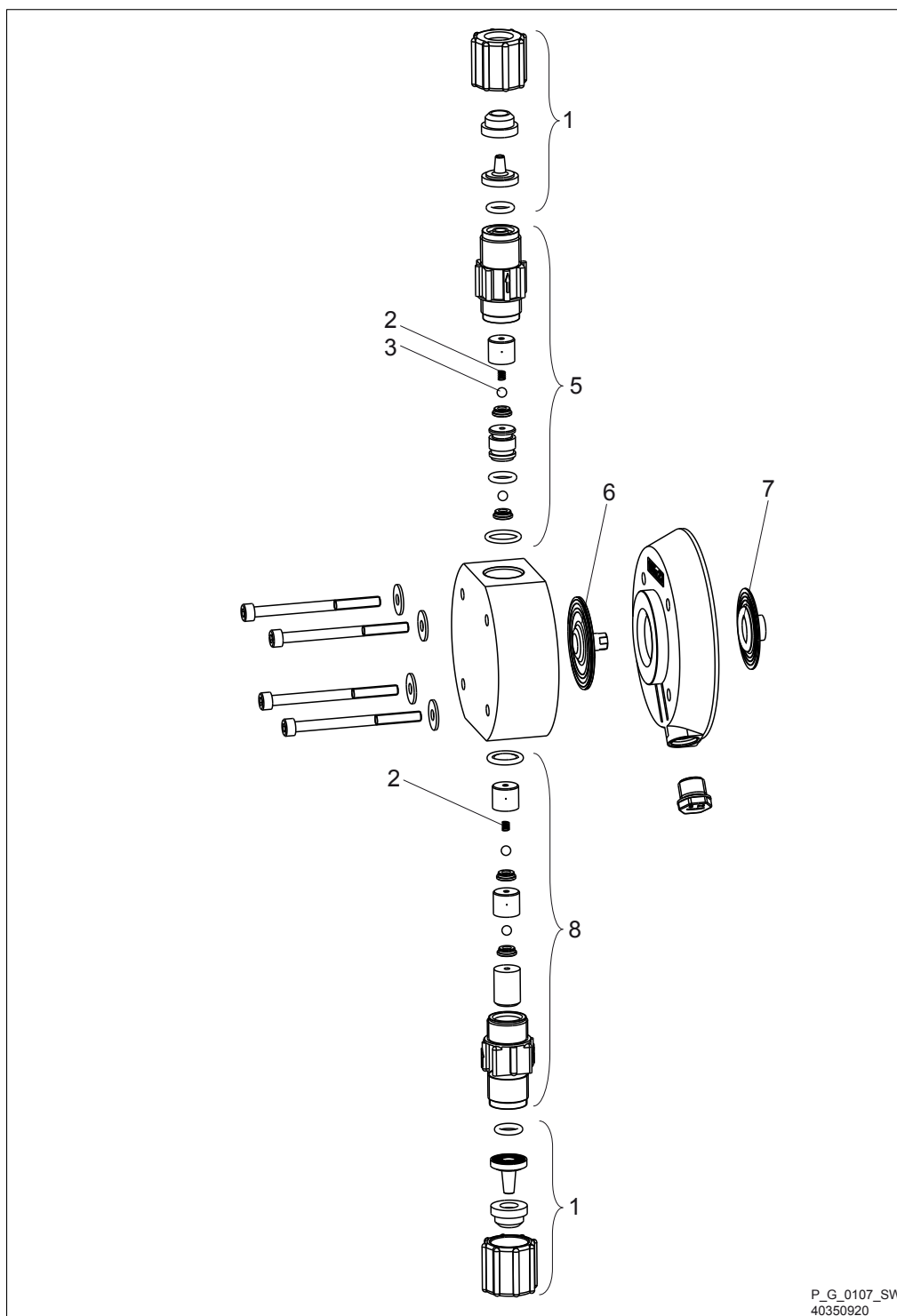
Fig. 44: @

Tab. 32: Spare parts for liquid end gamma/ XL 1612 - 0730 NPT7, self-bleeding SER

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

## Liquid end gamma/ XL NPT 7

	1612	1020	0730
Liquid end with bleed valve	1096272	1096266	1096267
Spare parts kit	1047832	1047833	1095503
Diaphragm	1000248	1000249	1045456

Liquid end of gamma/ XL 1608 / 2508  
NP\_0

Tab. 33: Spare parts for liquid end gamma/ XL 1608 / 2508 NP\_0

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

### Liquid end gamma/ XL NPT 0

	1608	2508
Liquid end without bleed valve	1096217	1096214
Spare parts kit	1030225	1095912
Diaphragm	1030353	1030353

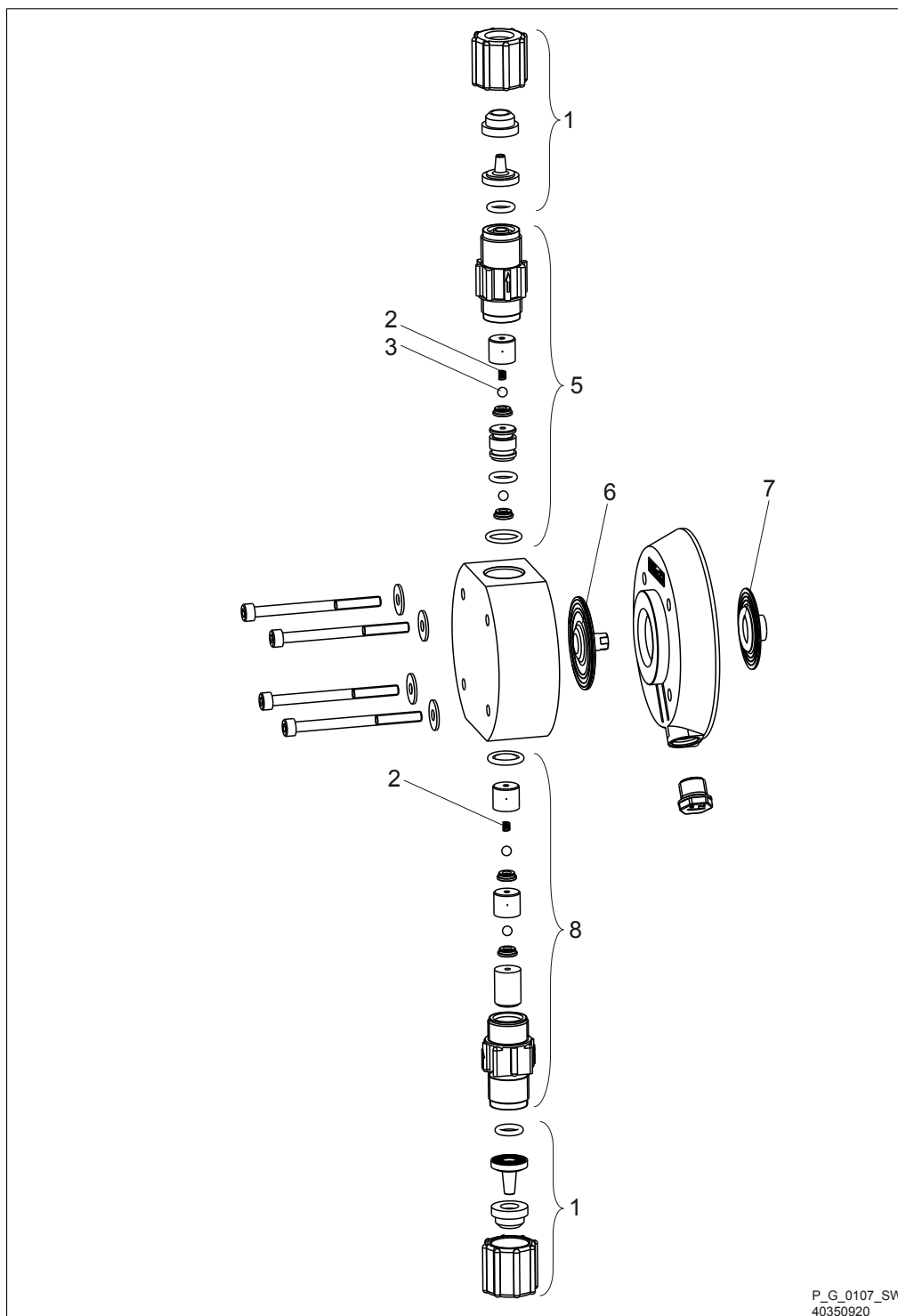
### Liquid end gamma/ XL NPE 0

	1608	2508
Liquid end without bleed valve	1096175	1096216
Spare parts kit	1030620	1033172
Diaphragm	1030353	1030353

### Liquid end gamma/ XL NPB 0

	1608	2508
Liquid end without bleed valve	1096280	1096281
Spare parts kit	1030611	1033171
Diaphragm	1030353	1030353

Liquid end of gamma/ XL 1612 - 0730  
NP\_0



Tab. 34: Spare parts for liquid end gamma/ XL 1612 - 0730 NP\_0

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

---

## Exploded drawings

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### Liquid end gamma/ XL NPT 0

	1612	1020	0730
Liquid end without bleed valve	1096215	1096182	1096183
Spare parts kit	1027081	1027082	1095626
Diaphragm	1000248	1000249	1045456

### Liquid end gamma/ XL NPE 0

	1612	1020	0730
Liquid end without bleed valve	1096180	1096181	1096178
Spare parts kit	1030536	1030537	1030621
Diaphragm	1000248	1000249	1045456

### Liquid end gamma/ XL NPB 0

	1612	1020	0730
Liquid end without bleed valve	1096284	1096285	1096262
Spare parts kit	1030525	1030526	1030612
Diaphragm	1000248	1000249	1045456

## Liquid end of gamma/ XL 1608 PV\_2

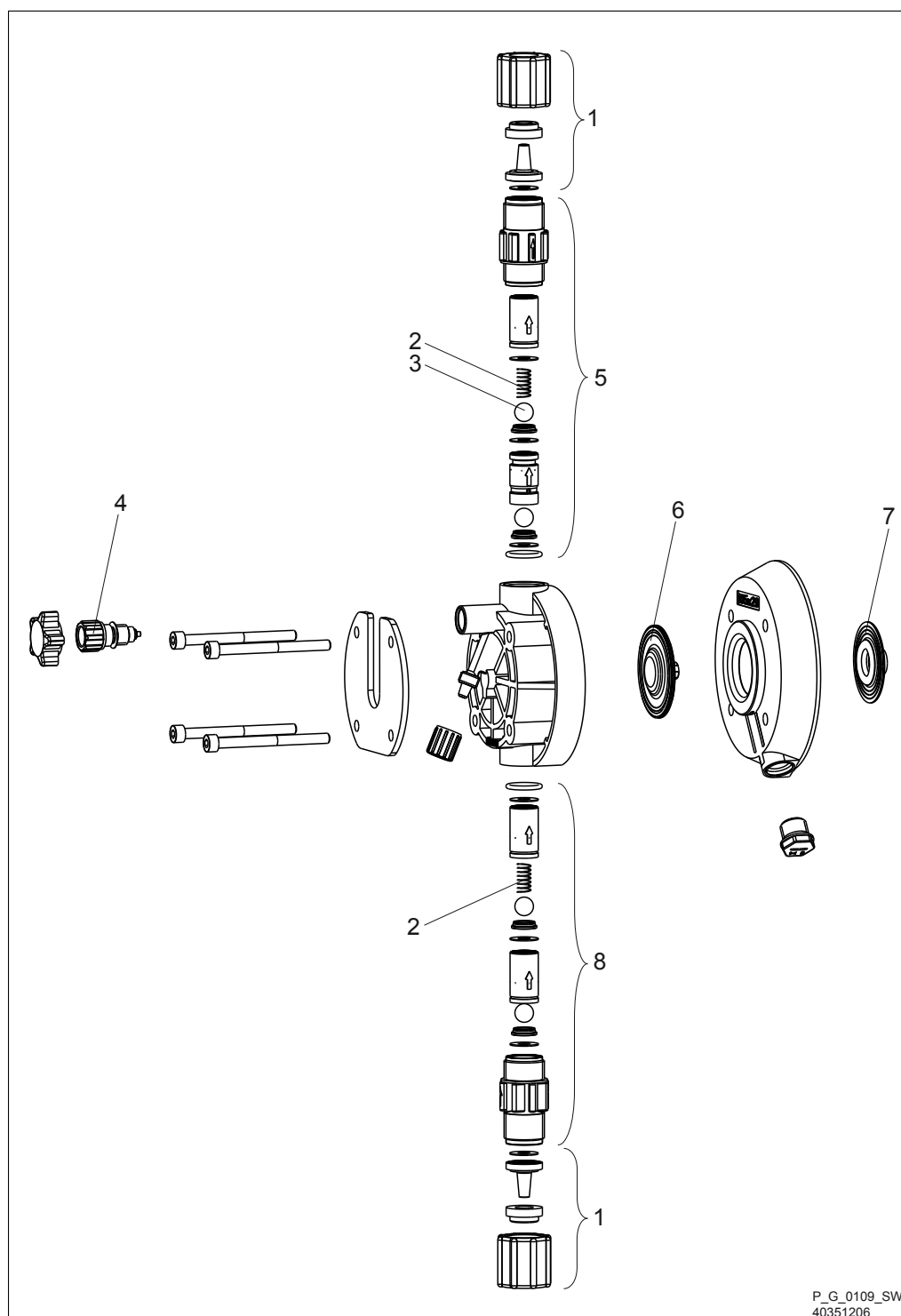


Fig. 45: @

Tab. 35: Spare parts for liquid end gamma/ XL 1608 PV\_2

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

**Liquid end gamma/ XL PVT 2**

	<b>1608</b>
Liquid end with bleed valve	1096265
Spare parts kit	1030225
Diaphragm	1030353

**Liquid end gamma/ XL PVT 7, SER**

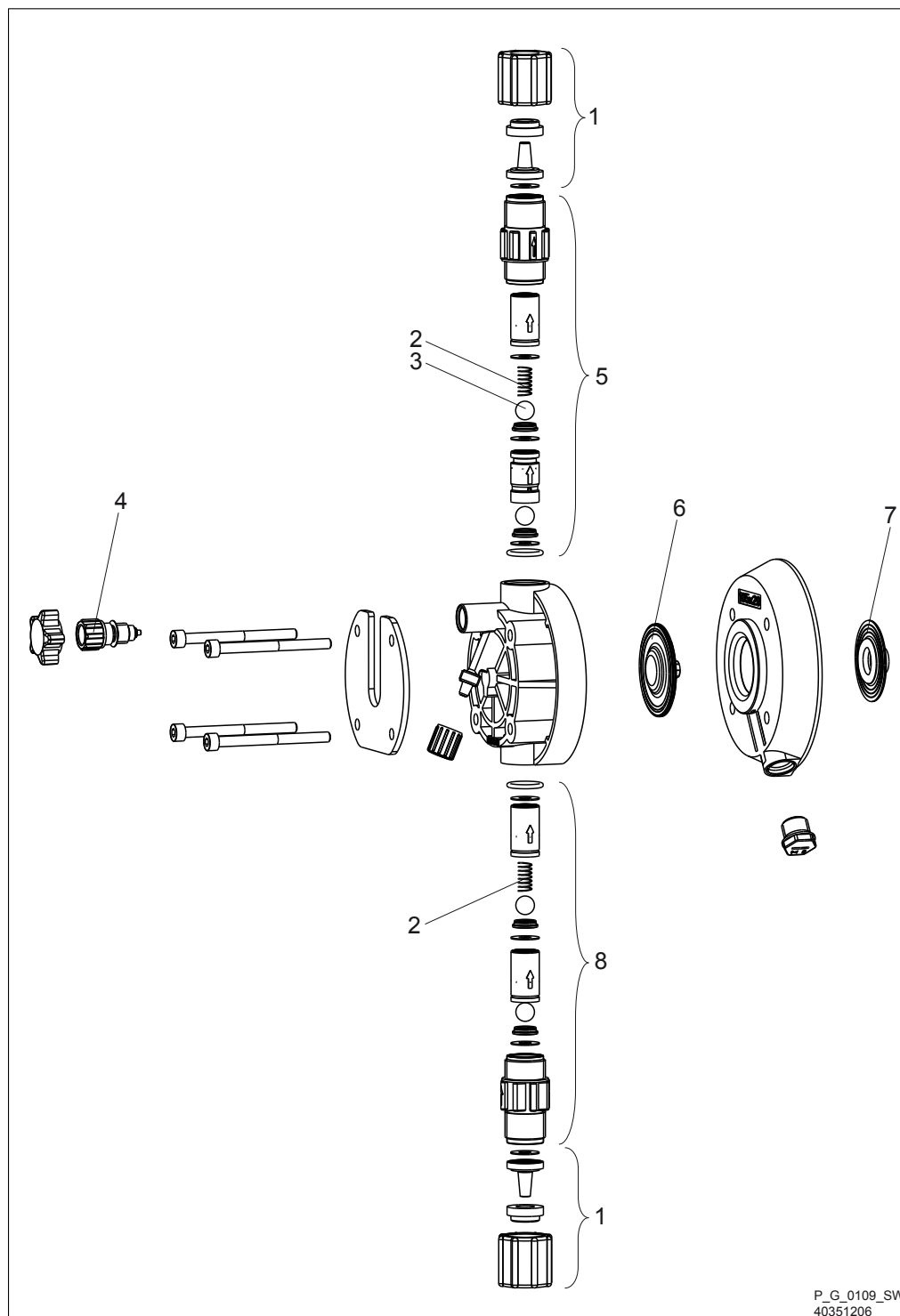
	<b>1608</b>
Liquid end, self-bleeding SER	1096251
Spare parts kit	1047831
Diaphragm	1030353

**Liquid end gamma/ XL PVF2, FDA**

	<b>1608</b>
Liquid end with bleed valve	1096252
Spare parts kit	1083565
Diaphragm	1030353



Liquid end gamma/ XL 1612 - 0730  
PV\_2



Tab. 36: Spare parts for liquid end gamma/ XL 1612 - 0730 PV\_2

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

---

## Exploded drawings

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### Liquid end gamma/ XL PVT 2

	1612	1020	0730
Liquid end with bleed valve	1096264	1096258	1096257
Spare parts kit	1027081	1027082	1095626
Diaphragm	1000248	1000249	1045456

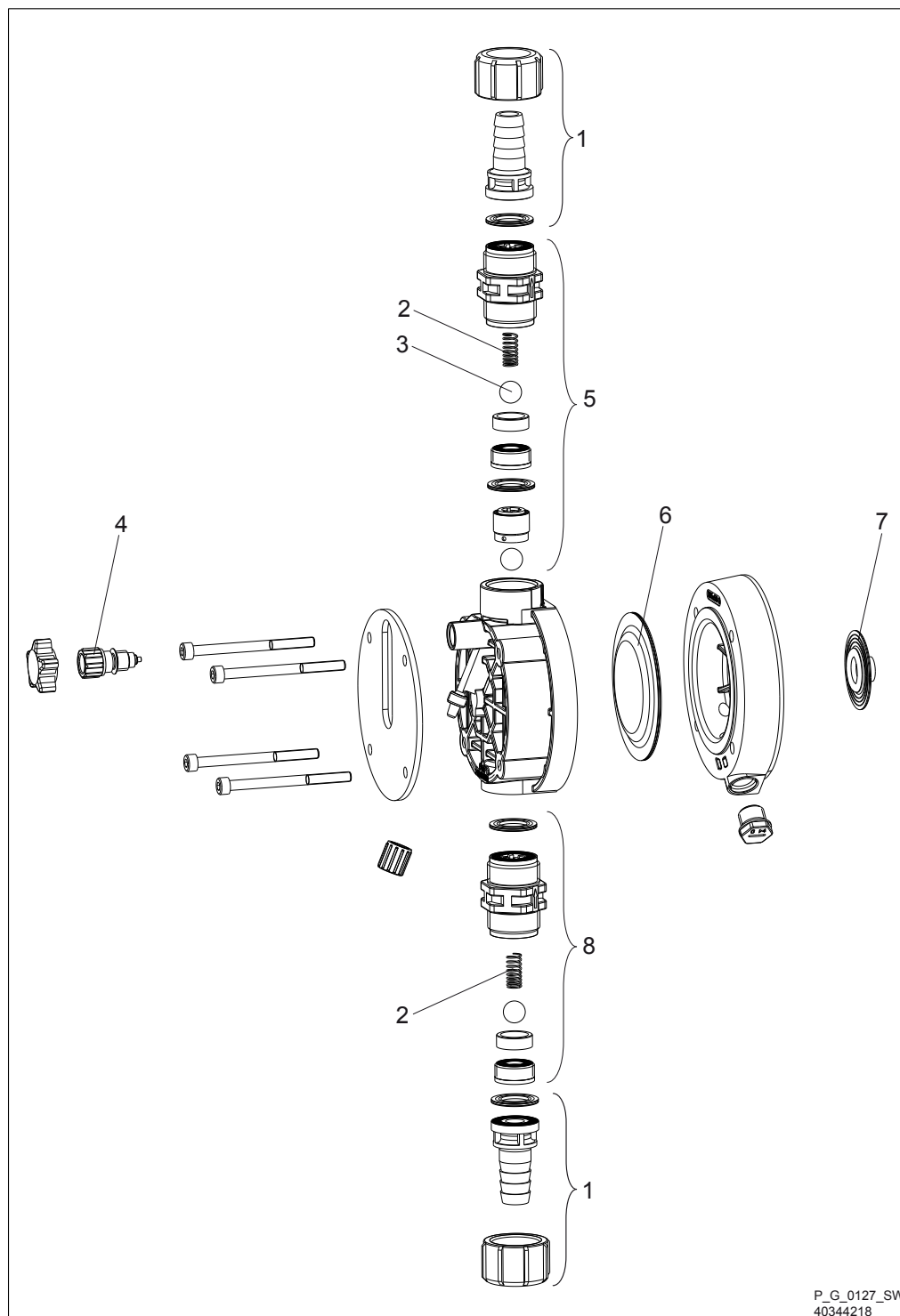
### Liquid end gamma/ XL PVT 7, SER

	1612	1020	0730
Liquid end, self-bleeding SER	1096250	1096249	1096255
Spare parts kit	1047832	1047833	1095503
Diaphragm	1000248	1000249	1045456

### Liquid end gamma/ XL PVF2, FDA

	1612	1020	0730
Liquid end with bleed valve	1096246	1096247	1096248
Spare parts kit	1083569	1083570	1096089
Diaphragm	1000248	1000249	1045456

Liquid end of gamma/ XL 0450 / 0280  
PV\_2



Tab. 37: Spare parts for liquid end gamma/ XL 0450 / 0280 PV\_2

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

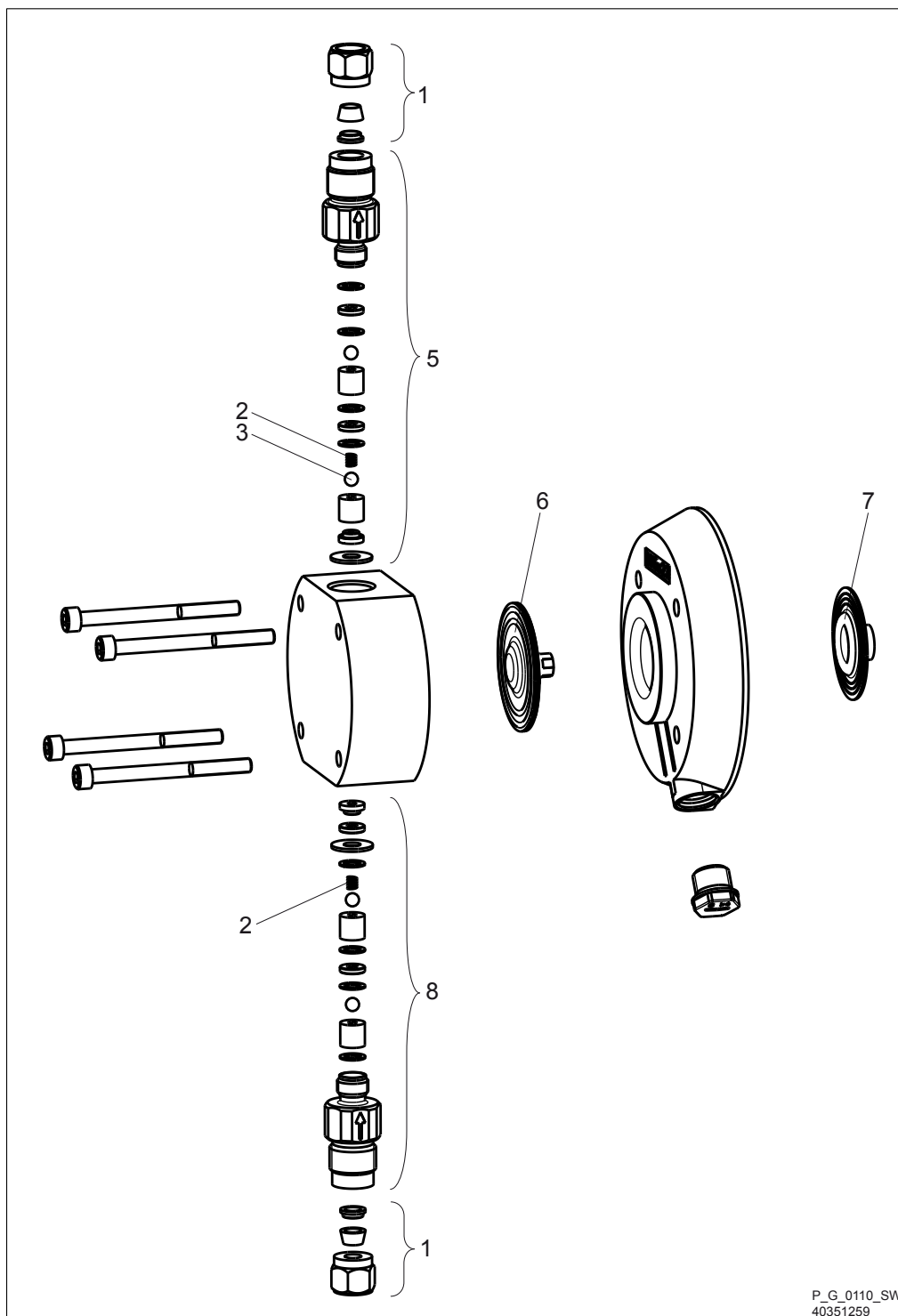
**Liquid end gamma/ XL PVT 2**

	<b>0450</b>	<b>0280</b>
Liquid end with bleed valve	1096254	1096253
Spare parts kit	1095502	1095500
Diaphragm	1045443	1059691

**Liquid end gamma/ XL PVF2, FDA**

	<b>0450</b>	<b>0280</b>
Liquid end with bleed valve	1096243	1096242
Spare parts kit	1096090	1096088
Diaphragm	1045443	1059691

Liquid end of gamma/ XL 1608 / 2508  
SST0



Tab. 38: Spare parts for liquid end gamma/ XL 1608/2508 SST0

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

---

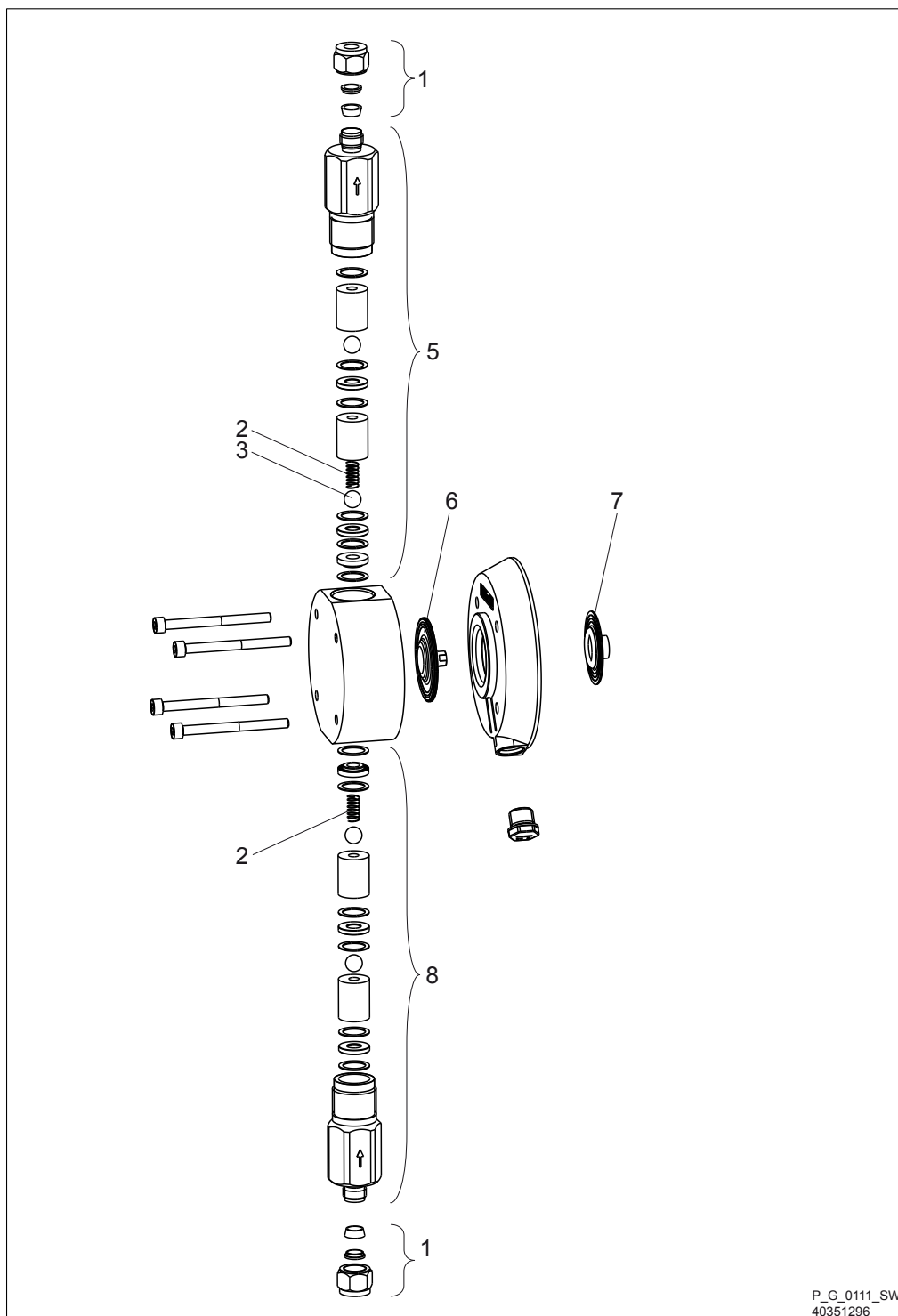
## Exploded drawings

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Liquid end gamma/ XL SST 0

	1608	2508
Liquid end without bleed valve	1096245	1096244
Spare parts kit	1030226	1030226
Diaphragm	1030353	1030353

Liquid end of gamma/ XL 1612 - 0730  
SST0



Tab. 39: Spare parts for liquid end gamma/ XL 1612 - 0730 SST0

Pos.	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

---

## Exploded drawings

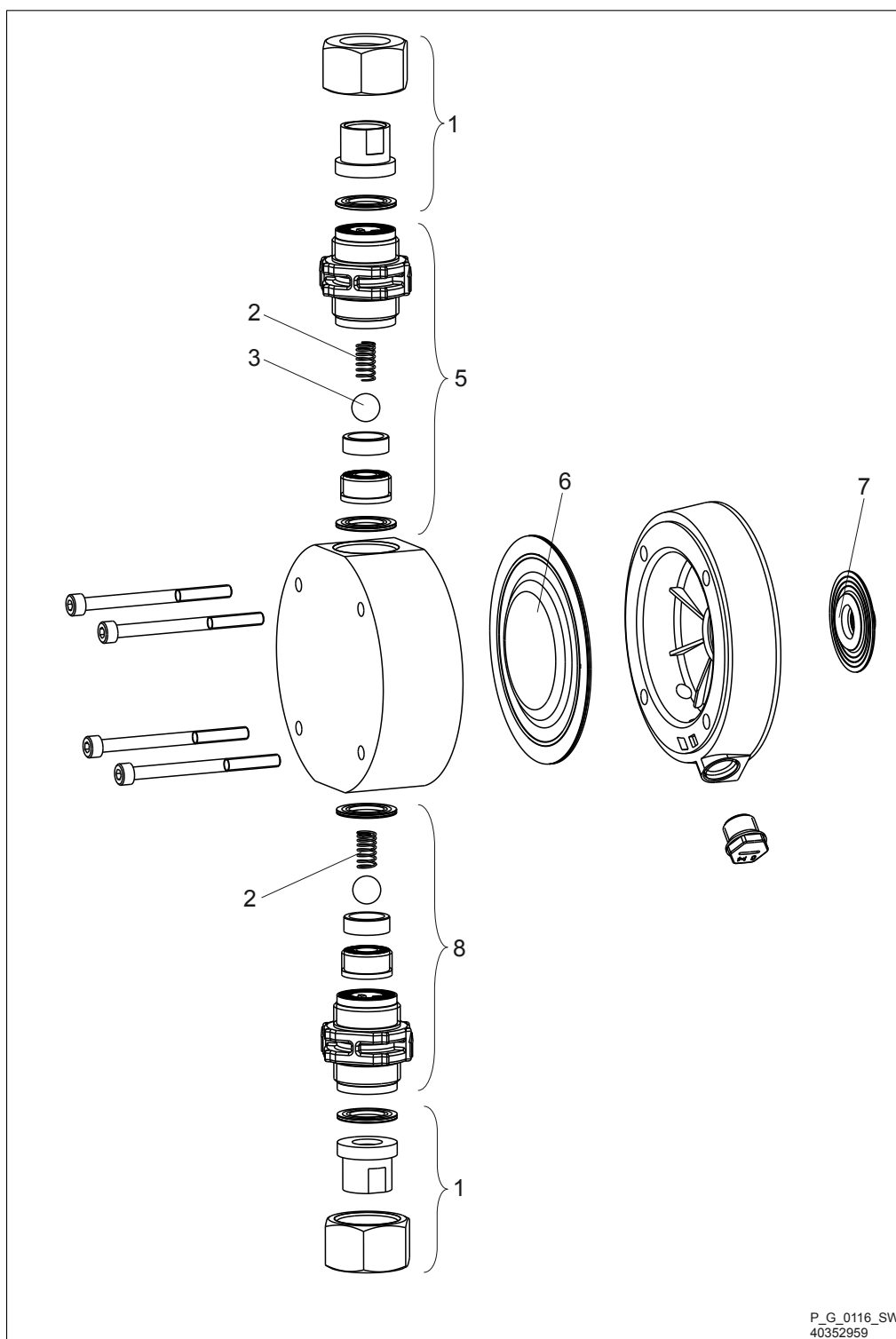
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### Liquid end gamma/ XL SST0

	1612	1020	0730
Liquid end without bleed valve	1096239	1096236	1096237
Spare parts kit	1027086	1027087	1095501
Diaphragm	1000248	1000249	1045456



Liquid end of gamma/ XL 0450 - 0280  
SST0



Liquid end gamma/ XL SST0

	0450	0280
Liquid end without bleed valve	1096218	1096235
Spare parts kit	1095625	1095624
Diaphragm	1045443	1059691

---

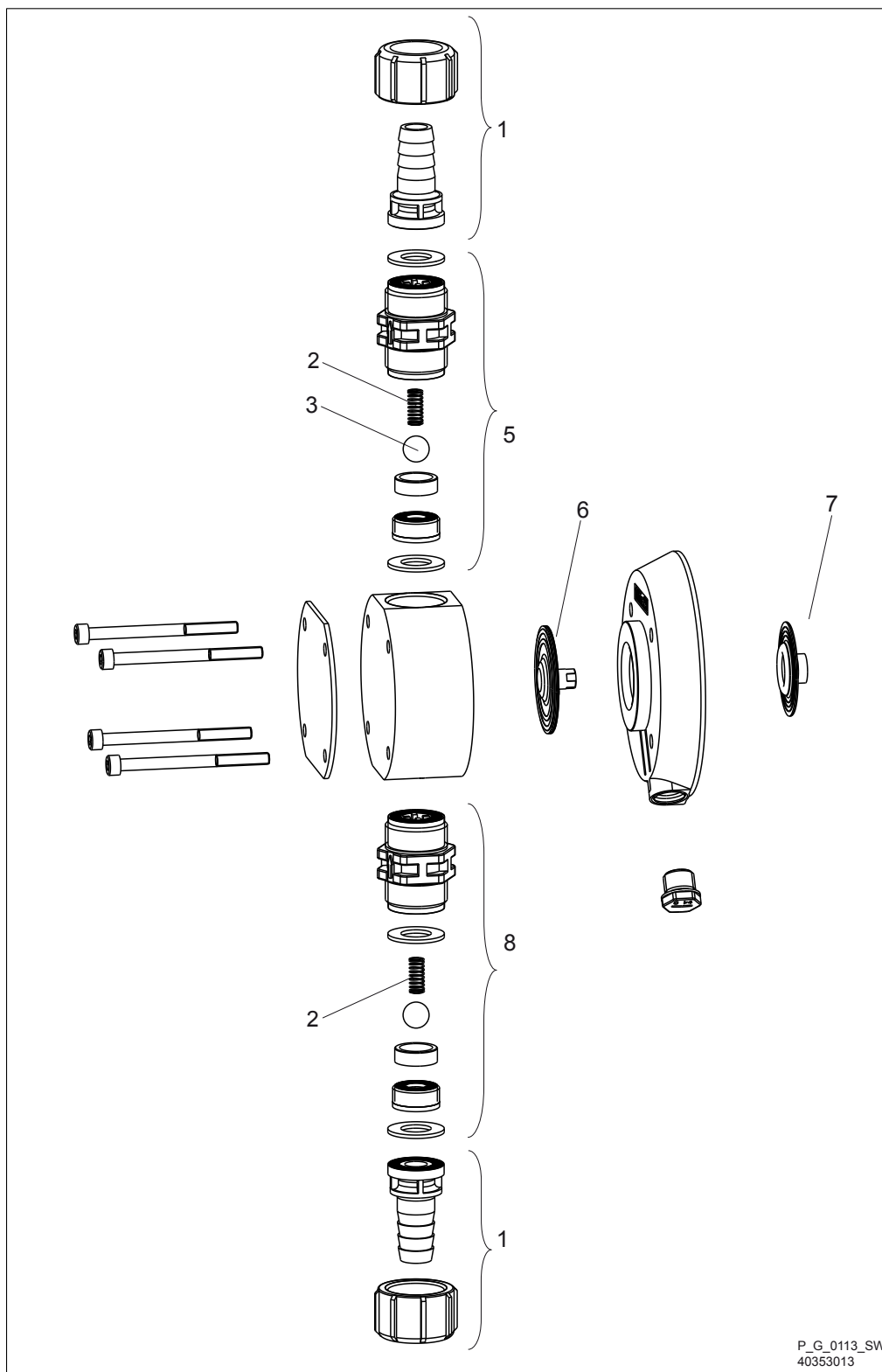
## Exploded drawings

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Liquid end gamma/ XL SSF0, FDA

	0450	0280
Liquid end without bleed valve	1096234	1096223
Spare parts kit	1095625	1095624
Diaphragm	1045443	1059691

Liquid end gamma/ XL 1608 / 1612 / 1020  
PVT4, HV



Tab. 40: Spare parts for liquid end gamma/ XL 1608 / 1612 / 1020 PVT4 HV

Pos.	Description
1	Connector kit with hose nozzle
6	Diaphragm

---

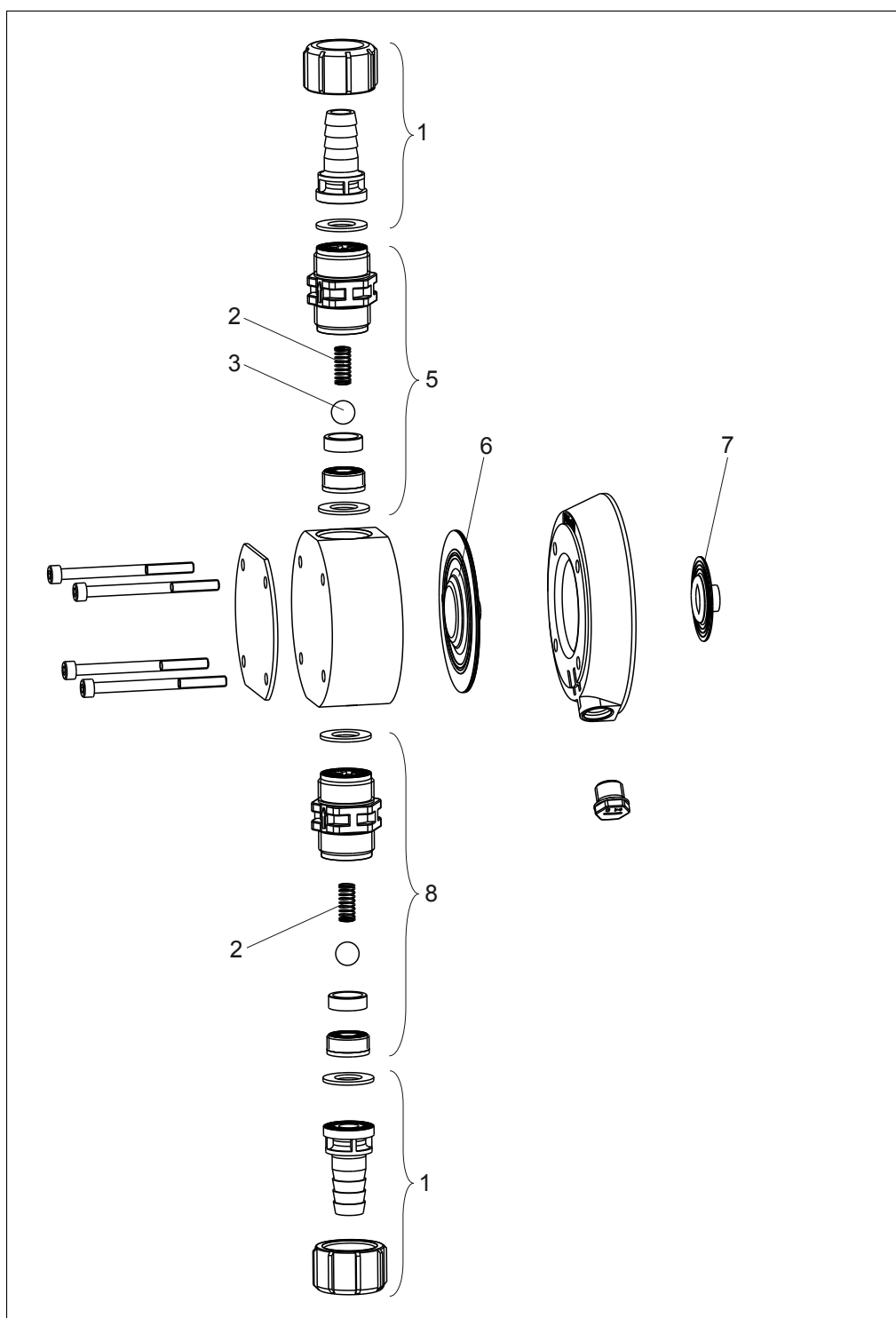
## Exploded drawings

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Liquid end gamma/ XL PVT4, HV

	1608	1612	1020
Liquid end HV	1096222	1096221	1096220
Spare parts kit	1019066	1019067	1019069
Diaphragm	1030353	1000248	1000249

## Liquid end gamma/ XL 0730 PVT4, HV



P\_G\_0114\_SW  
40353046

Tab. 41: Spare parts for liquid end gamma/ XL 0730 PVT4, HV

Pos.	Description
1	Connector kit with hose nozzle
6	Diaphragm

Liquid end gamma/ XL 0730 PVT4, HV

	<b>0730</b>
Liquid end HV	1096219
Spare parts kit	1095499
Diaphragm	1045456

# 19 Dimensional drawings



- Compare the dimensions on the dimensional drawing with those of the pump.
- All dimensions are in mm.

Dimensional drawing gamma/ XL, material versions NP

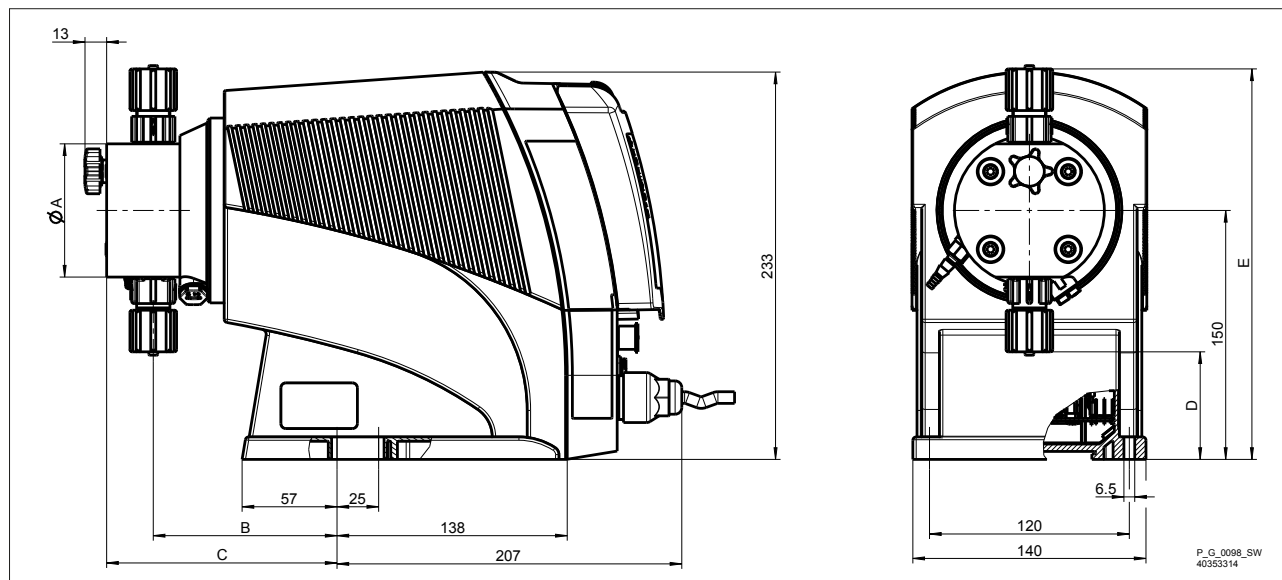


Fig. 46

	2508	1608	1612	1020	0730
ØA	90	90	90	90	90
B	110	110	110	112	112
C (with bleed valve)	138	138	138	140	140
C (without bleed valve)	125	125	125	127	127
D	63	63	60	54	53
E	235	235	239	245	246

## Dimensional drawing gamma/ XL, material version PV

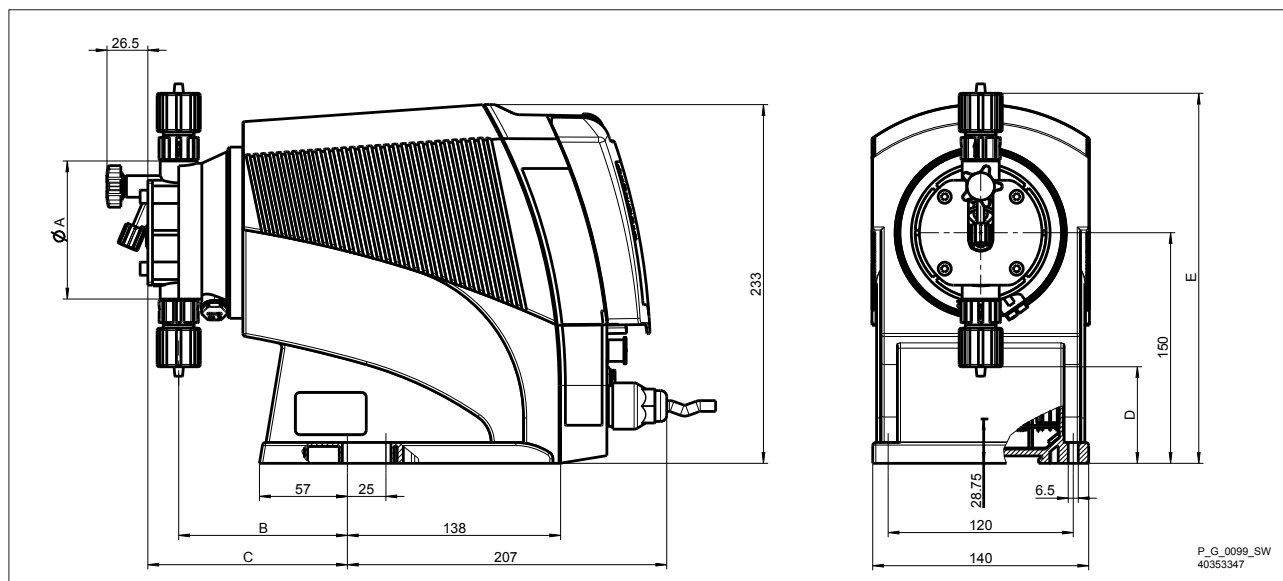


Fig. 47

	1608	1612	1020	0730
ØA	90	90	90	90
B	108	110	110	112
C (with bleed valve)	-	130	130	132
C (SER)	128	130	130	132
D	63	63	63	63
E	240	240	240	240



Dimensional drawing gamma/ XL, material  
version PV DN10

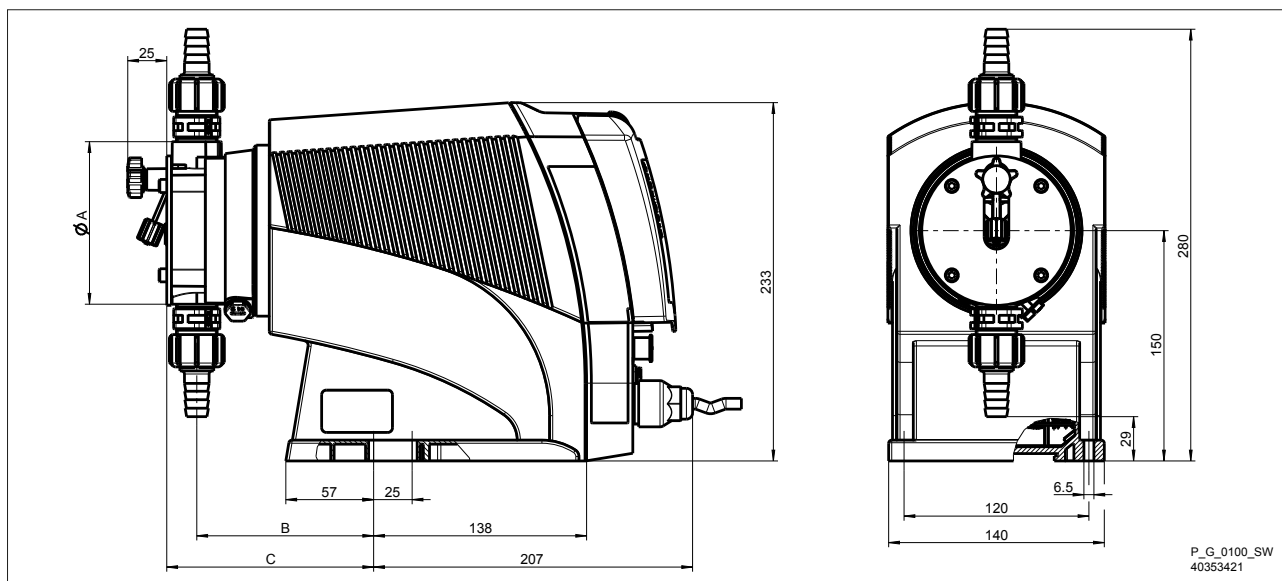


Fig. 48

	0280	0450
ØA	100	100
B	115	115
C	135	135
D	29	29
E	281	281

## Dimensional drawing gamma/ XL, material version PV HV

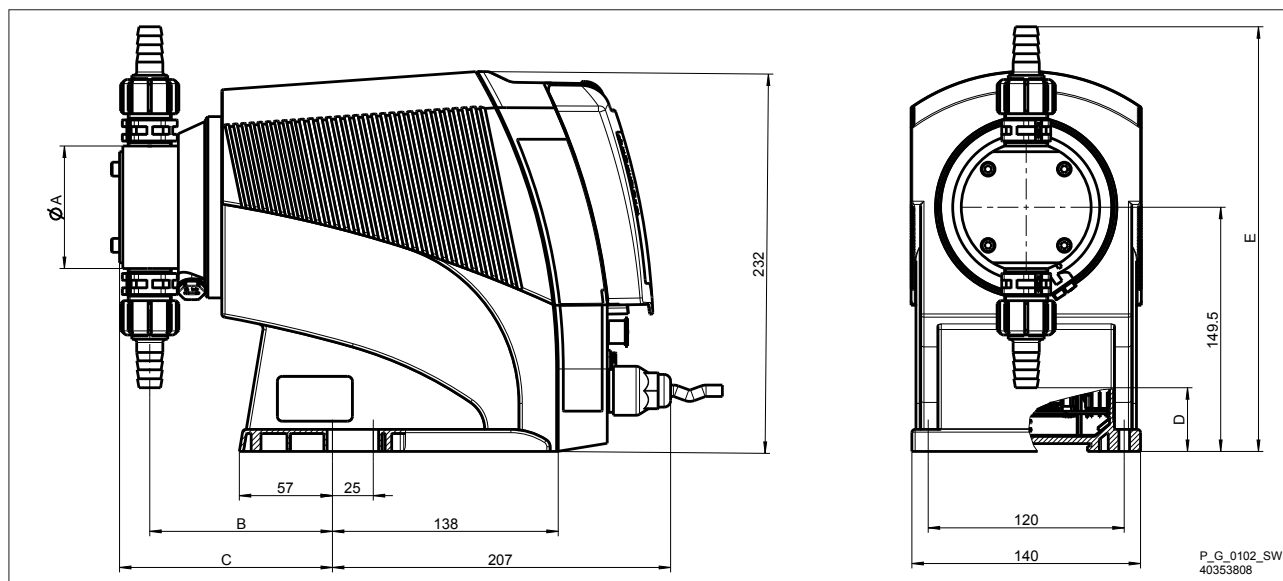


Fig. 49

	1608	1612	1020	0730
$\varnothing A$	80	80	80	85
B	112	113	113	114
C	131	131	131	132
D	39	34	34	31
E	260	260	260	263

## Dimensional drawing gamma/ XL, material version SS

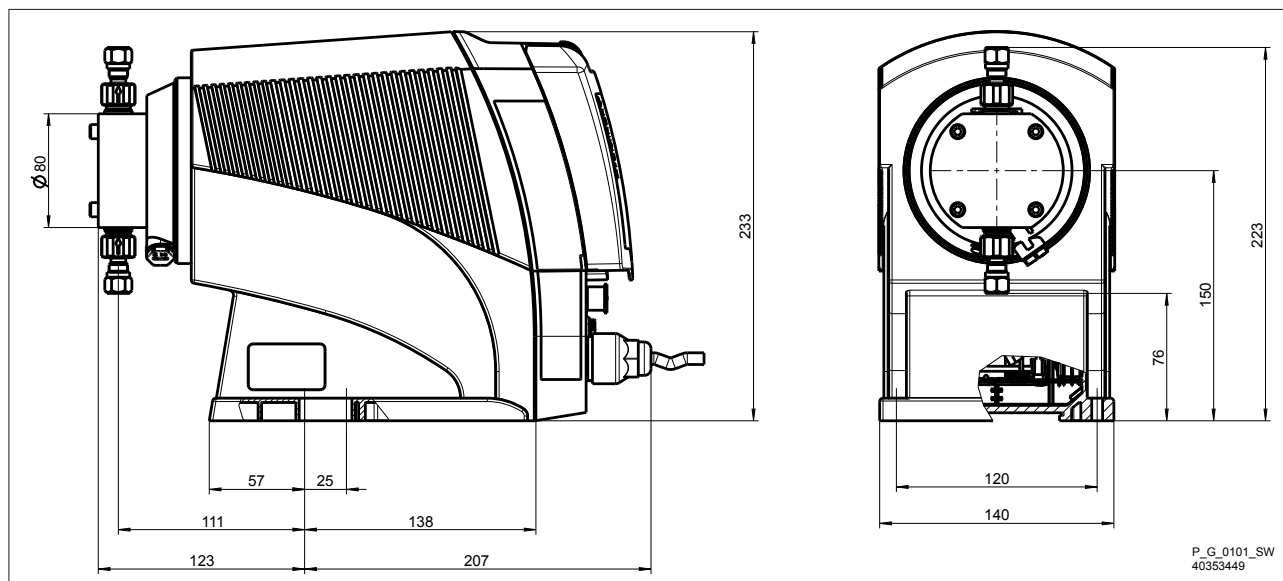


Fig. 50

Dimensional drawing gamma/ XL, material  
version SS UNF

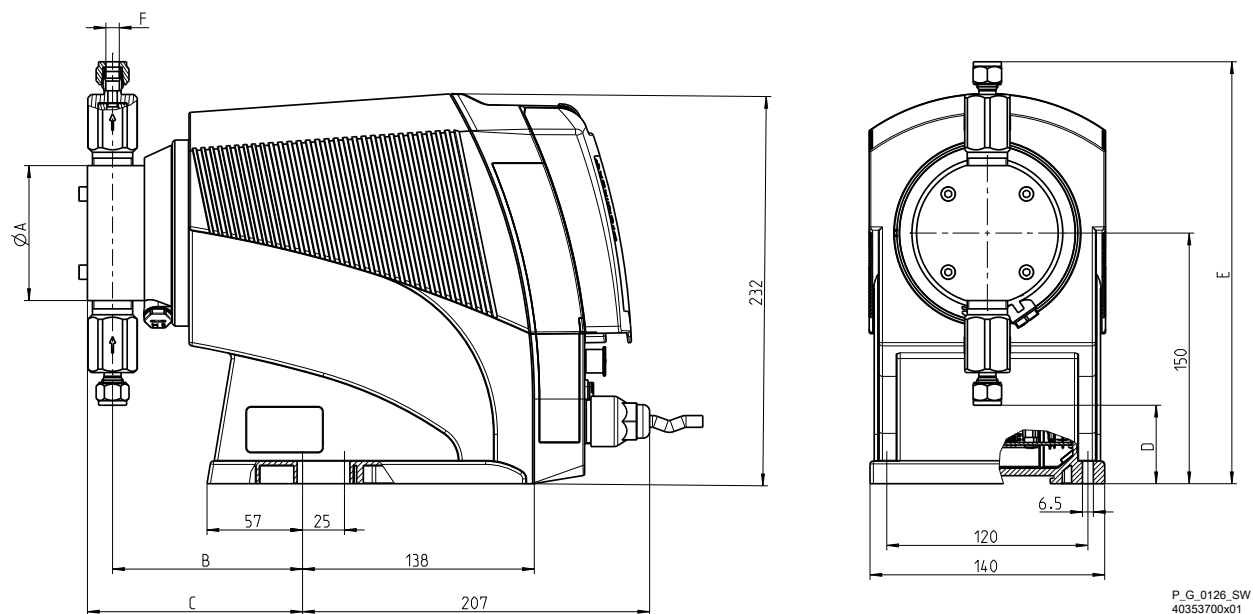


Fig. 51

	1612	1020	0730
ØA	85	85	85
B	113	117	117
C	128	130	130
D	47	47	47
E	252	252	252
ØF	8	12	12

Dimensional drawing gamma/ XL, material  
version SS DN10

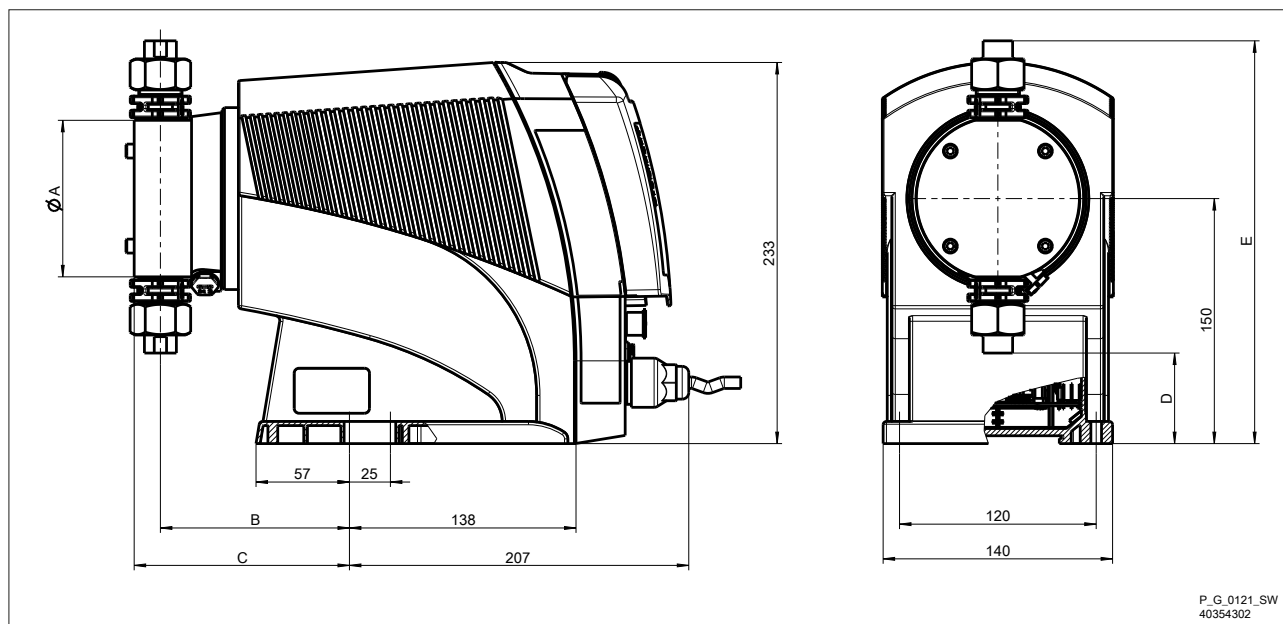


Fig. 52

	0450	0280
$\varnothing A$	100	100
B	115	115
C	132	132
D	55	55
E	246	246

## 20 Declaration of Conformity for Machinery

In accordance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, BASIC 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.

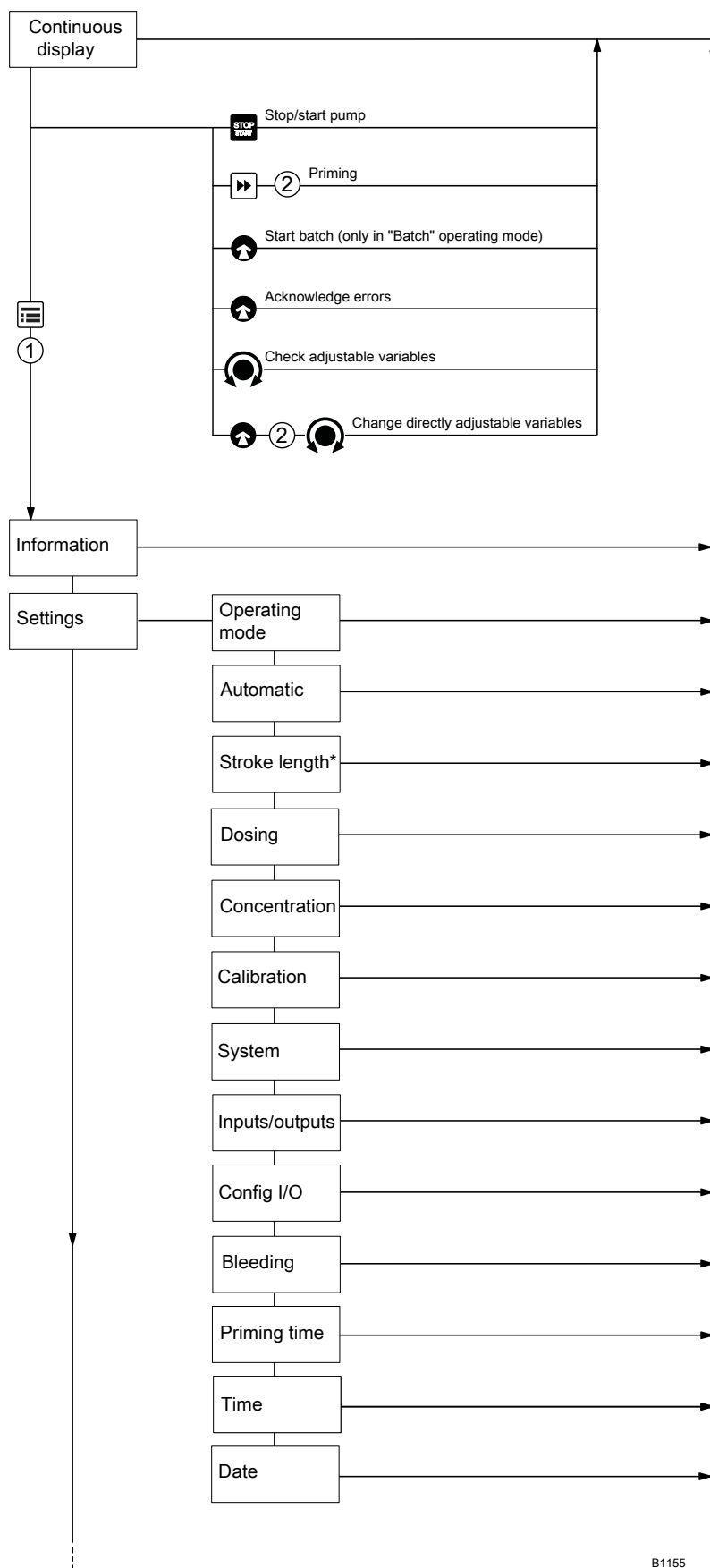
Any modification to the product not approved by us invalidates this declaration.

Tab. 42: Excerpt from the Declaration of Conformity

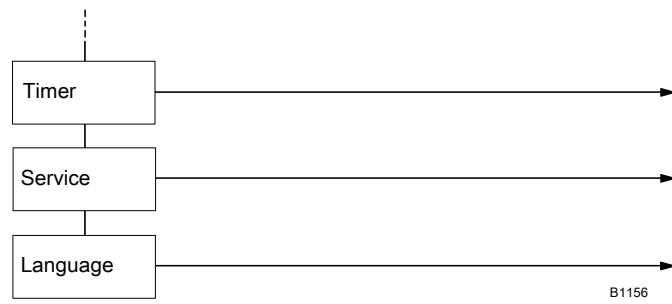
Designation of the product:	Solenoid-driven metering pump, gamma/ XL product range
Product type:	GXLa _ _ _ _ _ U _ _ _ _ _
Serial number:	see nameplate on the device
Relevant directives:	Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive according to Annex 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 EN 61326-1:2013 for industrial environments EN 50581:2012
Date:	03.05.2019

You can download the Declaration of Conformity at [www.prominent.com](http://www.prominent.com).

## 21 Operating / set-up overview gamma/ XL



B1155



## 22 gamma/ XL operating menu, overall

1. level	2.	3.	4.	5.	xth
Information	Versions	Control	Hardware Software Bootloader		
		Power	Hardware Software Bootloader		
		HMI data			
	Time				
	Date				
	Max. capacity *1				
	Max. capacity *2				
	Serial number				
	Identity code				
	Switch-on counter				
	Total operating time				
	Total number of strokes				
	Total metering volume *1				
	Current stroke volume				
Settings	Operating mode	Manual			
		Contact	<i>Adaptive</i> On Off	<i>Memory</i> On Off	...
					...
		Batch	<i>Memory</i> On Off	Metering volume *1	Metering time *1
				Factor *2	...
		Analogue	0...20 mA		
			4...20 mA		
			Linear curve Lower side band Upper side band	Curve point 1 (I1,F1)	...
	Automatic	On Off			
	Stroke length *2	1 ... 100%			



1. level	2.	3.	4.	5.	xth
	Dosing	Discharge stroke	optimum fast sine mode continuous DFMa		
		Suction stroke	normal HV1 HV2 HV3		
		Pressure stage	x bar		
		Monitoring	Air lock	Inactive Warning Fault	
			Air sensitivity	normal average weak	
			Message with over-pressure	Warning Fault Error+warning Inactive	
			Message when no pressure	Inactive Warning Fault Error+warning	
			Cavitation	Inactive Warning	
		Compensation*1 *2	Inactive Active		
		Adaptive control	Inactive Adaptive Save param. Restore old values		
	Concentration	Concentration control active inactive	at 'Manual': Flow of main medium	Concentration of feed chemical	...
			at 'Contact': Contact interval	Concentration of feed chemical	...
			at 'Batch': Volume main medium	Concentration of feed chemical	...
			for 'Analogue': Max. flow of main medium	Concentration of feed chemical	...
	Calibration	Calibration factor	Calibration factor		

1. level	2.	3.	4.	5.	xth
		Calibration	Start calibration	Calibration ended	Calibration result
	System	Dosing head	Self-bleeding: No	No dosing head ... 0280	
			Groove	No dosing head ... 0280 SER	
			Steel	No dosing head ... 0280 SS	
		Volume unit	Litres Gallon (U.S)		
		Pressure unit	bar psi		
		Pressure adjustment	<i>Password?</i>	... bar	
		Start behaviour	always STOP always on last status		
	Inputs/outputs	Auxiliary mode	Auxiliary capacity *1 Auxiliary frequency *2 Auxiliary stroke length *2	...	
		Relay 1	Relay1 type	Timer Fault Warning Warning + error Warning, error + stop Pump active Cycle quantity Stroke rate Metering / Batch Bleeding	
			Relay 1 polarity	energizing (N/O) releasing (N/C)	
			Relay cycle quantity	01.000 l	

1. level	2.	3.	4.	5.	xth
		Relay 2	Relay type	Inactive Fault Warning Warning + error Warning, error + manual stop Pump active Metering volume Stroke rate Metering / Batch Bleeding External	
			Polarity	energizing (N/O) releasing (N/C)	
		mA output	0...20 mA 4...20 mA	Strokes / hour Litre / hour at 20 mA	...
		Flow control	Flow Control	Tolerance / strokes	...
				Activation	...
				if auxiliary	...
		diaphragm rupture	Warning Fault		
		Pause input	N/C N/O		
		Level monitor	2-stage	N/C N/O	
			continuous	Calibration Configure	
	Config I/Os	Set Config I/Os	Config I/O 1 Config I/O 2 Config I/O 3	off Timer input Timer output AUX Selective fault Selective warning Stroke rate Cycle quantity Metering / Batch Fault Warning Warning + error Warning, error + stop Pump active	...

1. level	2.	3.	4.	5.	xth
		Config I/O 1 xxxxxx Config I/O 2 xxxxxx Config I/O 3 xxxxxx			
	Bleeding	Off			
		Periodic	Bleed cycle	Bleed metering time	...
		Air lock	Bleed metering time		
		both	Bleed cycle	Bleed metering time	...
	Priming time	0 ... 60 s			
	Set time	Time	Setting	hh.mm.ss	
		Auto. summer time	Yes No		
		Summer time begins in	February March April		
		Sunday the	1st, 2nd, 3rd, 4th, 5th		
		Summer time ends in	August September October November		
		Sunday the	1st, 2nd, 3rd, 4th, 5th		
		Location	Northern Hemisphere Southern Hemisphere		
	Date	dd.mm.yyyy			
Timer	Timer status				
	Activation	Active Inactive			

1. level	2.	3.	4.	5.	xth
	Setting the timer	New Displays Change Clear	Command 01 Anweisung2 ...	Hourly Daily (Mon-Sun) Weekdays1 (Mo-Fr) Weekdays2 (Mo-Sa) Weekend (Sa+Su) Weekly Monthly Init Delayer Config I/O 1 Config I/O 2 Config I/O 3	...
	Clear all	No Yes			
Service	Access protection	<i>Password?</i>	None Locking menu Lock all		
	Password	<i>Password?</i>	0000		
	Clear counter	Stroke counter Quantity counter Contact memory All			
	Error log book	Error log book	...		
		Filter	None Warn.+error only Error only Warnings only Events only		
	Diaphragm replacement	Back To change position			
	Display	Brightness			
		Contrast			
	Factory setting	<i>Password?</i>	Yes No		
	Diaphragm part number: -----				

1. level	2.	3.	4.	5.	xth
	Spare parts kit part number: -----				
Language	English German Frenchç Spanishñ Italian ...				

\*1 with 'Automatic' - 'on' - see Chap. 'Set Up' - 'Settings' - 'Automatic'

\*2 with 'Automatic' - 'off' / with conventional operating mode

Menus may be missing or added depending on the design and equipment on the pump.



























## 23 Continuous displays and secondary displays

### Continuous displays

Continuous display	"Manual" operating mode	"Contact" operating mode with transfer factor 5	"Batch" operating mode with transfer factor 5	"Analogue" operating mode
Capacity	12.00 <sup>**</sup> m			12.00 <sup>**</sup> m
Stroke rate (h)	12,000 <sup>*</sup> $\frac{1}{h}$	12000 <sup>*</sup> $\frac{1}{h}$	12,000 <sup>*</sup> $\frac{1}{h}$	12,000 <sup>*</sup> $\frac{1}{h}$
Stroke rate (min)	200 <sup>*</sup> $\frac{1}{min}$	200 <sup>*</sup> $\frac{1}{min}$	200 <sup>*</sup> $\frac{1}{min}$	200 <sup>*</sup> $\frac{1}{min}$
Stroke length	50.0 <sup>*</sup> %	50.0 <sup>*</sup> %	50.0 <sup>*</sup> %	50.0 <sup>*</sup> %
Factor		5 <sup>*</sup> $\frac{1}{h}$	5 <sup>*</sup> $\frac{1}{h}$	
Contact volume		1,250 <sup>**</sup> $\frac{1}{h}$	1,250 <sup>**</sup> $\frac{1}{h}$	
Batch dosing time			90 <sup>**</sup> s	
Concentration	03.5 <sup>**</sup> %	03.5 <sup>**</sup> %	03.5 <sup>**</sup> %	03.5 <sup>**</sup> %
Trigger batch				
Time	16:12:21	16:12:21	16:12:21	16:12:21

\* only with "Automatic" off      \* only with "Automatic" on

## Auxiliary displays in the continuous display

Auxiliary display	Mode "Manual"	Mode "Batch" with transfer factor 5	Mode "Contact" with transfer factor 5	Mode "Analogue"
Capacity	12.00 L / h			12.00 L / h
Stroke rate	12000  / h	12000  / h	12000  / h	12000  / h
Factor		5  / 	5  / 	
Remaining strokes			25,00  <sup>1</sup>	
Remaining litres			000,833  L <sup>1</sup>	
Total number of strokes	86500 	86500 	86500 	86500 
Stroke length	50 % 	50 % 	50 % 	50 % 
Signal current (at the input)				12,7 mA <sup>2</sup>
Dosing mode	 slow  HV1	 slow  HV1	 slow  HV1	 slow  HV1
Pressure display	12,5 bar	12,5 bar	12,5 bar	12,5 bar
Time	16:12:21	16:12:21	16:12:21	16:12:21
Date	2015 - 03 - 27	2015 - 03 - 27	2015 - 03 - 27	2015 - 03 - 27

1 = only with "Storage tank" function extension

2 = only with current output



## 24 Installation instructions: Retrofitting Relays

These installation instructions apply to:

	Order No.
Fault indicating relay GMXa	1050643
Fault indicating and pacing relay GMXa	1050654



### WARNING!

#### Danger of electrocution.

Live parts can be accessed if the slot for the relay has been opened.

- Disconnect the pump from the mains/power supply prior to commencing work.
- Only operate the pump with a liquid-tight screwed slot for the relay and connector for the relay cable.

### Scope of delivery

- 1 - Relay board, fully ass.
- 1 - Relay cable, fully assembled, with connector
- 1 - Seal

### Materials

Torx spanner T 25



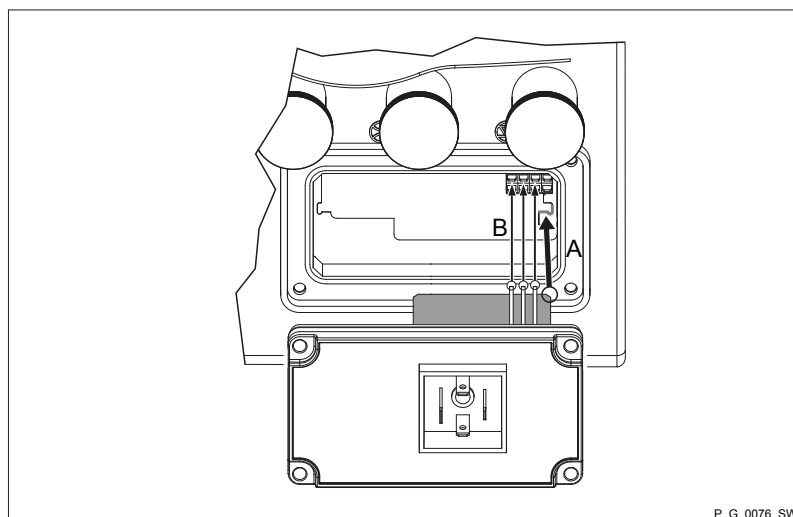
*A small bright pocket torch can help to find the 4x2 contact in the slot for the relays more easily.*

Personnel: ■ Electrician

Prerequisite:

The pump is electrically disconnected.

1. ➞ Remove the cover of the slot.
2. ➞ Hold the relay board by the edge of the relay cover.
3. ➞ Carefully insert the relay board into the slot for the relay - the opening in the board in the slot will help with this (A); at the same time make sure that the 3x2 pins on the relay board are sitting correctly and on the left contacts of the 4x2 contact in the slot (B) - see Figure
4. ➞ Push the relay board with gentle pressure into the slot.
5. ➞ Use the screws to screw the relay cover until liquid-tight with the housing.
6. ➞ Insert the seal of the connector of the relay cable into the relay cover.
7. ➞ Push the connector onto the pins of the relay cover and then tighten the screw into the connector until liquid-tight.



## 25 Index

### 1, 2, 3 ...

.....	78
"External control" terminal .....	35
0...20 mA .....	66
2-stage .....	67
4 - 20 mA .....	48
4...20 mA .....	66

### A

About This Pump .....	8
Access code .....	88
Access protection .....	44, 88
Accuracy .....	108
Acknowledgement .....	91
Adaptive .....	46
Adjustment .....	63
Air in the dosing head	
Selective errors .....	69
Selective warning .....	69
Air lock .....	54
Air sensitivity .....	54
Altitude of site .....	110
Analogue .....	23, 36
Analogue input .....	35, 48
Assembly .....	26
Automatic .....	50
Automatic bleeding .....	25
AUX .....	64
Auxiliary .....	68
Auxiliary capacity .....	24, 25, 35, 36, 64
Auxiliary frequency .....	24, 25, 35, 36, 64

### B

Back pressure fluctuations .....	55
Basic principles for setting up the control .....	42
Batch .....	23, 38, 48, 57, 58, 59, 65
Behaviour, mA output .....	66
Bleed, function .....	24
Bleeding .....	30, 38, 69
Selective errors .....	69
Bluetooth Name .....	45
Brightness .....	89
BT device address .....	45

### C

Calibration .....	24, 60, 61
Calibration factor .....	61
Calibration, level measurement .....	68

Capacity at 20 mA .....	66
Capacity too low	
Selective warning .....	69
Carrying out repairs .....	95
Cavitation .....	52
Check adjustable variables .....	91
Checking adjustable variables .....	44
Cleaning the diaphragm rupture sensor .....	98
Cleaning valves .....	98
Clear .....	88
Clear counter .....	88
Clickwheel .....	16
Code .....	88
Compensation .....	55
Concentration .....	55
Concentration entry .....	55
Config I/O .....	33
Config I/Os .....	68
Configure .....	68
Contact .....	23, 46
Contact - adaptive .....	46
Contact memory .....	88
Contact water meter .....	47
continuous .....	68
Continuous display .....	17
Continuous displays .....	44, 155
continuous level measurement .....	37
Contrast .....	89
Control elements .....	16
Current output .....	40, 66
Current stroke volume .....	45
Curve .....	48
Cycle quantity .....	68

### D

Date .....	45, 71, 89, 104
Declaration of Conformity .....	145
Decommissioning .....	106
Decontamination declaration .....	14
Defective strokes	
Selective errors .....	69
Degassing, mA output .....	66
Degree of protection .....	111
Demonstration purposes .....	62
Detailed view .....	89, 104
DFMa .....	51
Diaphragm .....	90
Diaphragm part number .....	90

Diaphragm replacement . . . . .	89	Functional description . . . . .	21
Diaphragm replacement position . . . . .	89	Functions . . . . .	24, 25
diaphragm rupture . . . . .	67	<b>G</b>	
Selective warning . . . . .	69	Gas lock . . . . .	54
Diaphragm rupture . . . . .		Gaseous feed chemicals . . . . .	52
Selective errors . . . . .	69	<b>H</b>	
Diaphragm rupture indicator . . . . .	38	Hardware . . . . .	45
Dielectric constant . . . . .	68	Hemisphere . . . . .	70
Dimensional drawings . . . . .	139	Hierarchy of operating modes . . . . .	25
Directly changeable variables . . . . .	91	HMI version . . . . .	45
Discharge stroke . . . . .	21, 51	HV1 . . . . .	52
Display . . . . .	89	<b>I</b>	
Disposal . . . . .	107	Identification of safety notes . . . . .	9
Dosing . . . . .	38, 51, 65	Identifier . . . . .	17
Dosing precision . . . . .	55	Identity code . . . . .	6
Draining the liquid end . . . . .	106	Identity Code . . . . .	45
DulcoFlow . . . . .	51	Information . . . . .	45
DulcoFlow® . . . . .	66	Information in the event of an emergency . . . . .	12
<b>E</b>		Input signal iMax . . . . .	
Electrical installation . . . . .	32	Selective errors . . . . .	69
Emergency . . . . .	12	Input signal iMin . . . . .	
Error . . . . .	102	Selective errors . . . . .	69
Error log book . . . . .	89	Input signal mA . . . . .	
Error processing . . . . .	49	Selective errors . . . . .	69
Error, mA output . . . . .	66	Inputs/outputs . . . . .	64
EU Declaration of Conformity . . . . .	145	Installation, electrical . . . . .	32
Events . . . . .	104	Installation, hydraulic . . . . .	27
External contact . . . . .	25, 35, 36	Installing hose lines . . . . .	28
External frequency changer . . . . .	25	Intended Use . . . . .	9
<b>F</b>		Invalid metering vol. . . . .	
Factor . . . . .	46, 48	Selective warning . . . . .	69
Factory setting . . . . .	90	IP . . . . .	111
Fast . . . . .	51	<b>K</b>	
Fault . . . . .	25, 38, 65, 68, 102	Keys . . . . .	16, 19
FAULT . . . . .	100	<b>L</b>	
Fault indicating and pacing relay . . . . .	25	Language . . . . .	90
Fault indicating relay . . . . .	24, 39, 40	LCD screen . . . . .	16, 89
Fault indicator . . . . .	16	Leakage hole . . . . .	93
Fault indicator (red) . . . . .	25	Level . . . . .	67
Fault message . . . . .	17	Selective errors . . . . .	69
Fault messages . . . . .	100	Selective warning . . . . .	69
Fault statuses . . . . .	25	Level error . . . . .	67
Fault threshold level . . . . .	68	Level measurement, continuous . . . . .	37
Faults without a fault message . . . . .	99	Level switch . . . . .	24, 36, 39
Fill . . . . .	51	Level warning . . . . .	67
Flow control . . . . .	66	Linear curve . . . . .	49
Flow Control . . . . .	66		
Flow monitor . . . . .	24		

Liquid level percent . . . . .	68	Overview of equipment . . . . .	15
Location . . . . .	70	<b>P</b>	
Lock . . . . .	88	Pacing relay . . . . .	40
Log book . . . . .	89, 102, 103, 104	Password . . . . .	44, 88
Log book entries . . . . .	89	Pause . . . . .	24, 25, 35, 36, 67
Log book entry . . . . .	89, 104	Percent level . . . . .	68
Lost in hyperspace . . . . .	42	Polarity . . . . .	64
Lower side band . . . . .	49	Pressure . . . . .	53
<b>M</b>		Pressure adjustment . . . . .	63
m input . . . . .	35, 48	Pressure display . . . . .	17
mA output . . . . .	25, 66	Pressure stage . . . . .	53
Main display . . . . .	17	Pressure too low	
Mains cable . . . . .	33	Selective warning . . . . .	69
Maintenance . . . . .	93	Pressure unit . . . . .	63
Manual . . . . .	23, 25, 46, 55	Priming . . . . .	25, 91
Maximum capacity . . . . .	45	Priming time . . . . .	70
Maximum metering rate . . . . .	45	Protection against contact and humidity . . . . .	111
Memory . . . . .	46, 48	Protection class . . . . .	111
Menu . . . . .	45	Protection menu . . . . .	88
Metering monitor . . . . .	37, 66	Pulse control . . . . .	47
Selective warning . . . . .	69	Pulses . . . . .	46
Metering profiles . . . . .	21, 51	Pump active . . . . .	38, 65, 68
Metering pumps with bleed valve . . . . .	30	<b>Q</b>	
Metering pumps without integral relief valve . . . . .	31	Qualification of personnel . . . . .	12
Metering pumps without self-bleeding . . . . .	28	Quantity counter . . . . .	88
Metering volume / Batch . . . . .	68	<b>R</b>	
Minimum Stroke Length . . . . .	108	Relay . . . . .	24, 38, 64
Monitoring . . . . .	54	Relay polarity . . . . .	39, 65
<b>N</b>		Relay type . . . . .	64
No pressure		Replace diaphragm . . . . .	96
Selective errors . . . . .	69	Replacement position . . . . .	96
Nominal pressure . . . . .	53	Replacing the diaphragm . . . . .	96
Normal . . . . .	52	Replacing the dosing head . . . . .	62
<b>O</b>		Reproducibility . . . . .	108
Operating indicator (green) . . . . .	16, 25	Retrofitting Relays . . . . .	157
Operating menu . . . . .	148	Return line . . . . .	31
Operating mode selection . . . . .	45	Return pipe . . . . .	28, 30
Operating modes . . . . .	23, 25	<b>S</b>	
Operating overview . . . . .	146	Safety Chapter . . . . .	9
Operation . . . . .	91	Safety declaration form . . . . .	14
Optimum . . . . .	51	Safety requirements . . . . .	111
Optional . . . . .	38	Scaling, mA output . . . . .	66
Out-gassing . . . . .	50, 54	Scope of Delivery . . . . .	14
Overload		Secondary display . . . . .	17
Selective warning . . . . .	69	Secondary displays . . . . .	44, 156
Overpressure		SEK dosing head . . . . .	62
Selective errors . . . . .	69		

Select the analogue signal . . . . .	66
Selective errors . . . . .	69
Selective warning . . . . .	69
Self-Bleeding . . . . .	23
Semiconductor switch . . . . .	40
SER types . . . . .	23
Serial number . . . . .	45
Service . . . . .	87
Set time . . . . .	70
Set up, chapter . . . . .	45
Set-up overview . . . . .	146
Setting . . . . .	42
Setting mode . . . . .	44
Settings . . . . .	45
Side band . . . . .	48, 49, 50
Slot . . . . .	16
Slow . . . . .	51
Software . . . . .	45
Sound pressure level . . . . .	13, 111
Spare parts kit . . . . .	90
Spare parts kit part number . . . . .	90
Standard installation . . . . .	31
Standard signal output . . . . .	66
Start behaviour . . . . .	63
Starting a batch . . . . .	91
Stop . . . . .	24, 25, 68
Stop, mA output . . . . .	66
Storage . . . . .	14
Storage period . . . . .	83
Storage tank overflow	
Selective errors . . . . .	69
Stroke counter . . . . .	88
Stroke length . . . . .	50
Stroke length, manual . . . . .	50
Stroke rate . . . . .	38, 65, 68
Stroke rate since switching on . . . . .	89, 104
Suction lance . . . . .	24
Suction lance electrodes . . . . .	68
Suction lance, continuous . . . . .	68
Suction stroke . . . . .	21, 22, 50, 52
Summertime . . . . .	70
Sunday . . . . .	70
Supplementary information . . . . .	2
Supply voltage . . . . .	33
Switch-off pressure . . . . .	54
Switch-on counter . . . . .	45
Switching-on duration . . . . .	89, 104
Symbols . . . . .	31
System . . . . .	62

**T**

Temperature . . . . .	89, 104
Selective errors . . . . .	69
Terminals . . . . .	16
Test (function) . . . . .	25
Time . . . . .	45, 89, 104
Timer . . . . .	71
1 time event - several actions . . . . .	77
Action . . . . .	74
Actions . . . . .	84
Activation . . . . .	71
active . . . . .	71
Active / inactive . . . . .	83
Administration functions for commands . . . . .	72
Change program lines . . . . .	78
Check program lines ("Show") . . . . .	78
Clear all . . . . .	79
Clear, all . . . . .	79
Clearing the program . . . . .	79
Config I/O . . . . .	33
Creating a program . . . . .	72
Cycle . . . . .	75
Deactivation . . . . .	71
Delayer . . . . .	76, 84
Delete individual program lines . . . . .	79
Delete program lines . . . . .	79
Event . . . . .	73
Examples . . . . .	79
Explanation of functions . . . . .	84
Explanation of selected functions . . . . .	84
Faults . . . . .	83
Generating commands . . . . .	72
Help diagrams . . . . .	85
inactive . . . . .	71
Init . . . . .	75
Initialisation . . . . .	84
Input . . . . .	33, 68
Inputs . . . . .	77, 84
Mains voltage . . . . .	83
Metering . . . . .	80
new program line . . . . .	73
Output . . . . .	33, 68
Outputs . . . . .	77, 84
Pins . . . . .	33
Pitfall . . . . .	83
Program line . . . . .	72
Program line new . . . . .	73
Programming aids . . . . .	85
Sequence . . . . .	78

set . . . . .	72
several actions - 1 time event . . . . .	77
Show instruction . . . . .	78
Show program line . . . . .	78
Sorting criterion . . . . .	78
Sorting sequence . . . . .	78
Switching time . . . . .	75
Terminal . . . . .	33
Time . . . . .	75
Time event . . . . .	73
Timer information . . . . .	83
Trigger . . . . .	73, 84
Triggering event . . . . .	84
Timer terminal . . . . .	33
Timer, function . . . . .	24
Total metering volume . . . . .	45
Total number of strokes . . . . .	45, 89, 104
Total operating time . . . . .	45, 89, 104
Transport . . . . .	14
Troubleshooting . . . . .	99

## U

Unit level . . . . .	68
Unpacking . . . . .	14
Upper side band . . . . .	50

## V

Versions . . . . .	45
Viscosity . . . . .	50, 52
Volume unit . . . . .	62

## W

Warning . . . . .	38, 65, 68, 103
WARNING . . . . .	101
Warning indicator . . . . .	16
Warning indicator (amber) . . . . .	25
Warning message . . . . .	17, 39
Warning messages . . . . .	101
Warning sign . . . . .	9
Warning threshold level . . . . .	68
Warning, mA output . . . . .	66
Warnings . . . . .	103



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