Operating instructions
Solenoid Metering Pump
gamma/ XL, GXLa

EN



Target group: at least "instructed personnel" unless otherwise required.

Please carefully read these operating instructions before use. · Do not discard.

982271, 6, en_GB, © 2026 Original operating instructions (2006/42/EC)

Supplemental directives

Supplementary information



Fig. 1: Please read!

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

The following are highlighted separately in the document:

- Enumerated lists

⟶ Instructions

  ➡ Outcome of the instructions

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

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

[Keys]

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

'Software interface texts'

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 us to clearly identify the unit type and material version.

General non-discriminatory approach

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

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1 Identity code

Product identification

This identity code serves to identify the product.

Use the identity code from the Product Catalogue for orders.

Product range gamma/ XL									
GXLa	**Type**								
	- - - -	Performance data and type - see nameplate							
		Dosing head material							
		NP	Clear acrylic						
		PV	PVDF						
		SS	Stainless steel						
			Seal material						
			T	PTFE					
			F	PTFE, FDA-compliant					
				Dosing head version					
				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 (SER)				
					Hydraulic connector				
					0	Standard connector 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			
						Diaphragm rupture indicator			
						0	without diaphragm rupture indicator		
						1	with diaphragm rupture indicator, optical sensor, electrical signal		
							Design		
							0	Housing RAL5003 / Hood RAL2003	
								Logo	
								0	with ProMinent logo

Product range gamma/ XL																
								2	without ProMinent logo							
									Electrical connection							
									U	100-230 V ± 10%, 50/60 Hz						
										Cable and plug						
										A	2 m European					
										B	2 m Swiss					
										C	2 m Australian					
										D	2 m USA / 115 V					
										1	2 m open end					
										. .	...					
											Relay, pre-set to ...					
											0	no relay	-			
											1	1 x changeover contact 120 V AC – 3 A	Fault indicating relay (N/C)			
											4	1 x N/O 24 V DC – 1 A 1 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 V DC			
											. .	...				
												Accessories				
												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			
													Control version			
													0	Manual + external contact with pulse control		
													3	Manual + external contact with pulse control + analogue 0/4-20mA		

Product range gamma/ XL																
												C	As 3 + CANopen			
												P	As 3 + PROFINET®			
												M	As 3 + Modbus RTU			
												R	As 3 + PROFIBUS® interface, M12			
													Communication			
													0	without interface		
													B	with Bluetooth		
													W	with Wi-Fi		
														Language		
														EN	Deutsch	
														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 section

Cessation of statutory warranty claims

Do not open the unit! We would advise that the unit may only be opened by qualified personnel authorised by ProMinent to avoid damage to the unit and guarantee the seamless and safe operation of the unit. All warranty claims will be invalidated if the unit is opened by unauthorised persons. You forfeit warranty claims and claims for damages against ProMinent for damage caused by unauthorised persons opening the unit.

3.1 Labels

Identification of safety notes

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

Signal word	Meaning
WARNING	Denotes a possibly dangerous situation. If this is disregarded, you are in a life-threatening situation and this can result in serious injuries.
CAUTION	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 – danger zone.
	Warning – automatic start-up.
	Warning – high-voltage.

3.2 Intended use

NOTICE

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

Frequent switching of the pump on and off (>2 times each day) using the supply voltage leads to increased wear in the pump. The pump is not technically designed for this.

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

- Only use the pump to meter liquid feed chemicals.
- Only use the pump once it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions.
- Observe the general limitations with regard to viscosity limits, chemical resistance and density - see also the ProMinent Resistance List in the Product Catalogue or at www.prominent.com.
- All other uses or modifications are prohibited.
- The pump is not designed to meter gaseous media and solids.
- The pump is not intended to meter flammable media without appropriate protective measures having been put in place.
- The pump is not designed to meter explosive media.
- The pump is not suitable for operation in areas at risk from explosion.
- The pump is not designed for use outdoors without appropriate protective measures having been put in place.
- Only allow the pump to be operated by trained and authorised personnel, see the following "Qualifications" table.
- You have a duty to observe the information contained in the operating instructions during the different phases of the unit's service life.

3.3 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

Supply voltage may be present inside the pump housing.

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

  Only return the pump to operation after an authorised repair.



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

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

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

Warning of feed chemical spraying around

- The metering pump may generate a multiple of its nominal pressure. Hydraulic parts may rupture if a pressure line is blocked.
- Install a relief valve in the pressure 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.

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 → Replace head type'* menu.



CAUTION

Warning against illegal operation

Observe the regulations that apply where the device is installed.

Isolating protective equipment

- Cover of the slot for relays and optional modules - see the chapter entitled "Overview of equipment and control elements"

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

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

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

Sound pressure level

Sound pressure level LpA < 70 dB according to EN ISO 20361

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

3.4 Information in the event of an emergency

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

3.5 Personnel qualification

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

Task	Qualification
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.

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

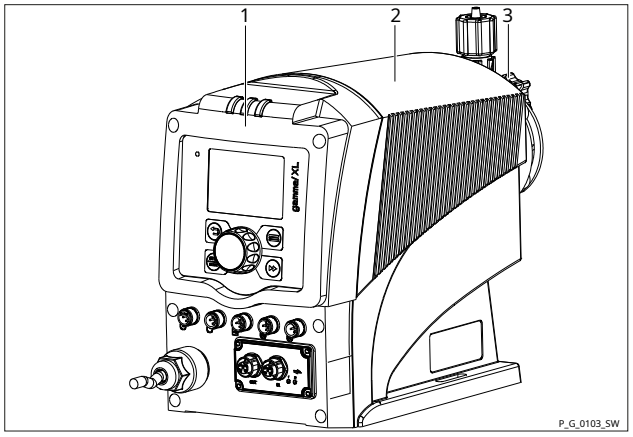


Fig. 2: Overview of equipment, complete

1 Control unit
2 Drive unit
3 Liquid end

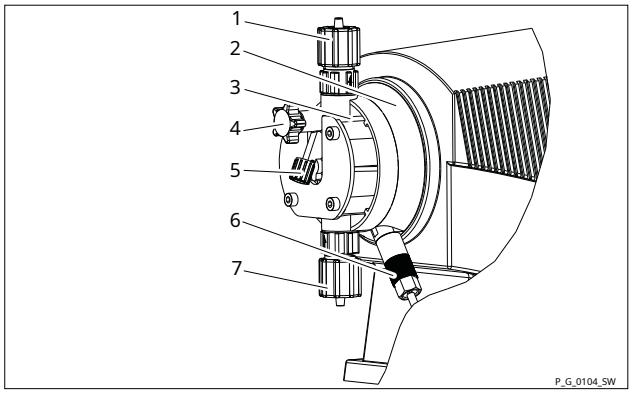


Fig. 3: Liquid end with PV bleed valve

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

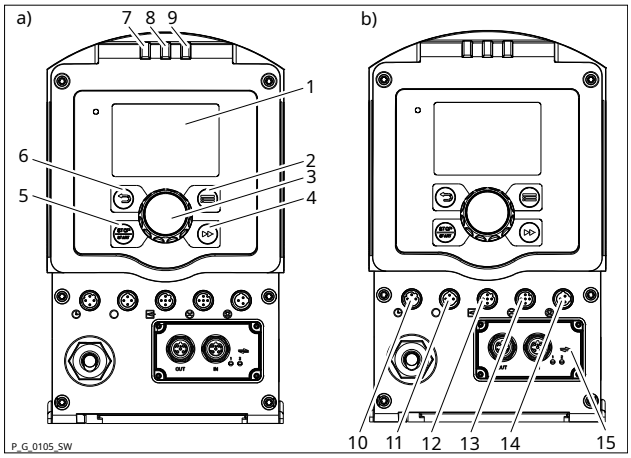


Fig. 4:

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

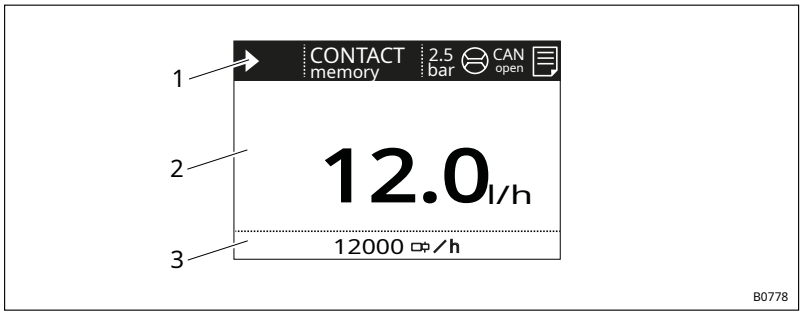


Fig. 5: Construction of continuous display

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:

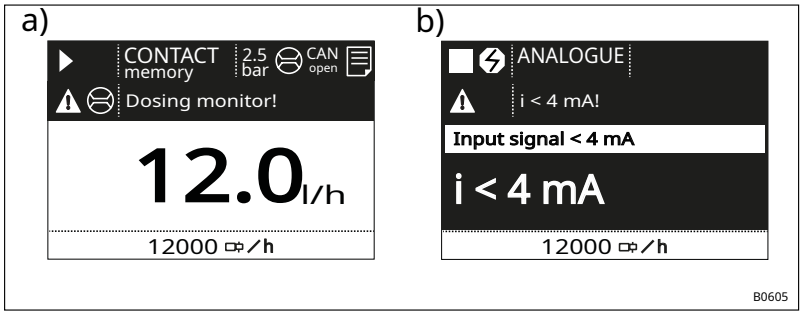


Fig. 6: a) Continuous display with warning message; b) Continuous display with fault message. Explanation of the symbols in the following tables.

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
2.5 bar	Displays the average system pressure

Tab. 2: Identifier and error displays:

Identifier	Meaning
	The pump is working or waiting for a starting signal.
	The pump was manually stopped using the [STOP/START] *[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.

Identifier	Meaning
	*'Metering → Discharge stroke → HV1'* metering profile has been set.
	*'Metering → Suction stroke → HV2'* metering profile has been set.
	*'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 "Troubleshooting" 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 *

Key	Application	In the continuous displays	In the menu
[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 diaphragm is driven by an electromagnet, controlled by an electronic control.

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 their 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 a fast discharge stroke.
C.	*'sine mode'*	For a long, sine-shaped discharge stroke.
D.	*'continuous'*	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.	*'DFMa'*	For optimum operation with a flow meter DulcoFlow® DFMa.

* see following drawing.

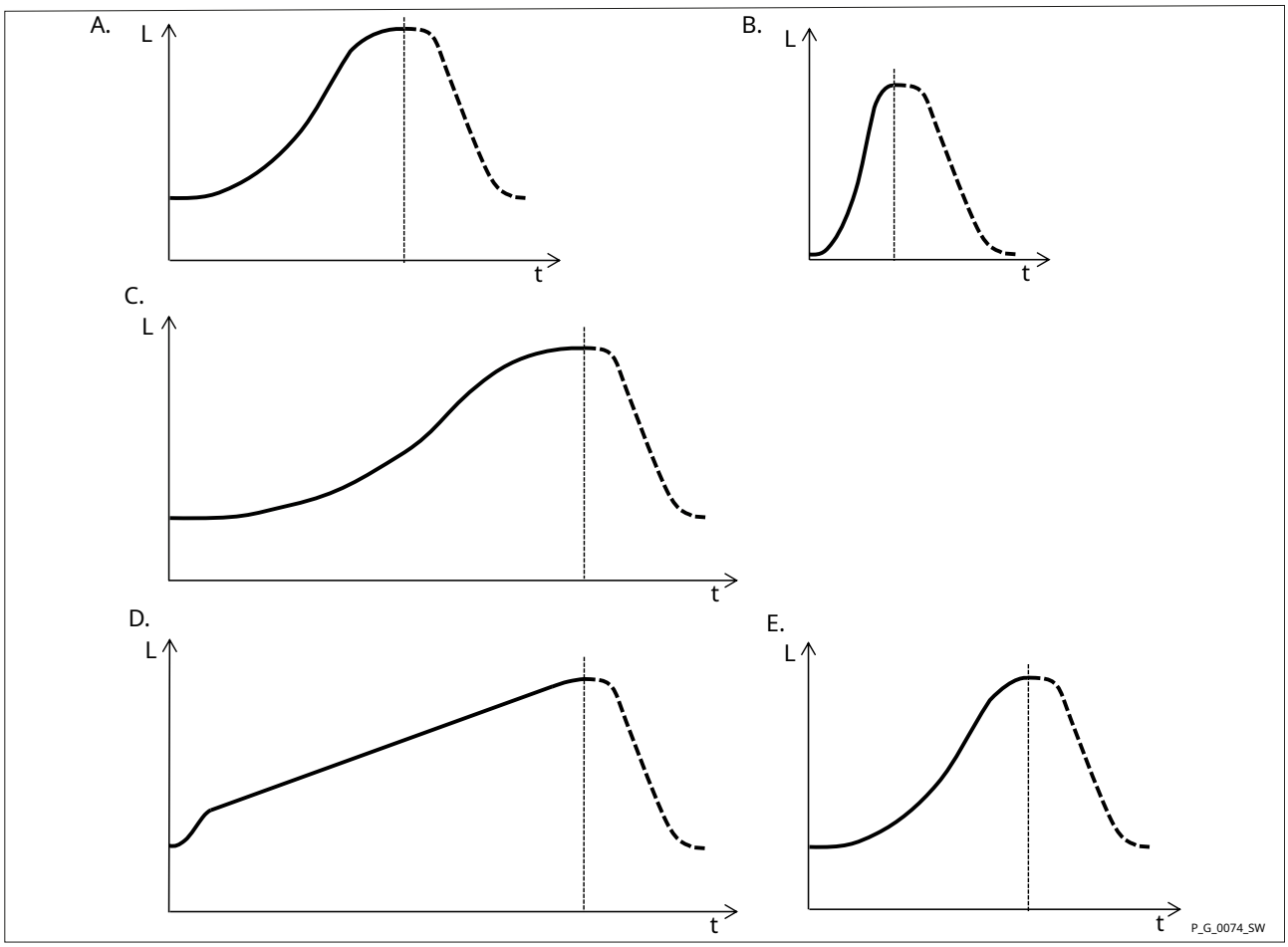


Fig. 7: Discharge stroke metering profiles with stroke L and time t (suction stroke shown as a dotted line)

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.

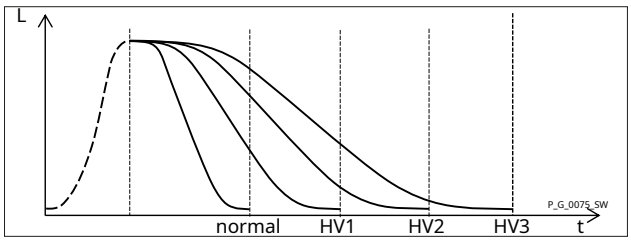


Fig. 8: Suction stroke metering profiles with stroke L and time t

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

Back pressure oscillations in the dosing line, which could lead to undesirable variations in the metering volume, are automatically compensated for by the drive. This results in a **dosing precision** that could otherwise only be achieved with complex control circuits.

6.3 Dosing rate

The pump itself regulates the dosing rate that has been set in *'Automatic'* ON mode.

By contrast, in conventional mode (*'Automatic'*-OFF), the stroke length and stroke rate determine the dosing rate. The stroke length can be adjusted between 0 and 100% via the continuous display or the menu. Only 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 "Analog" operating mode) within a range of 0 - 12,000 strokes/h.

6.4 Self-degassing

SER types

Self-degassing liquid ends without bypass are capable of independent priming when a pressure line is connected and pumping any air locks present into the pressure line. During operation, they are also capable of conveying away gases that 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 allows you to preselect the number of strokes (a step-down or step-up factor of 0.01 to 99.99) in the *'Settings'* menu.

"Batch" operating mode

This operating mode provides the option of working with large step-up factors (up to 99,999). Metering can be triggered either by pressing the *[Clickwheel]* or by a pulse received via the "External control" terminal by 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.

"Analog" operating mode

The dosing rate and/or stroke rate is controlled by an analogue current signal via the "External control" terminal. 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 should take place at the operating point and be retained over the entire stroke rate range and over a stroke length range of 0 - 100%.

"Auxiliary dosing rate" / "Auxiliary frequency" function

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

"Degassing" function

It permits the pump to pump the gas bubbles out of the liquid end even without a vent 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 led 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 *[STOP/START]*.

"Priming" function

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

6.7 Relays (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. *'Level warning'*).

The function of the relay can be programmed 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 can be programmed 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 degassing" option

The "Automatic degassing" option is used for the 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 1 relay – to control the electric vent valve in the dosing head (identity code characteristic F, degassing module 3-pin, 230 V)
- Version with 2 relays – one relay to control the electric vent valve in the dosing head and one relay freely available (identity code characteristic G, degassing module 4-pin with relay, 24 V)

"mA-output" option

The current output signal I 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 dosing rate / Auxiliary frequency
5. Manual, Analog, Contact, Batch, Fieldbus

Comments:

re 1. "Priming" can take place in any pump mode (providing it is working).

re 2. "Stop" stops everything apart from "Priming".

re 3. "Error", and "Pause" stop everything apart from "Priming".

re 4. "Auxiliary dosing rate" and/or "Auxiliary frequency" always have priority over the dosing rate / stroke rate specified by an operating mode listed under 5 or the fieldbus.

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

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

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



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 with metering pumps without vent valve

Safety information

Spraying feed chemical

- The lines can become loose or rupture if they are not installed correctly.
- Route all hose lines so that they are free from mechanical stresses and kinks.
- Only use original hoses with the specified hose dimensions and wall thicknesses.
- Only use clamp rings and hose sleeves intended for the respective hose diameter to ensure the long service life of the connections.

Rupturing hydraulic components

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

Feed chemicals could escape

- Hazardous or extremely aggressive feed chemicals could escape outside when using conventional venting procedures with metering pumps.
- Install a vent line with a return line into the supply tank.

Feed chemicals could escape

- Hazardous or extremely aggressive feed chemicals could escape outside in the event that the metering pump is removed from the installation.
- Install a shut-off valve on the pressure and suction side of the metering pump.

Uncontrolled flow of feed chemical

- Feed chemical can press through the stationary metering pump if there is back pressure.
- Use an injection valve or a vacuum breaker.

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.

INFORMATION: Arrange the lines so that the metering pump and the liquid end can simply be removed from the side if necessary.

8.1.1.1 Installing hose lines - versions without SS

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) over the sleeve (4) as far as the stop and widen, if necessary.

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

   INFORMATION: Never re-use used PTFE seals. An installation sealed in this way is not leak-tight. These seals are permanently distorted when compressed.

   INFORMATION: The PV version of FPM flat seal has a dot to distinguish it from the EPDM flat seal.
4. Position the hose (1) with the sleeve (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 briefly on the hose line (1), which is fastened to the dosing head and then re-tighten the union nut (2).

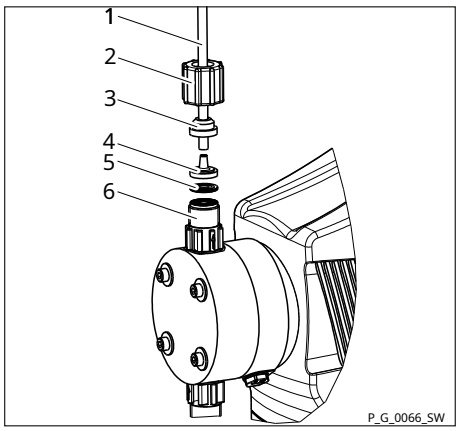


Fig. 9: Layout

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

8.1.1.2 Installing the stainless steel pipe - SS versions

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

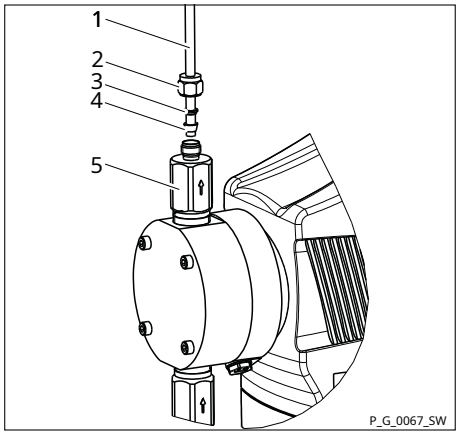


Fig. 10: SS versions with pipe

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

8.1.1.3 Installing hose lines - SS versions

Feed chemical

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

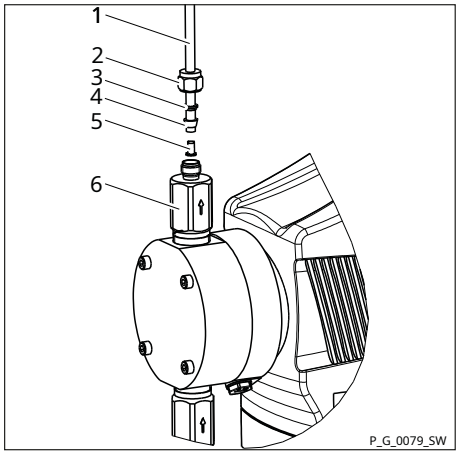


Fig. 11: SS versions with hose

1 Hose
2 Union nut
3 Rear clamp ring
4 Front clamp ring
5 Support insert
6 Valve

8.1.2 Installation with metering pumps with vent valve

Safety information

Installation of the return line

INFORMATION: All the installation and safety information for metering pumps without vent valve also applies.

A return line is also connected to the suction and pressure line.

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

8.1.3 Installation with metering pumps with self-venting (SEK type)

Safety information

INFORMATION:

- All the installation and safety information for metering pumps without self-venting also applies.
- Do not exceed the maximum values for priming lift, priming pressure and viscosity of the feed chemical.
- Do not allow the suction side line cross-section to exceed the line cross-section on the suction valve.

Information about priming pressure

- Make sure that the pressure in the return line is at least equal to the priming pressure on the suction side.
- Back pressure in the return line restricts the venting function.
- In contrast, it is possible to operate the pump with back pressure in the return line and at atmospheric pressure on the suction side.

8.1.3.1 Installation of the return line

A return line is also connected to the suction and pressure line.

- The return line is connected to the vertical valve on the upper side of the liquid end. It is factory-labelled with a red sleeve - see *Fig. 9*.
- The pressure line is connected to the horizontal valve.

1. Attach the hose line to the return hose sleeve or to the liquid end vent valve. A PVC hose, soft, 6x4 mm is recommended.
2. Feed the free end of the return line into the supply tank.
3. SEK only: Insert the return line into the anti-kink device on the vent valve and pull it downwards until it engages in the anti-kink device.

   INFORMATION: The anti-kink device prevents the return line from kinking, avoiding the risk of self-venting failure.
4. Shorten the return line so that it is not immersed in the feed chemical in the supply tank.

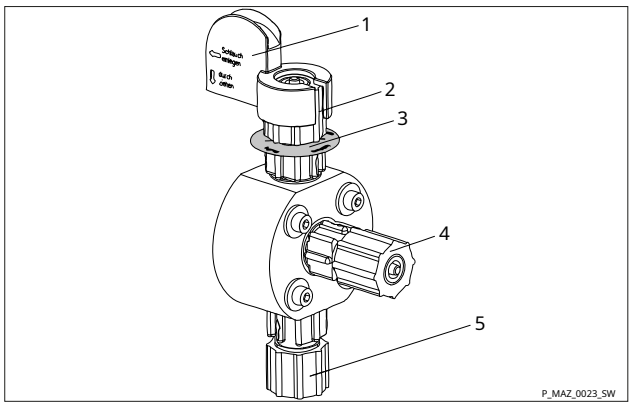


Fig. 12: SEK liquid end

1 Anti-kink device
2 Vent valve for the return line into the supply tank, 6/4 mm
3 Red sleeve
4 Discharge valve for the pressure line to the injection point, 6/4 - 12/9 mm
5 Suction valve for the suction line in the supply tank, 6/4 - 12/9 mm

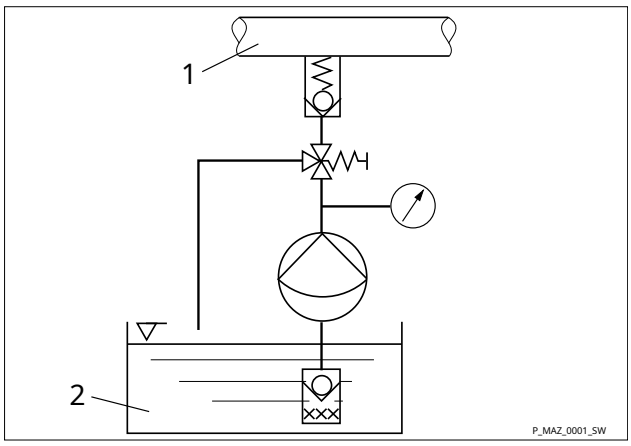


Fig. 13: Standard installation

1 Main line
2 Supply tank

→ Shorten the return line so that the line is not immersed in the feed chemical in the supply tank.

8.2 Basic installation information

Safety information

Rupturing hydraulic components

- Hydraulic components can rupture if the maximum permissible operating pressure of the hydraulic parts 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 into the pressure line.

Hazardous feed chemicals can escape

- With hazardous feed chemicals: Hazardous feed chemical can leak out when using conventional venting processes with metering pumps.
- Install a vent line with a return line into the supply tank.

Legend for the hydraulic diagram

Tab. 3: Legend for the hydraulic diagram

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

9 Installation, electrical

Electrocution

- Incompletely installed electrical options can allow moisture to penetrate into 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 device.

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



⚠ 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

Supply voltage may be present inside the pump housing.

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

  Only return the pump to operation after an authorised repair.



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

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

– Provide the pump with its own contacts (phase) and supply these contacts with voltage via a contactor relay or relay.
– If need be, fit external overvoltage protection, e.g. for the socket or control cabinet.



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 professionally and correctly and in accordance with the operating instructions and applicable regulations.

9.1 Supply voltage connector - power supply



⚠ 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.

Use the main cable to connect the pump to the power supply.

9.2 Description of the sockets

9.2.1 "Config I/O" terminal

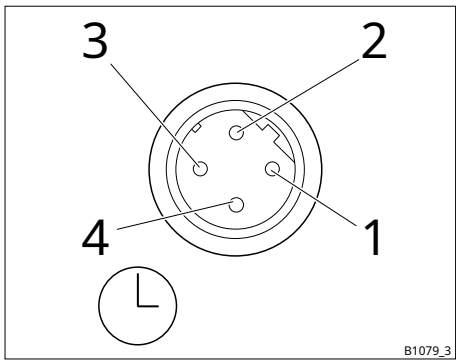


Fig. 14: "Config I/O" terminal, pin assignment

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:.

Tab. 4: Pin assignment

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

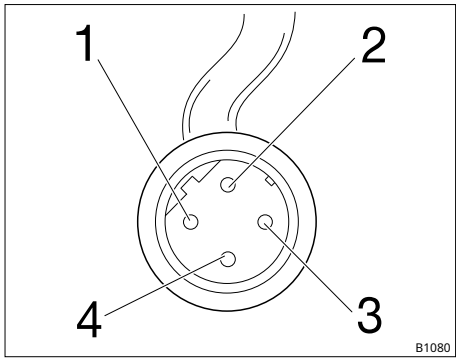


Fig. 15: Plug to "Config I/O" terminal, pin assignment

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. 5: Control via:

Switching element	Specification
Potential-free contact	Load: 0.5 mA at 5 V

Switching element	Specification
Semiconductor switch	Residual voltage < 2 V

Configured as an output

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

Tab. 6: .

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

No protection provided for inductive loads.

- Provide a free-running diode when controlling a relay.

9.2.2 "External control" terminal

The "External control" terminal is a 5-pin 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"

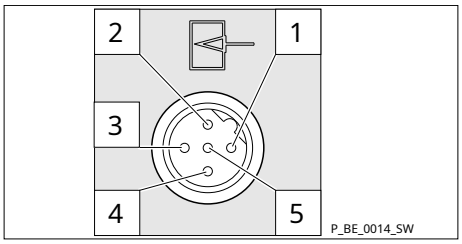


Fig. 16: Assignment on the pump

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)[1]

Data	Value	Unit
Input load, approx.	120	Ω

[1] 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.

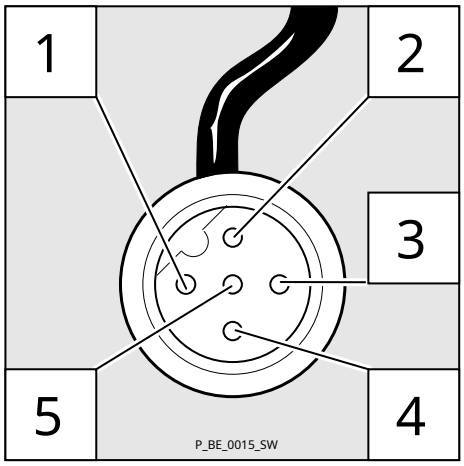


Fig. 17: Assignment on the cable

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.

"Analog" 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 with 2-stage level switch

Electrical interface

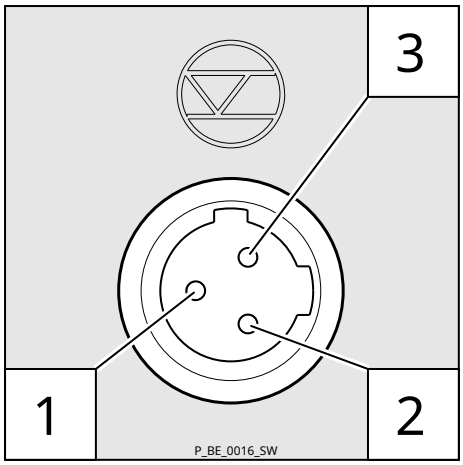


Fig. 18: Assignment on the pump

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)

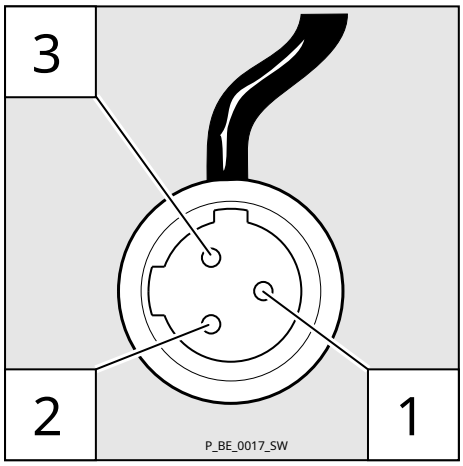


Fig. 19: Assignment on the cable

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

9.2.3.2 Suction lance with continuous level measurement

Electrical interface

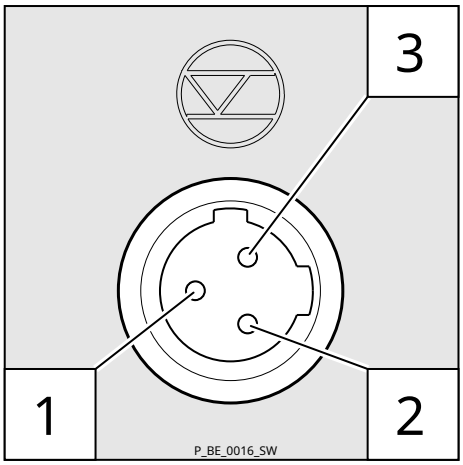


Fig. 20: Assignment on the pump

Pin	Designation	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)

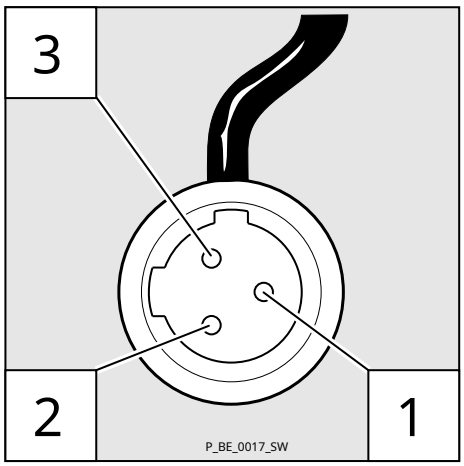


Fig. 21: Assignment on the cable

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

9.2.4 "Metering monitor" terminal

There is a connecting option for a metering monitor.

Electrical interface

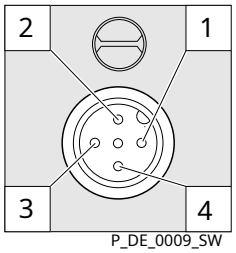


Fig. 22: Assignment on the pump

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

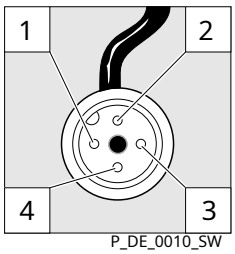


Fig. 23: Assignment on the cable

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 a connecting options for a diaphragm rupture indicator.

Electrical interface

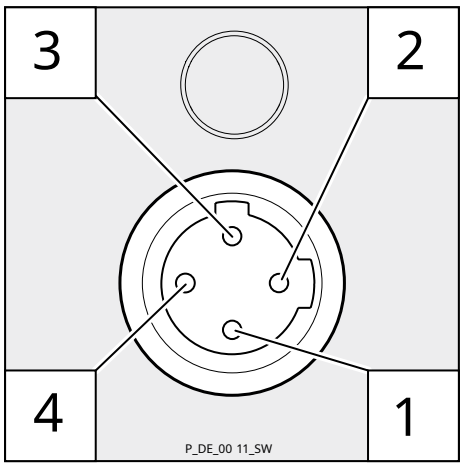


Fig. 24: Assignment on the pump

Specification	Value
Supply voltage, approx.:	+5 V, can be loaded to 20 mA (current limitation 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)

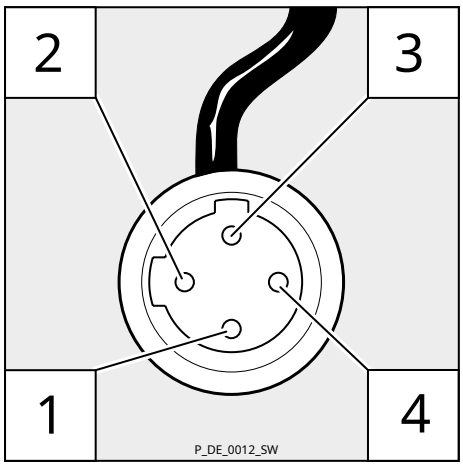


Fig. 25: Assignment on the cable

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. 7: gamma/ XL GXLa

Identity code	Designation	Type	Maximum voltage	Maximum current	Operational lifetime Min. switching operations
0	no relay	-	-	-	-
1	Fault indicating relay, N/C	Changeover contact	120 V AC	3 A	50 000
4	Fault indicating relay, N/C	N/C	24 V DC	1 A	50 000
	Pacing relay, normally open	N/O	24 V DC	100 mA	unlimited
C	4-20 mA current output	-	-	-	-
	Fault indicating relay, N/C	N/C	24 V DC	100 mA	unlimited
F	Automatic bleeding	Changeover contact	230 V AC	6 A	50 000
G	Automatic bleeding	N/O	24 V DC	1 A	50 000
	Fault indicating relay, N/C	N/C	24 V DC	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 *[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** (pacing relay)	The relay switches with every stroke.
Cycle quantity** (pacing relay)	The relay always switches when the set cycle quantity has been reached.

Menu setting	Effect
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	Action
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 closes 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 wished, 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.

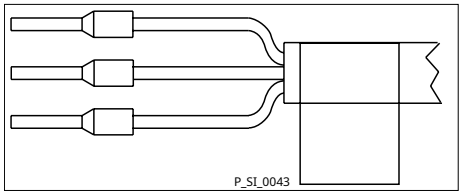


Fig. 26: Assignment on the cable

Identity code 1

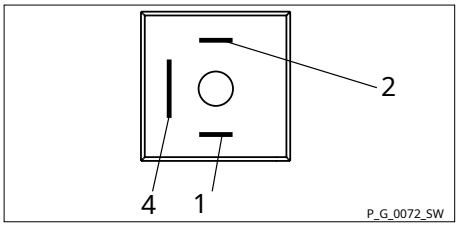


Fig. 27: Assignment on the pump

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 be ordered as options - 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 wished, 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.

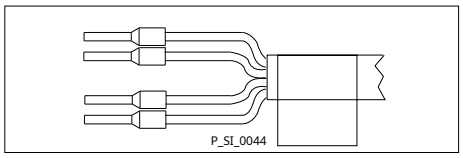


Fig. 28: Assignment on the cable

Electrical interface

for semiconductor switch pacing relay:

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

Identity code 4

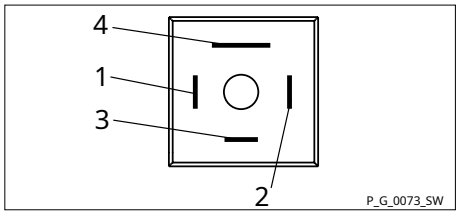


Fig. 29: Assignment on the pump

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 "Current output plus relay" output (identity code C)

A relay combined with a current output can be ordered as an option. The relay either switches 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 wished, 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.

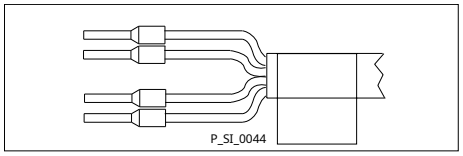


Fig. 30: Assignment on the cable

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 µA	0.4	V
Pacing pulse duration, approx.	100	ms

Identity code c

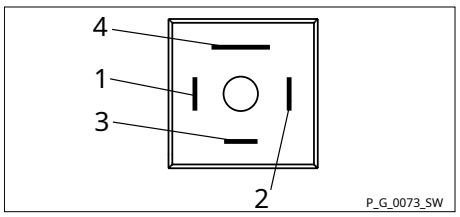


Fig. 31: Assignment on the pump

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. 32: Please read

Fig. 33 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

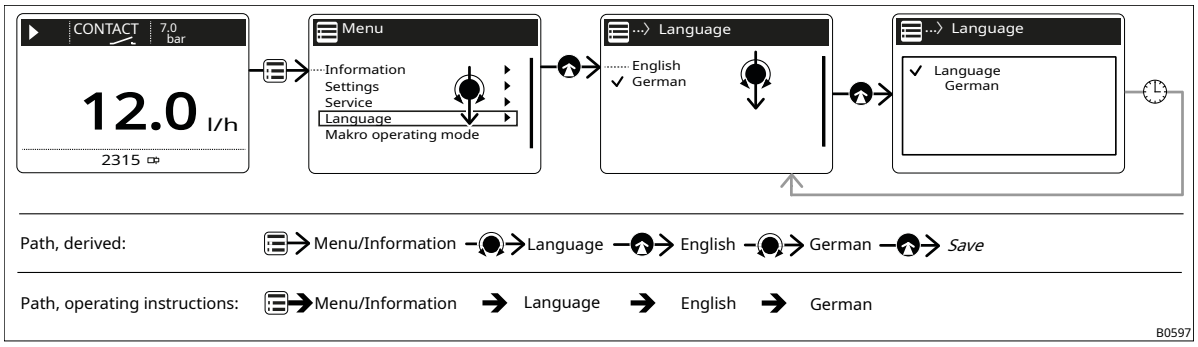


Fig. 33: "Setting up the language": As an example of set-up and path displays

Tab. 8: 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

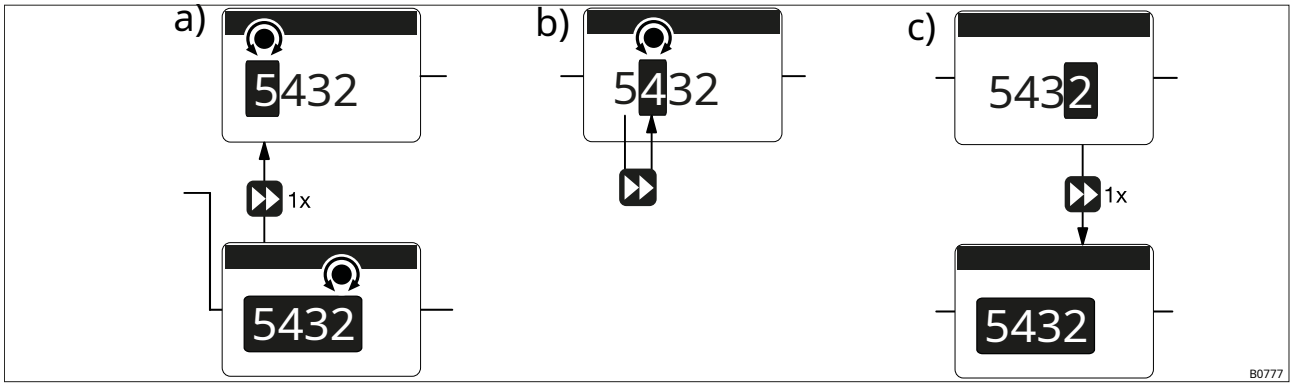


Fig. 34: a) Changing from one figure to its initial figures; b) Changing the figure; c) Returning from the last figure to the (complete) figure (to correct a wrong figure, for example).

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 Setting / *'Menu'*

- *Refer to the overviews covering "Operating/set up overview" and "gamma/ XL operating menu, complete" in the appendix and in the "Overview of equipment" - "Control elements" chapters by way of supplementary information.*
- *The pump exits the menu and returns to a continuous display if [Menu] is pressed or if 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 following setting menus are generally available in the *'Settings'* menu:

1 *'Operating mode'*
2 *'Automatic'*
3 *'Stroke length'*
4 *'Metering'*
5 *'Concentration'*
6 *'Calibrate'*
7 *'System'*
8 *'Inputs/outputs'*
9 *'Config I/O'*
10 *'Venting'*
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 lets you 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 a 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 *[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)
Step-up*			
	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)
Step-down**			
	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. 9: * Explanation of step-up*

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. 10: ** 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'*)

The same applies to the *'Metering volume'* as 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 preselect 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.

The maximum batch time that can be set is 10 000 s.

The maximum possible batch in automatic mode is the feed rate (in litres or gallons) that the metering pump can meter in 10,000 seconds at maximum capacity.

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] *[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 *'Analog'* (option)

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

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 "Linear curve" symbol 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 (I1, F1) and P2 (I2, F2) (F1 is the stroke rate at which the pump is to operate at current I1, F2 is the stroke rate at which the pump is to operate at current I2...); this defines a straight line and thus the behaviour is specified:

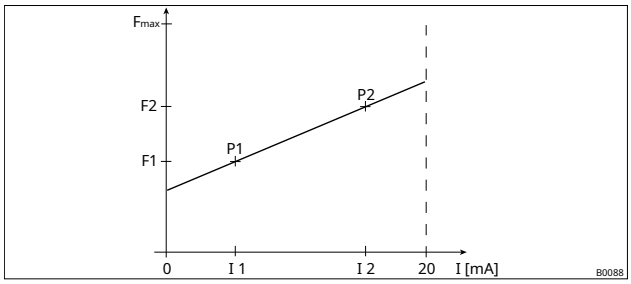


Fig. 35: Frequency-current diagram for "Linear curve"

Plot a diagram similar to the one above – with values for (I1, F1) and (I2, F2) – so that you can set the pump as desired!

The smallest processable difference between I1 and I2 is 4 mA (ll I1-I2 ll ≥4 mA).

Error processing

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

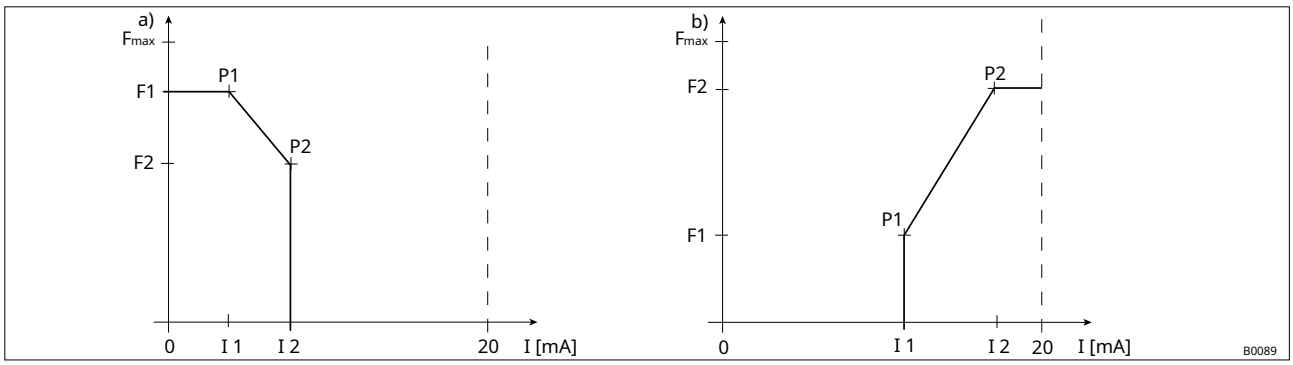


Fig. 36: Frequency-current diagram for a) Lower side band, b) Upper side band

'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 processing.

11.2.2 *'Automatic'*

➔ *'Menu / Information → Settings → Automatic → ...'*

The *'Automatic'* menu lets you set whether the unit is to meter automatically or conventionally.

'Automatic' - 'on' lets 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. 11: 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 via 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 Metering

➔ *'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 users can set the optimum discharge stroke for their 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 a fast discharge stroke.
C.	*'very fast'*	For a super-fast discharge stroke.
D.	*'sine mode'*	The duration of the discharge stroke is dependent on the stroke rate for a long, sine-shaped discharge 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.

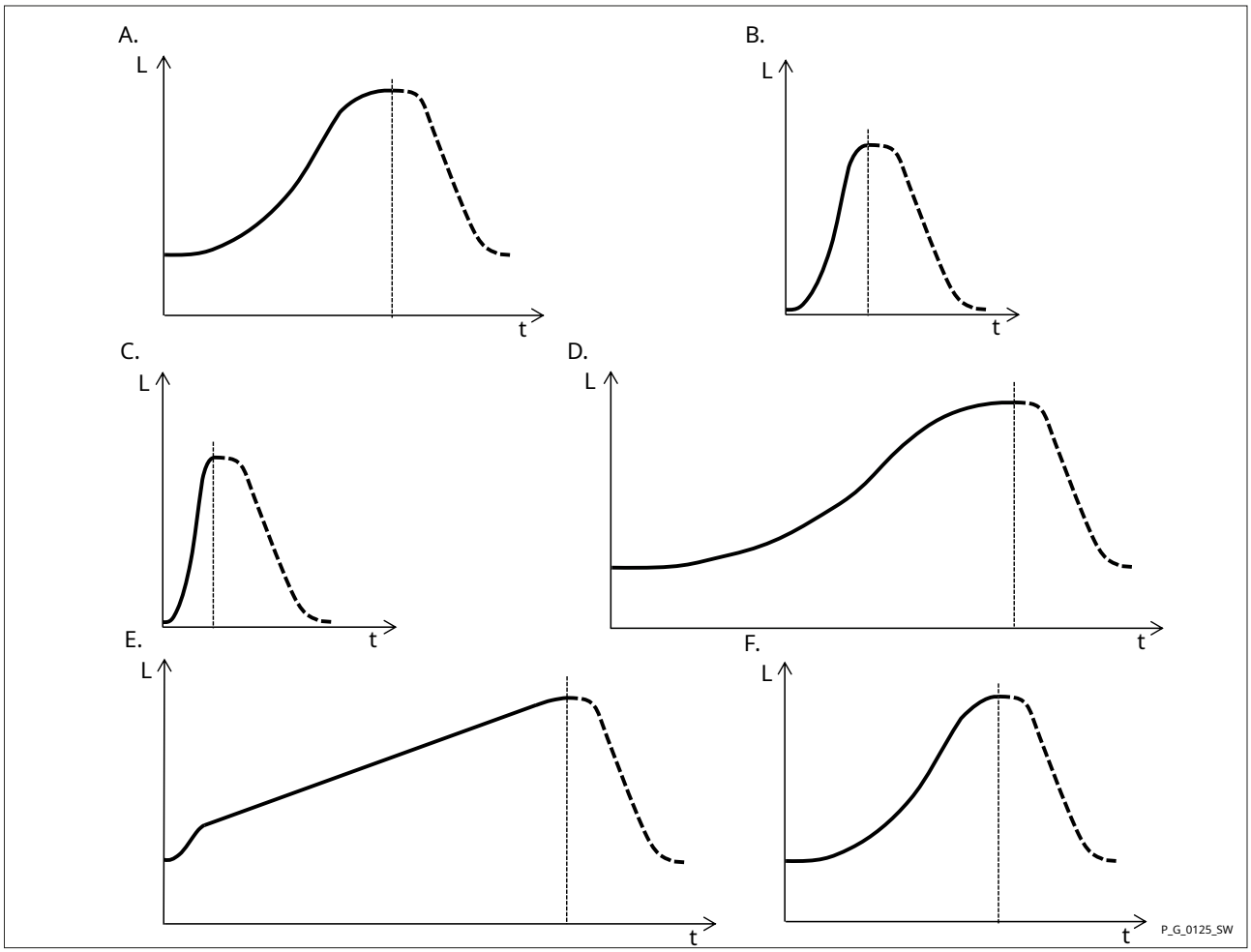


Fig. 37: Discharge stroke metering profiles with stroke L and time t (suction stroke shown as a dotted line)

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 gas-

eous feed chemicals, the slow suction stroke prevents cavitation and consequently increases dosing precision.

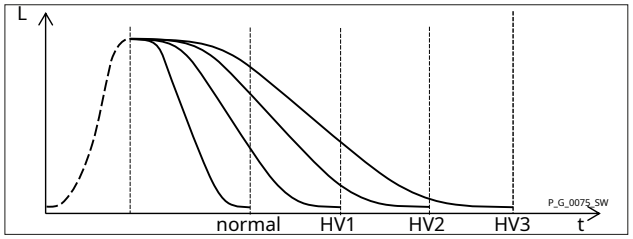


Fig. 38: Suction stroke metering profiles with stroke L and time t

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 rating'*

➔ *'Menu / Information → Settings → Metering → Pressure rating → ...'*

You can use the programmable *'Pressure rating'* 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 rating - see .

Tab. 12: Nominal pressures depending on the size of the liquid ends and the pressure ratings

Pressure rating /	**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 rating plus 10 ... 20%.

11.2.4.4 *'Monitoring'*

☰ ➔ *'Menu / Information → Settings → Metering → Monitor → ...'*

11.2.4.4.1 *'Air lock'*

☰ ➔ *'Menu / Information → Settings → Metering → Monitor → 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 *'Sensitivity air detect'*

☰ ➔ *'Menu / Information → Settings → Metering → Monitor → Sensitivity air detect → ...'*

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

Tab. 13: There are 3 levels of sensitivity:

normal	maximum sensitivity
medium	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 when 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 kg/l ≙ g/cm³)
- 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 ≙ g/cm³)
- 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. 14: Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Flow in m^3/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 kg/l ≙ 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 kg/l ≙ g/cm³)
- 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. 15: 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 ≙ g/cm³)
- 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 ≙ g/cm³)
- 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. 16: 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 kg/l ≙ g/cm³)
- 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 ≙ g/cm³)
- 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. 17: Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Max. flow in m^3/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 Calibrate

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

Calibration - precision

Normally the pump does not need to be calibrated.

However, the pump should be calibrated for precise metering.

With individual pumps in the product range, the dosing rate can systematically deviate from the specified dosing rate by -5% to +10%. A reproducibility of ±1% from the specified dosing rate remains as a deviation after calibration.

Calibration influences the menu

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

Calibrate using Calibr. factor

If you already know what calibration factor is needed for the pump to achieve the desired accuracy, go to *'Calibrate'-'Calibr. factor'* and enter the appropriate calibration factor as a %.

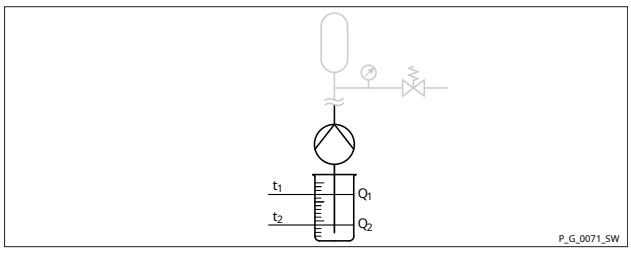
Calibrating using a calibration procedure

If you do not know which calibration factor you need, use this calibration procedure.

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!

Please only calibrate using the suction hose – as shown here.



Preparation

1. Use the *[Clickwheel]* to scroll through the continuous displays 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 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 pressure tube is permanently installed (operating pressure, ...!).
5. Prime the feed chemical (press ⏩ *[Priming]*) if the suction hose is empty.

Calibration procedure

1. Record the level in the measuring cylinder.
2. Select the *'Menu / Information → Settings → Calibrate → Calibrate'* menu and press the *[Clickwheel]*.
   ➡ The *'Start calibration'* (PUSH) menu item appears.
3. Press the *[Clickwheel]* to start calibration.
   ➡ The *'Calibrate ...'* menu item appears, the pump starts to pump and indicates the number of strokes.
4. Use the *[Clickwheel]* to stop the pump after a reasonable number of strokes (a minimum of 200).
   ➡ The *'Calibrate ended'* menu item appears. You are now asked to enter the calibration volume.
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 *'Calibrate 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 *[STOP/START]* key" mode. It can only be started by pressing STOP/START *[STOP/START]*.
'always on'	The pump always starts immediately.

Start behaviour	Description
'last status'	The pump always adopts the last status it had before the supply voltage was switched off.

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

11.2.8 Inputs/outputs

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

The *'Inputs/outputs'* menu is split 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'* (optional)

7 *'Level monitoring'*

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 → ...'

gamma/ XL, GXLa

Tab. 18: Relay, physical and pre-set to ...

Identity code specification	Relay, physical	Pre-set to ...
1	1 x changeover contact 120 V – 3 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.
Error	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 status 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 status 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.

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 closes with a triggering event. (N/O)

Relay polarity

You can set here how a relay is to switch.

11.2.8.3 *'Relay2 (optional)'*

☰ ➔ *'Menu / Information → Settings → Inputs/ outputs → Relay2 → ...'*

Relay cycle volume

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

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' *'4...20 mA'*	*'Strokes / hour'*	-	*'No change'*	-	-
			'Behaviour, mA output'	*'Passive'* *'Error'* *'Warning'* *'Warning + error '* *'Warning + error + stop'* *'Bleeding'*	*'Passive'* *'Error'* *'Warning'* *'Warning + error '* *'Warning + error + stop'* *'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 *'Liter/Hour at 20mA'*: Select the capacity (Litre / hour) in the *'Capacity at 20 mA'* display, which is to be used for 20 mA (thereby scaling your mA range).
4. In the *'Behavior mA output'* display, select whether the mA output is to signal something or not (*'No change'*).
5. In the *'Behavior 23 mA'* display, select which pump behaviour the mA output is to signal by 23 mA. *'Behavior 3.6 mA'* acts in a similar way.

The behaviour selected under 'Behavior 23 mA' has a higher priority when signalling than the one selected under 'Behavior 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 are only available 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 monitoring'*

☰ ➔ *'Settings → Inputs/outputs → Level monitoring → ...'*

Select the measuring principle to be used for level monitoring in the *'Level monitoring'* menu:

- *'2-stage'*
- *'continuous'*
- *'DULCOLEVEL'*

11.2.8.8.1 2-stage

In the *'Level warning'* sub-menu, you can select for a 2-stage level switch whether the pump switches to *'Level warning'* with a *'Normally closed'* or *'Normally open'* input contact signal.

In the *'Level error'* sub-menu, you can select for a 2-stage level switch whether the pump switches to *'Error'* with a *'Normally closed'* or *'Normally open'* input contact signal.

11.2.8.8.2 Continuous

Calibrate

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

Continuous level measurement can be calibrated in the *'Calibrate'* sub-menu.

Electrodes

'Electrodes' can be calibrated in this sub-menu – this is a step that is not normally necessary. You can try to get level measurement running if the feed chemical has a dielectric constant ε_r below 30.

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

Perc. liquid level

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

1. Select *'Perc. liquid 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 of the menu.
4. Check whether the level gauge is working as expected.

Configuration

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

1. Enter the *'Level warning threshold'* as a % and press the *[dial]*.
2. Enter the *'Level fault threshold'* as a % and press the *[dial]*.

3. Select the *'Liquid level unit'* for the "continuous level" secondary display: select *'Percent'* or *'Litre'* and press the *[dial]*.

11.2.8.8.3 DULCOLEVEL

This displays the liquid level value, as detected by the DULCOLEVEL sensor.

The DULCOLEVEL is a radar sensor, which communicates with the pump by Bluetooth.

The tank liquid level measured by the radar sensor can be displayed in the secondary display.

If the metering pump loses its Bluetooth connection to the sensor, then the "???" appears in the secondary display for the value.

Configuration and commissioning of the DULCOLEVEL sensor is done solely through the DULCONNEX Blue app.

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 14*) socket 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 stroke met., Air in 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 (retrofittable), 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 *[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 state when the pump is to change to and from *'Summertime'*.

Check under *'Location'* whether the pump is also set to your *'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 section in full to gain an overview. You will then understand the timer better when working through the section.*

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

- 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
- Have 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 state'* then shows *'Inactive'*.

→ To activate the timer, set *'Activation'* to *'active'*.

➡ The first line of the timer menu *'Timer state'* 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 status 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 Clear individual program line (*'Clear'*)
(5 Clear the entire program (*'Clear all'* one level higher))

CAUTION

The pump does not perform any plausibility check.

Before using, please ensure that the timer actually does what you expect it to do. 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 on 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 Reprogramming program line (*'new'*)

CAUTION

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

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

11.3.2.1.1 Principle construction 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

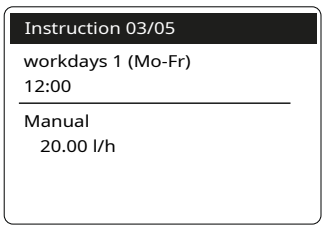
This corresponds to the following instruction:

`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:



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'* operating mode at 20.00 l/h.

Tab. 19: Time events (triggers)

Time events (triggers)	Description	Remark
Time	Switching time reached	For more information - see ➦ *Chapter 11.3.2.1.3 'Selecting cyclic time events and switching point' on page 75*
'Init'	Thus declared is started at the beginning of the program process	Defines starting conditions - see ➦ *Chapter 11.3.2.1.2 "Init' Initial conditions' on page 74*
'Delayer'	Delay time of delayer D: xx expired	-
'Config I/O' input	0/1 contact at input I: x	Socket 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. 20: Action

Action	Description	Value
'Manual'	Switch over in this operating mode	Litre/h (*'Dos. capacity'*)
'Manual'	Switch over in this operating mode	Litre/h *1 (*'Dos. capacity'*)
		Strokes/h *2 (*'Metering rate'*) + *'Stroke length'*
'Halt'	Stop pump	--
*'Relay1 **'*	Have the relay switch to status ...	open closed
*'Relay2 **'*	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. 21: Selected value ranges

Designation	Value range
Line numbers	01 ... 99
Day (date)	01 ... 28
Time of day (hours)	00 ... 23

Designation	Value range
Seconds	0001 ... 9999
No. of delayer D:	01 ... 15

11.3.2.1.2 *'Init'* Initial conditions

The triggering event *'Init'* can be used to set initial conditions 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 power supply on), *'Init'* sets *'Relay 2'* to *'closed'* and the *'Operating mode'* to *'Contact'*.

11.3.2.1.3 Selecting cyclic 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. 22: 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 day 01 – 28



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 lets you 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	-	Halt	-
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	Halt	-
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 ±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'* socket can be a triggering event.

Example

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

The example means:

If a 0/1 contact signal is closed between pin 1 of the *'Config I/O'* socket 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'* socket 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 between pin 3 of the *'Config I/O'* socket 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	Halt	-
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 80.*
- *The timer program can have a maximum of 99 program lines.*

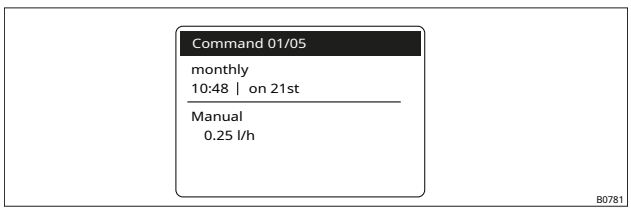
11.3.2.3 Check program lines (*'Show'*)

➔ *'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 72* 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 80*).

11.3.2.5 Clear individual program lines (*'Clear'*)

☰ ➔ *'Menu / Information → Timer → Set timer → Clear'*

1. Use the *[Clickwheel]* to select the required program line / instruction according to its number.
2. The program line will be cleared as soon as you press the *[Clickwheel]*.
   ➥ The timer software re-sorts the remaining programme lines (Rules - see ➦ *'Sorting sequence' on page 80*).

Clear all program lines

The option to clear 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 (possibly set under *'Settings → Set time → Time'*. Only possible with *'Timer state'-'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' 'Mode'* for 10 min at a *'Dos. capacity'* of 12,000 l/h. A *'Dos. 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. 23: 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	Halt	-	Halt
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	Halt	-	Halt
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	Halt	-	Halt

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 state'* 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 state'* 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 with this as it 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 'Clear' to select the program line and clear*
- *or clear 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 parameter	Action	Additional parameter	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" socket, 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" socket, 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 at "Config I/O" socket, this starts delayer 3
04	Init		Halt		Pump stops as soon as the timer is acti-vated
05	Delayer 1	after 60 sec	Close Config I/O 2		Pins 2 and 4 of the "Config I/O" socket 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	Halt		Pump stops after 180 s

Com-mand	Time event	Additional parameter	Action	Additional parameter	Comment
08	Delayer 3	after 180 sec	Open Config I/O 2		Pins 2 and 4 of the "Config I/O" socket 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 shorter 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 clears 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" socket

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" socket or issue up to 3 contact signals as outputs (total of inputs + outputs = 3).

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

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

Status as soon as the programmed pump is connected to the power supply:

The timer software now generates the status of the pump which the pump would have precisely had at this time if it had not been disconnected from the power supply.

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 is maintained for up to 100 years).

The time is retained without power supply 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 clears 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" socket.	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.
The timer does not set a Config I/O output.	Config I/O was not configured as "Timer" - "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 the power supply 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 - precisely to the second.

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 status of the pump which the pump would have precisely had at this time if it had been set to *'active'* without any interruption.

This does not relate to delayed, linked actions.

The initial commands (*'Init'*) can be used to program a defined switch-on status. Initial commands have priority over time commands.

Outputs

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

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

Inputs

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

Delayer

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

11.4 *'Service'*

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

11.4.1 *'Access protection'*

☰ ➔ *'Menu / Information → Service → Access protection → ...'*

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
'Lock all +' [1)]	X	X

[1)] Everything is locked except for the Start/Stop key

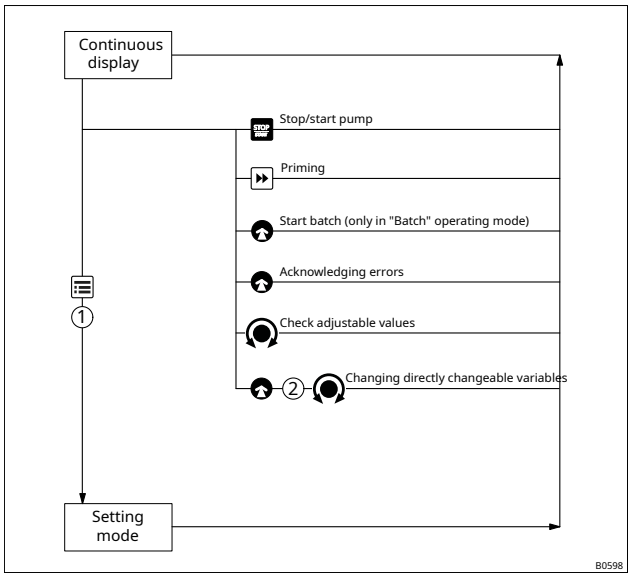


Fig. 39:

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 counters'*

➔ *'Menu / Information → Service → Clear counters → ...'*

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

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

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

The values have increased since commissioning 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 gamma/ XL metering pump with Bluetooth functionality can display a more extensive log file with pump-related events and you can email 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 change 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 by selecting *'Yes'*.

The password is the last 4 digits of the serial number.

11.4.8 Diaphragm part number: XXXXXXX

☰ ➔ *'Menu / Information → Service → Diaphragm part number: XXXXXXX → ...'*

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

11.4.9 Spare parts kit part number: XXXXXXX

☰ ➔ *'Menu / Information → Service → Spare parts kit part number: XXXXXXX → ...'*

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

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 person trained on 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 lengthen or shorten the priming time during priming.

Start 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.

Check adjustable variables

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

Changing directly adjustable 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 gamma/ XL' on page 87*, 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 gamma/ XL

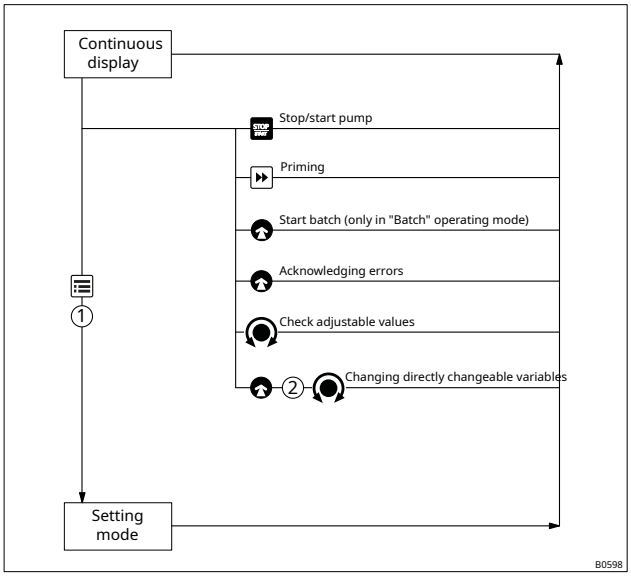


Fig. 40: Control options using keys and locking options

Press *[Clickwheel]*
Turn *[Clickwheel]*
① "Lock menu"
② "Lock all"

13 Bluetooth control

13.1 Description of Bluetooth functionality

The metering pump gamma/ X with Bluetooth functionality can largely be wirelessly controlled and monitored via a Bluetooth-capable Android or Apple IOS smart device using the “DULCOnneX Blue” app. A log file containing pump-related events can also be displayed and e-mailed. The app can also be used to save and then restore the pump configuration. Or update the pump. The pump configuration can also be e-mailed. There are also many other functions that are being continuously extended.

Specific information must be stated in certain countries:

Country	Information
USA:	Contains FCC ID: QOQGM210P This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: ■ Reorient or relocate the receiving antenna. ■ Increase the separation between the equipment and receiver. ■ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. ■ Consult the dealer or an experienced radio/TV technician for help.
Canada:	Contains IC: 5123A-GM210P This Class B digital apparatus complies with Canadian ICES-003. Contiens IC: 5123A-GM210P Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.
Japan:	
Korea:	R-CBGT-GM210P

13.2 Safety



CAUTION

Danger from hackers

The user must guarantee the IT security of their smart device (smartphone, tablet, ...) to ensure that the metering pump cannot be controlled by hackers.



CAUTION

Change the temporary *'password'* in the pump menu under *'Settings → Service → Password'*.



CAUTION

Only download the "DULCONNEX Blue" app from the "Google Play Store" or the "Apple App Store" - not from other sources.



CAUTION

Do not modify the unit.

In particular do not increase the size of the aerial.

Qualification of personnel

Personnel must:

- Be familiar with Android or Apple IOS smart devices.
- Have read and understood the pump operating instructions and these operating instructions as well.

Licences for Bluetooth metering pumps

The Bluetooth metering pump can be operated licence-free in the following countries:

Belgium, Denmark, Germany, Estonia, Finland, France, Greece, Great Britain, Ireland, Italy, Canada, South Korea, Japan, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Austria, Poland, Portugal, Sweden, Switzerland, Slovakia, Slovenia, Spain, the Czech Republic, Hungary, the USA and Cyprus.



CAUTION

For all other countries:

Check whether the operation of Bluetooth metering pumps is permitted in the country in question. If necessary, please contact the ProMinent head office.

Emissions



WARNING

The Bluetooth metering pump is not designed for applications in which interference from or by the metering pump can lead to fatal injury or serious personal injury.



WARNING

The Bluetooth metering pump can cause interference to or even destroy radio and television frequencies.

It is essential that you avoid this.

– For remedies, refer to the "Troubleshooting" chapter.

Start up the unit in accordance with the official start-up instructions:

This unit complies with Part 15 of the FCC Regulations. The following 2 conditions must be fulfilled for operation: (1) This unit should not cause any hazardous interference, and (2) this unit should tolerate all interference, including interference that can cause unwanted operation.

13.3 Requirements

Prerequisites for operation:

- Metering pump gamma/ X with Bluetooth functionality (identity code characteristic "Remote stop / Remote control" = "B, with Bluetooth")
- The metering pump gamma/ X has been fully electrically and hydraulically installed
- Bluetooth-capable Android or Apple IOS smart device
- Apple-only: Pump production date - April 2021 and later required
- Only for transmission of log files and downloading the app: The smart device must have access to the internet.
- "DULCOnneX Blue" app can be downloaded free of charge from the "Google Play Store".
- "DULCOnneX Blue" app can be downloaded free of charge from the "Apple App Store".



Fig. 41: QR code for downloading the "DULCOnneX Blue" app from the "Google Play Store" (➥ https://play.google.com/store/apps/details?id=com.prominent.ngap)



Fig. 42: QR code for downloading the "DULCOnneX Blue" app from the "Apple App Store" (➥ https://apps.apple.com/de/app/dulconnex-blue/id1559249540)

CAUTION

Only download the "DULCONNEX Blue" app from the "Google Play Store" or the "Apple App Store" - not from other sources.

13.4 Establishing a Bluetooth connection

To establish a Bluetooth connection between the metering pump and the smart device:

1 Enable Bluetooth functionality on both units

2 Initiate a search for Bluetooth devices nearby on the smart device

3 Couple the smart device to a pump that has been found

4 Connect the smart device to a pump that has been found

13.4.1 Enable Bluetooth functionality on both units

1. *The 'System' menu only appears if [Start/Stop] has stopped the metering pump.*

   Enable Bluetooth functionality on the metering pump:

   'Settings → System → Bluetooth enabled'

   ➥ The blue Bluetooth LED flashes and the Bluetooth symbol appears on the display.

2. Enable the Bluetooth function on the smart device - refer to the operating instructions for your smart device.

13.5 Further information / functions

13.5.1 Bluetooth LED signal code

LED	Meaning
lit	The Bluetooth function on the metering pump is switched to *'active'* and the metering pump has a connection to a smart device.
flashes slowly	The Bluetooth function on the metering pump is switched to *'active'* but the metering pump does not have a connection to a smart device.
flashes quickly for 5 s	The user uses the app to try to find the Bluetooth metering pump that the user wishes to control amongst several Bluetooth metering pumps - see ➦ *Chapter 13.5.2 'Finding a metering pump amongst several metering pumps' on page 91*.
off	■ The Bluetooth function on the metering pump is switched to *'inactive'*. ■ The metering pump is disconnected from the mains/power supply.

13.5.2 Finding a metering pump amongst several metering pumps

The "DULCOnneX Blue" app can help users to find a specific metering pump amongst several metering pumps:

Valid coupling

A coupling must have been made in the past and still be applicable to be able to use the identification function.

→ Press the identification button in the app - *Fig. 43*.

➡ The blue Bluetooth LED on the metering pump searched for flashes for 5 seconds.

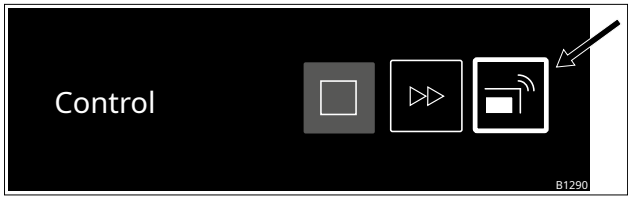


Fig. 43: Identification button (arrow)

13.6 Troubleshooting

Fault description	Cause	Remedy
The metering pump does not start although I have pressed the slide switch in the app.	The metering pump has been stopped using *[Start/Stop]* or a fault is pending.	Use *[START/STOP]* to start the metering pump. Rectify the fault.
The metering pump and other devices are interfering with each other.*	The WiFi signal from the smart device is interfering with the connection.	Switch off WiFi on the smart device.
	Interference with other devices is causing a problem.	Change the orientation of the metering pump until the problems disappear. Change the installation site of the metering pump until the problems disappear. Connect the metering pump and the devices experiencing interference to different power circuits. Call in a high-frequency engineer.
	Other devices are interfering with the Bluetooth connection to the metering pump.	Increase the gap between the devices and the metering pump.

* Confirm or cancel this by switch the Bluetooth metering pump on and off.

13.7 Extract EC / EU Declaration of Conformity gamma/ X with Bluetooth

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 in the following, 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 distributed by us.

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

Tab. 25: Extract from the EC / EU Declaration of Conformity

Designation of the product:	Metering pump, gamma/ X product range	
Product type:	GMXa _ _ _ _ _ _ _ _ _ _ _ _U _ _ _ Y _ B Y = 0, 3, 4, 5	
Serial number:	see nameplate on the device	
Relevant EC directives:	Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive according to Appendix I, No. 1.5.1 of the Machinery Directive RoHS- Directive (2011/65/EU) R&TTE Directive (1999/5/EC)	
	up to 19.04.2016 EMC - Directive (2004/108/EC)	from 20.04.2016 EMC Directive (2014/30/EU)
Harmonised standards applied, in particular:	EN ISO 12100:2010 EN 809:1998 + A1:2009 + AC:2010 EN 61010-1:2010 EN 61000-6-3:2007 + A1:2011 EN 61000-6-2:2005 EN 300 328 V1.8.1:2012 EN 50581:2012	
Date:	21.03.2016	

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

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

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

14.1 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 leaktight.	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
Green LED display (operating indicator) not lighting up.	The wrong power supply or no power supply is connected.	The specified power supply as per the voltage specification can be found on the nameplate.	Electrician

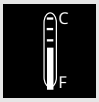
14.2 Fault with error message / log book

14.2.1 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. An error number which clearly identifies the error can be found in the log book.
- The pump stops.

No.	Symbol	Message	Cause	Remedy	Personnel
0		System error	The pump is not capable of operation as something is wrong with the configuration.	Reset the pump to factory settings. Return the pump to ProMinent.	
1		Input signal < 4 mA	The control current has fallen below 4 mA when current monitoring is switched on.	Eliminate the cause of the low control current or Switch the programming of the fault behaviour to *'off'*.	Technical personnel

No.	Symbol	Message	Cause	Remedy	Personnel
2		Input signal > 20 mA	The control current has fallen below 20 mA when current monitoring is switched on.	Eliminate the cause of the high control current or Switch the programming of the fault behaviour to *'off'*.	Technical personnel
3		Level error	The level switch input reports no feed chemical.	Top up feed chemical. Check the level cable. Check the suction lance. Check whether the right type of suction lance is set up.	Technical personnel
4		Diaphragm rupture	The diaphragm rupture sensor reports a diaphragm rupture.	Check and, if necessary, replace the diaphragm. Check the diaphragm cable.	Technical personnel
5		Metering defective strokes	The number of defective strokes permitted has been exceeded.	Check whether the pump is pumping medium. If there is air in the dosing head: check the tank and suction line. Check the metering monitor cable. Check the configuration of the metering monitor.	Technical personnel
6		Sensor error	Missing or faulty sensor.	Return the pump to ProMinent.	
7		Temperature	The ambient temperature is too high or too low.	Check the installation site of the pump. Check the pump settings.	Technical personnel
8		Initialisation	Pump restart, initialisations incomplete.	Perform a restart. Reset the pump to factory settings.	
9		Solenoid not connected	Check the connection to the solenoid.	Return the pump to ProMinent.	
10		Parameter wrong	Parameter was set incorrectly.	Correct the parameter.	Technical personnel

No.	Symbol	Message	Cause	Remedy	Personnel
11		Overload	The pump has detected too high a back pressure.	Check whether the system pressure is within the defined range. Check whether the pressure stage is correctly set. Check whether there might be a possible blockage. Check the sizing of the pressure line.	Technical personnel
12		Overload	The current is too high.	Check whether the pressure line is free. Check whether the head is mounted correctly. Check whether the pressure is too high in the metering line.	Technical personnel
13		Supply voltage	The supply voltage is too high or too low or not connected.	Rectify the cause.	Technical personnel
14		Air in the dosing head	Air in the dosing head.	Check the hydraulic line. Check if there is air in the dosing head. Vent the liquid end. Adjust the sensitivity settings. Switch off air detection, if necessary.	Technical personnel
15		Calibration unsuccessful	Calibration unsuccessful.	Check the hydraulic line. Check if there is air in the dosing head. Vent the liquid end. Adjust the sensitivity settings. Switch off air detection, if necessary.	Technical personnel

No.	Symbol	Message	Cause	Remedy	Personnel
16		Memory overload	A memory overload has been reached when the memory is switched on in "Batch" or "Contact" operating mode.	Check whether it is plausible that so many contacts have cumulated. Check whether the capacity or stroke rate is set too low. Check the step-up factor of the contacts.	Technical personnel
17		Control signal < Imin	The control current is < Imin when current monitoring is switched on.	Eliminate the cause of the low control current or Switch the programming of the fault behaviour to *'off'*.	Technical personnel
18		Control signal > Imax	The control current is < Imin when current monitoring is switched on.	Eliminate the cause of the high control current or Switch the programming of the fault behaviour to *'off'*.	Technical personnel
20		Module missing	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.	
21		Module communication	Missing connection to the optional module (Bus failure e.g. Profibus or CANopen not enabled)	Check the configuration of the field bus module. Check the configuration of the control unit. Check the cabling.	Technical personnel
22		Internal CAN bus	The associated heartbeat message was no longer received by the power assembly or the control part for a certain period of time.	Reset the pump to factory settings. Return the pump to ProMinent.	Technical personnel
23		Error versions	The version of the "Control assembly" firmware is not compatible with the "Power unit" firmware and / or the "HMI data" version.	Return the pump to ProMinent.	Technical personnel
24		Power system error	The pump is not capable of operation as something is wrong with the configuration.	Reset the pump to factory settings. Return the pump to ProMinent.	Technical personnel

No.	Symbol	Message	Cause	Remedy	Personnel
25		Init Power	Initialisations are incomplete after a pump restart.	Re-start the pump. Reset the pump to factory settings.	Technical personnel
26		Stroke error	The stroke monitor shows that the stroke was not fully completed.	Check the suction-side connector. Check the pressure-side connector. Check whether the dosing head is mounted correctly.	Technical personnel
27		Radar sensor	The radar sensor is not reporting.	Check whether Bluetooth is enabled on the pump. Restart the pump and sensor. Check the power supply of the radar module. Check whether the radar sensor has been assigned via the app to the pump.	Technical personnel
28		MVM level	Upper/lower transgression range with Measure Value Mapping.	Check whether the task is plausible. Check whether the configuration is correct. Check whether the configuration of the MVM input is correct. Switch off, if necessary.	Technical personnel

14.2.2 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.

No.	Symbol	Message	Cause	Remedy	Personnel
0		Level warning	The level switch input reports no feed chemical.	Top up feed chemical. Check the level cable. Check the suction lance.Check the water supply. Check whether the right type of suction lance is set up.	Technical personnel
1		Diaphragm rupture	The diaphragm rupture sensor reports a diaphragm rupture.	Check and, if necessary, replace the diaphragm. Check the diaphragm cable.	Technical personnel
2		Metering defective strokes	The number of defective strokes permitted has been exceeded.	Check whether the pump is pumping medium. If there is air in the dosing head: check the tank and suction line. Check the metering monitor cable. Check the configuration of the metering monitor.	Technical personnel
3		Invalid metering volume	The metering volume cannot be metered.	Check the parameters for concentration metering. With Contact mode: Check whether the contact interval is coming too quickly.	Technical personnel
4		Invalid parameter	Parameter is invalid.	Check the stroke length and metering time. Check the metering volume. Check the capacity.	Technical personnel
5		Fan warning	The fan is faulty or not connected.	Return the pump to ProMinent.	Technical personnel
6		System warning	An incorrect solenoid assignment was detected.	Reset the pump to factory settings. Return the pump to ProMinent.	

No.	Symbol	Message	Cause	Remedy	Personnel
7		Air in the dosing head	Air in the dosing head.	Check the hydraulic line. Check if there is air in the dosing head. Vent the liquid end. Adjust the sensitivity settings. Switch off air detection, if necessary.	Technical personnel
8		Overload	The pump has detected too high a back pressure.	Check whether the system pressure is within the defined range. Check whether the pressure stage is correctly set. Check whether there might be a possible blockage. Check the sizing of the pressure line.	Technical personnel
9		Dosing rate too low	The dosing rate cannot be metered.	Increase the required dosing rate.	Technical personnel
10		Negative pressure	The pump has detected too low a back pressure.	Check whether the system pressure is within the defined range. Check whether the pressure stage is correctly set. Check the metering hose.	Technical personnel
11		Cavitation	The pump has detected cavitation.	Adapt the HV level to the medium. Check the suction hose.	Technical personnel
12		The wrong module is fitted		Fit the module to match the identity code. Update the pump.	Technical personnel

No.	Symbol	Message	Cause	Remedy	Personnel
13		Radar sensor	The radar sensor is not reporting.	Check whether Bluetooth is enabled on the pump. Restart the pump and sensor. Check the power supply of the radar module. Check whether the radar sensor has been assigned via the app to the pump.	Technical personnel
14		MVM level	Upper/lower transgression range with Measure Value Mapping.	Check whether the task is plausible. Check whether the configuration is correct. Check whether the configuration of the MVM input is correct. Switch off, if necessary.	Technical personnel

14.2.3 Event messages in the log book

Tab. 26: Events

Log book no.	Description
0	Head change is active – dongle was inserted.
1	Parameter menu called up – dongle was inserted.
2	Air gap measured – dongle was inserted.
3	Too high current was detected but no fault message generated.
5	Automatic bleed was active.
7	The pump was reset to factory settings.
8	The pump was calibrated.
9	*[START/STOP]* was pressed.
10	*[Priming]* was pressed.
11	The *[Clickwheel]* was pressed.
12	The diaphragm was replaced.
13	The timer has performed an action.
15	Solenoid identification was performed.

Log book no.	Description
16	A 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
17	Overloading has been detected. *Log book:* [00 PP zz ii] PP – Solenoid power [W] zz – Uzk [V] ii – Solenoid current [* 100 mA]
18	The metering volume cannot be metered. In *'Contact'* operating mode, e.g. by too fast a contact sequence.
19	The pump has been booted and is operational.
21	An SDO request to the power unit was unsuccessful. Explanatory data: [01 00 00 00] – When reading the maximum capacity [02 00 00 00] – When reading the maximum volume per stroke [04 00 00 00] – When reading the minimum possible volume per stroke [08 00 00 00] – When reading a standard SDO request

14.2.4 Log book entry - Detailed view

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

Tab. 27: 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)

14.2.5 All other errors

Please contact the responsible ProMinent branch or representative!

15 Maintenance



WARNING

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



CAUTION

Warning of feed chemical spraying around

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

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



NOTICE

Third-party spare parts for the pumps can lead to 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.

15.1 Overview of maintenance work

Task	Personnel	Interval
Visual check for damage. See check-list ➦ *Tab. 28 'Check-list' on page 105*.	Technical personnel	Quarterly
Check standard liquid end. See ➦ *Chapter 15.1.2 'Maintenance work - standard liquid end' on page 106*	Technical personnel	Quarterly
Check liquid end with vent valve. See ➦ *Chapter 15.1.3 'Maintenance work - liquid end with vent valve' on page 106*	Technical personnel	Quarterly
Check dosing head screw torque. See ➦ *Chapter 15.1.4 'Tightening torques' on page 107*	Technical personnel	Annually
Check the operation of the relief valve.	Technical personnel	Annually
Replace diaphragm / valves / seals.	Technical personnel	Annually

15.1.1 Visual check for damage

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

Tab. 28: Check-list

Object to be inspected	Damaged?	More details
Check housing for damage	No Yes	Return the pump to us in the event of any damage.
Check the liquid end for leaks	No Yes	If a leak is identified, dismantle the dosing head and check for the source of the fault.
Check the diaphragm / diaphragm rupture indicator	No Yes	If the diaphragm rupture indicator comes on, then the diaphragm has ruptured and must be replaced. In the event of damage, see ➦ *Chapter 16.2.2 'Replacement of the diaphragm' on page 109*.
Check valve components	No Yes	The valves need to be replaced if liquid escapes from them or they are not leak-tight.
Check seals	No Yes	Rubber seals: They need to be replaced if they are damaged or brittle. PTFE seals: Once PTFE seals have been released they need to be disposed of.

15.1.2 Maintenance work - standard liquid end

Standard liquid ends:

Interval	Maintenance work	Personnel
Quarterly*	■ Check that the hydraulic lines are fixed firmly to the liquid end. ■ Check that the discharge and suction valve are tightly fitted. ■ Check that the entire liquid end is leak-tight - particularly around the leakage hole - refer to *Fig. 44*. ■ Check that the flow is correct: Press ⏭ *[Priming]* to allow the pump to prime briefly. ■ Check that the electrical connections are intact. ■ Check the integrity of the housing. ■ Check that the dosing head screws are tight.	Technical personnel

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

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

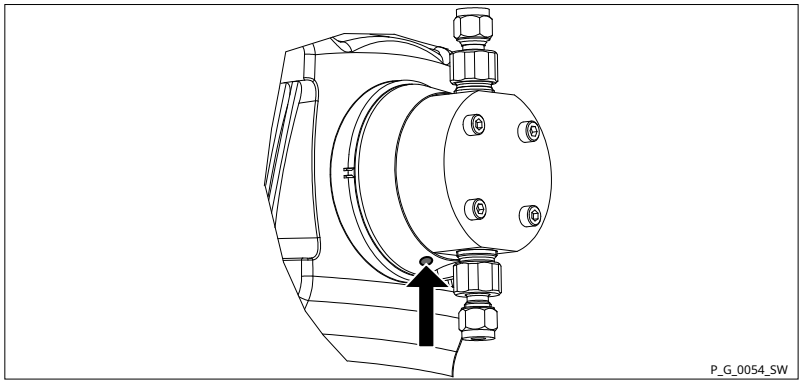


Fig. 44: The leakage hole

Interval	Maintenance work	Personnel
Annually*	■ Replace the metering diaphragm.	Technical personnel

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

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

Check the metering diaphragm more frequently or use a diaphragm rupture indicator with feed chemicals that put particular pressure on the diaphragm, e.g. those containing abrasive additives.

15.1.3 Maintenance work - liquid end with vent valve

Liquid ends with vent valve - additionally:

Interval	Maintenance work
Quarterly*	■ Check that the bypass line is fixed firmly to the liquid end. ■ Check that the vent valve is tight. ■ Check the pressure and bypass line for kinks. ■ Check that the vent valve is operating correctly.

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

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

15.1.4 Tightening torques

Tightening torque

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

16 Repair



CAUTION

Danger of injury with inadequately qualified personnel!

The operator of the system / equipment is responsible for ensuring that the qualifications are complied with.

If inadequately qualified personnel work on the equipment or loiter in the hazard zone of the system / unit, this could result in dangers that could cause serious injuries and material damage.

- Ensure that all work on the equipment is therefore only performed by qualified personnel.
- Keep unqualified personnel away from the hazard zone.

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to.

16.1 Overview of repairs

Task	Personnel	Interval
Replacement of the liquid end See ➦ *Chapter 16.2.1 'Replacement of the liquid end' on page 109*.	Service Technical personnel	As necessary / fault
Replacement of the diaphragm See ➦ *Chapter 16.2.2 'Replacement of the diaphragm' on page 109*.	Technical personnel Service	Annually
Replacement of the diaphragm rupture indicator See ➦ *Chapter 16.2.3 'Cleaning the diaphragm rupture indicator' on page 110*.	Technical personnel Service	As necessary
Replacement of valves / complete valve	Technical personnel Service	Annually
Retrofitting of relays See ➦ *Chapter 27 'Installation instructions: Retrofitting, relays' on page 156*.	Technical personnel Service	As necessary
Retrofitting of bus modules	Service	As necessary

16.2 Replacement of components

16.2.1 Replacement of the liquid end

16.2.2 Replacement of the diaphragm

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

- Put in place protective measures, if necessary.
- Note the material safety data sheet for the feed chemical.
- Prevent the escape of feed chemical.

1. Ensure that the system is at atmospheric pressure.
2. Drain 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.
3. Set up ☰ ➔ *'Service → Diaphragm replacement → To change position'*

   ➡ The pump moves the diaphragm away from the backplate.

   INFORMATION: Now leave the pump connected to the mains/power supply so that this state is maintained.
4. Unscrew the hydraulic connectors from the pressure and suction side.
5. With types with coarse/fine vent valve: Firstly remove the coarse/fine vent valve (grip), then lift off the cover of the liquid end with a screwdriver.

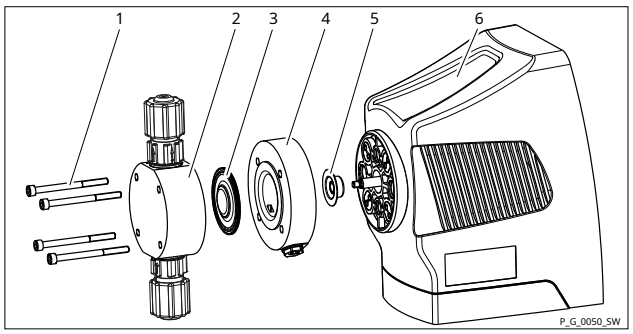


Fig. 45: Partially exploded view of the liquid end

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

6. Remove the screws (1).

7. Remove the dosing head (2) plus screws (1) from the pump - see figure

8. Loosen the diaphragm (3) from the drive axle with a gentle backwards turn in an anti-clockwise direction.

9. Fully unscrew the diaphragm (3) from the drive axle.

10. Remove the backplate (4) from the pump housing (6).

11. Check the condition of the safety diaphragm (5) and replace it if necessary.

12. Push the safety diaphragm (5) onto the drive axle only until it lies flush with the pump housing (6).

13. Tentatively screw the new diaphragm (3) onto the drive axle as far as the stop - ensure that this is successful, otherwise the pump will not subsequently meter precisely.

14. Unscrew the diaphragm (3) again.

15. Place the backplate (4) onto the pump housing (6).

- Make sure that the leakage hole points downwards when the pump is in its subsequent fitting position - 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 ensure that the safety diaphragm (5) does not become warped.

16. Place the diaphragm (3) into the backplate (4).

- Do not over-turn 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.

17. Hold the backplate (4) firmly and screw the diaphragm (3) clockwise until it is sitting tightly.

18. 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.

19. Set up ☰ ➔ *'Service → Diaphragm replacement → Back'*

➥ The pump moves the diaphragm back to the backplate.

20. Gently tighten the screws (1) and then tighten them crosswise. See below ➦ *'Tightening torque' on page 110* for the tightening torque.

21. With types with coarse/fine vent valve: Allow the cover of the liquid end to engage into the dosing head, then press the grip of the coarse/fine vent valve into the dosing head.

INFORMATION: 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

16.2.3 Cleaning the diaphragm rupture indicator

After the diaphragm rupture indicator has been triggered, any residue of feed chemical may affect its function.

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

1. First replace the liquid end diaphragm.

2. Unscrew the diaphragm rupture indicator using an AF 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.

16.2.4 Replacement of valves

17 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 is 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.



CAUTION

Warning of feed chemical spraying around

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

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



Danger of damage to the unit

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/power supply.
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.

- Disconnect 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!

18 Technical data

18.1 Performance data

Tab. 29: At 200 strokes/minute and 100% stroke length

Liquid end type	Minimum pump capacity			Max. stroke rate	Connector size outer ∅ x inner ∅	Suction lift*	Priming lift	Max. priming pressure on the suction side [1), 2)]	Weight
	bar	l/h	ml/stroke	Strokes/min	mm	m water column	m water column	bar	kg
2508	25	7.5	0.63	200	8x4 / 6x4	5	3.5 / 3.0	12.5	11 [3)]/ 10
1608	16	7.8	0.65	200	8x5 / 8x7	5	3.5 / 3.0	8	11 [3)]/ 10
1612	16	12.0	1.00	200	8x5 / 8x7	6	3.0 / 2.5	8	11 [3)]/ 10
1020	10	19.6	1.63	200	12x9 / 12x10	5	3.5 / 3.0	5	11 [3)]/ 10 10 / 11 [3)]
0730	7	29.4	2.40	200	12x9 / 12x10	5	4.0 / 3.5	3.5	11 [3)]/ 10
0450	4	49.0	4.08	200	DN 10	3	2.5 / 2.5	2	11 [3)]/ 10
0280	2	78.5	6.54	200	DN 10	3	3.0 / 3.0	1	11 [3)]/ 10
Version with self-venting dosing head without bypass**									
1608	10	7.0	0.60	200	8x5	3	3.0	8	10
1612	10	10.0	0.80	200	8x5	2	1.4	8	10
1020	10	15.0	1.25	200	12x9	2	1.5	5	10
0730	7	27.5	2.30	200	12x9	2	1.6	3.5	10

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

**** The performance data stated represents guaranteed minimum values, calculated using water as the medium at room temperature.**

[1)] The pressure on the pressure side must be a minimum of 1.5 bar higher than the pressure on the suction side. We therefore recommend installing a back pressure valve on the pressure side to adjust the increased pressure. This will avoid excess pumping.

[2)] The pump may only be operated in Automatic OFF mode if it is fitted with an SER head and priming pressure is applied.

[3)] With stainless steel version

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

Connector version

Material	Connector	Version
plastic	8 ... 12 mm	Hose squeeze connector
	DN 10	Hose sleeve d16 DN 10
stainless steel	6 ... 12 mm	Swagelok® system
	DN 10	Rp 3/8 insert

18.1.1 Performance data with vPTFE diaphragm

Tab. 30: at 200 strokes/minute and 100% stroke length

Type	Pump capacity at maximum back pressure			Connector size outer ∅ x inner ∅	Suction lift*	Priming lift**	Max. priming pressure on the suction side
	bar	l/h	ml/stroke	mm	m water column	m water column	bar
1612	10	12.0	1.00	8x5	5.0	2.5	5
1020	10	17.7	1.50	12x9	4.0	2.5	5
0730	7	26.7	2.23	12x9	4.0	2.5	3
0450	4	45.0	3.75	DN10	2.0	2.0	2

The stated performance data represents minimum values calculated using water as the medium at 20 °C.

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

** Priming lifts with clean and moist valves. Priming lift at 100% stroke length and free drain or opened vent valve.

18.2 Precision

18.2.1 Standard liquid end

Parameter	Value
Capacity range of the product range	-5 ... +10% at max. stroke length and max. operating pressure for all material versions
Reproducibility	±1% * under constant conditions and at least 30% stroke length

18.2.2 Self-venting liquid end

No metering dosing precision or reproducibility can be provided as the self-venting liquid end is used with outgassing media and when operating with air bubbles.

The recommended minimum stroke length with self-venting metering pumps is 50%.

18.3 Viscosity

Tab. 31: The liquid ends are suitable for the following viscosity ranges:

Design	Viscosity in mPas
Standard	0 ... 200
With valve springs	201 ... 500
With HV head	501 ... 3000*
Self-degassing (SEK)	0 ... 50
* Even significantly higher with correctly adjusted installation. Contact Technical Support in Heidelberg.	

Tab. 32: General information on selection according to viscosity.

Viscosity in mPas	Options	Stroke rate (strokes/minute)
0 ... 200	No specific options required	Any stroke rate.
201 ... 500	Valves fitted with springs	HV1 mode: Stroke rate max. 160 strokes/minute.
501 ... 1000	Valves fitted with springs. HV head recommended. A positive flow is required. Stroke length >75%.	HV 2 mode: Stroke rate max. 120 strokes/minute.
1001 ... 3000	Select an HV head. Valves fitted with springs. A positive flow is required. Stroke length >75%.	HV 3 mode: Stroke rate max. 80 strokes/minute.
> 3000	Contact Customer Service to select a suitable pump.	

18.4 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 fibre-glass)	Polyphenyl ether (PPE with fibre-glass)	Polycarbonate	Electronic compo-nents

18.5 Electrical data

Version: 100 - 230 V ±10%, 50/60 Hz

Specification	Value
Nominal power, approx.	68 W
Switch on peak current, (within approx. 50 ms falling	6 - 3 A
Fuse	T 3.15 A *

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

Fuses must have VDE, UL and CSA certification.

18.6 Temperatures

Pump, fully assembled

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

Liquid end, long-term*

Data	Value	Unit
Liquid end tempera-ture	-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 ver-sion	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

18.7 Climate

Air humidity, max. 95% relative humidity, non-condensing.

Exposure in a humid and changing climate:

FW 24 according to DIN 50016

Wet location

Wet location: No

18.8 Altitude of site

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

18.9 Degree of protection and safety requirements

Degree of protection

Protection against contact and moisture: IP 66 according to DIN EN 60529

Safety requirements

Protection class 1 - mains connection with protec-tive conductor

18.10 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

18.11 Weight

Material version	Weight
	kg
NPT	10
PVT	10
SST	11

18.12 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)

19 Exploded drawings of the gamma/ XL

You can replace the standard diaphragms 1:1 with vPTFE diaphragms. You simply require a new vPTFE diaphragm.

Liquid end 1608 / 2508 NP_2

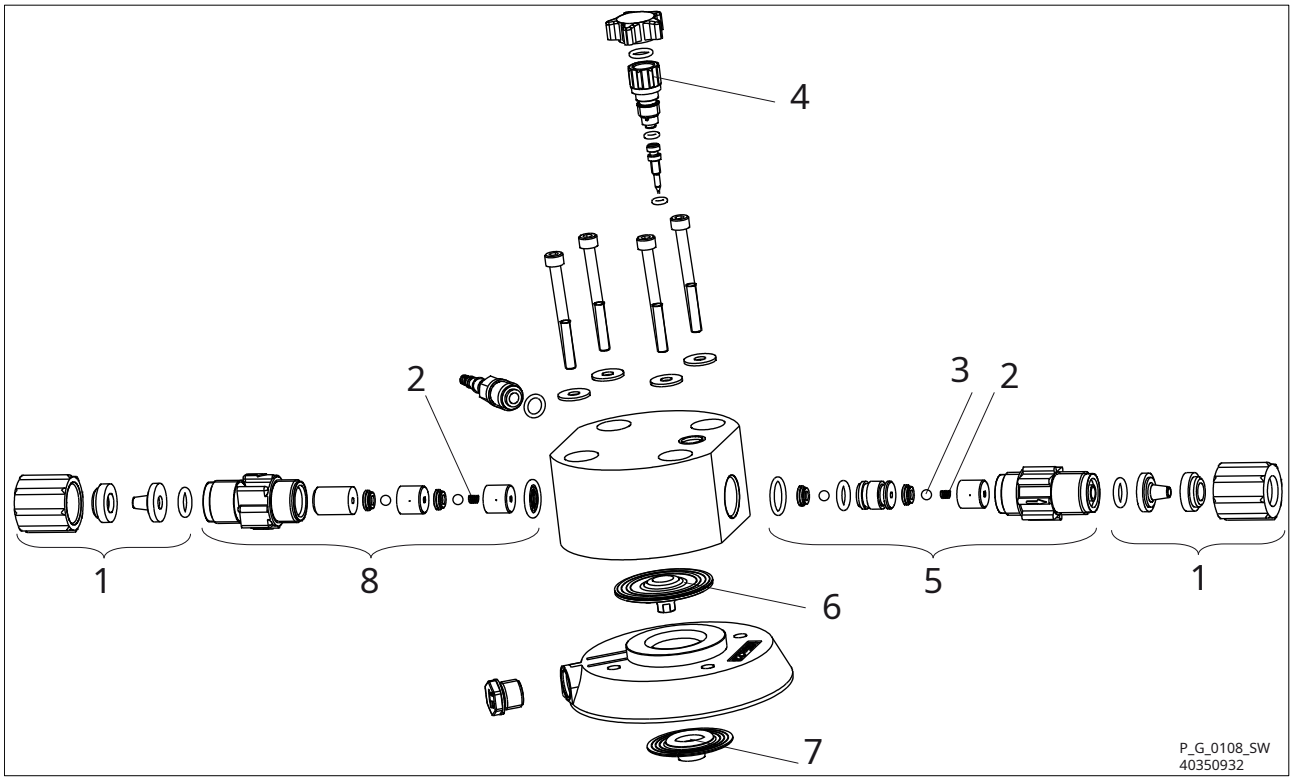


Fig. 46: Liquid end of gamma/ XL 1608 / 2508 NP_2

Tab. 33: Spare parts for liquid end gamma/ XL 1608 / 2508 NP_2

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

Liquid end gamma/ XL NPT2

	1608	2508
Liquid end with vent valve	1096276	1096214
Spare parts kit	1030225	1095912
Diaphragm	1030353	1030353

Liquid end gamma/ XL NPE2

	1608	2508
Liquid end with vent valve	1096278	1096279
Spare parts kit	1030620	1033172
Diaphragm	1030353	1030353

Liquid end gamma/ XL NPB2

	1608	2508
Liquid end with vent valve	1096282	1096283
Spare parts kit	1030611	1033171
Diaphragm	1030353	1030353

Liquid end 1612 - 0730 NP_2

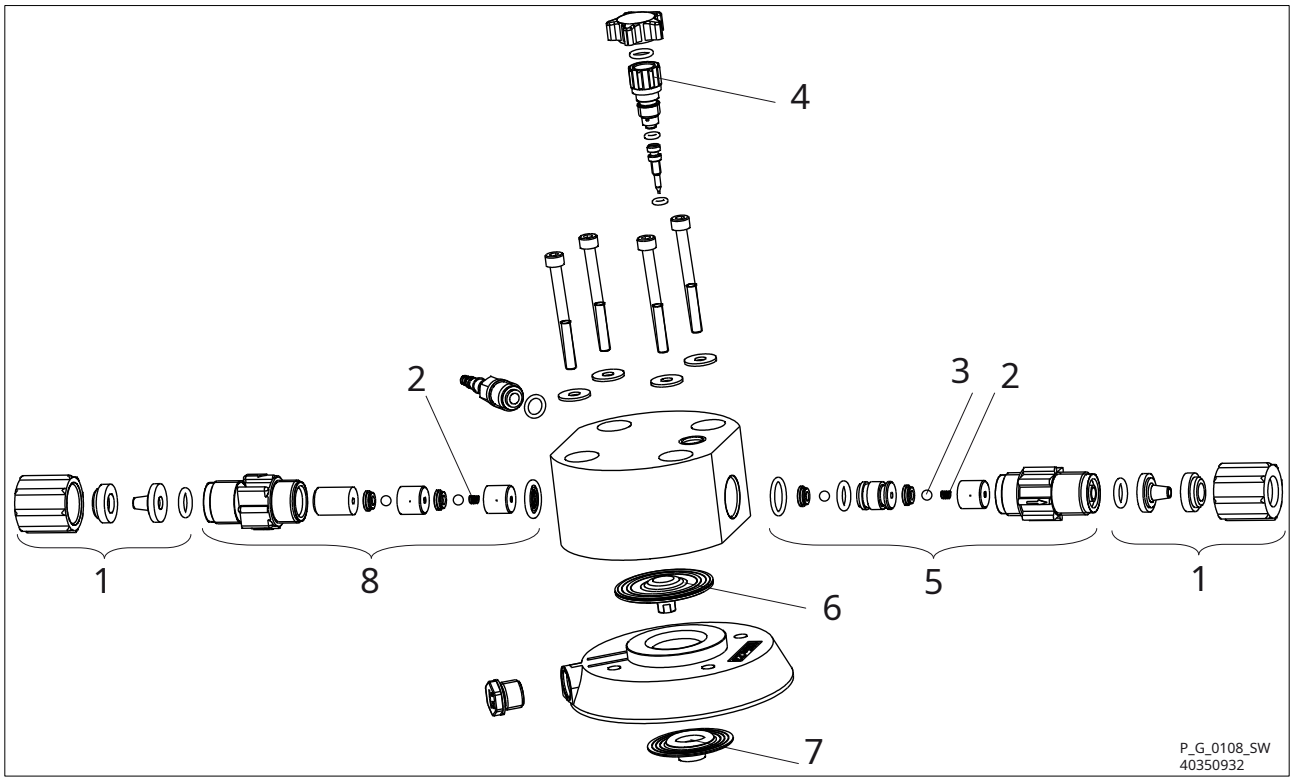


Fig. 47: Liquid end of gamma/ XL 1612 - 0730 NP_2

Tab. 34: Spare parts for liquid end gamma/ XL 1612 - 0730 NP_2

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

Liquid end gamma/ XL NPT2

	1612	1020	0730
Liquid end with vent valve	1096275	1096273	1096274
Spare parts kit	1027081	1027082	1095626
Diaphragm	1000248	1000249	1045456

Liquid end gamma/ XL NPE2

	1612	1020	0730
Liquid end with vent valve	1096270	1096261	1096260
Spare parts kit	1030536	1030537	1030621
Diaphragm	1000248	1000249	1045456

Liquid end gamma/ XL NPB2

	1612	1020	0730
Liquid end with vent valve	1096268	1096269	1096263
Spare parts kit	1030525	1030526	1030612
Diaphragm	1000248	1000249	1045456

Liquid end 1608 NPT7 SER

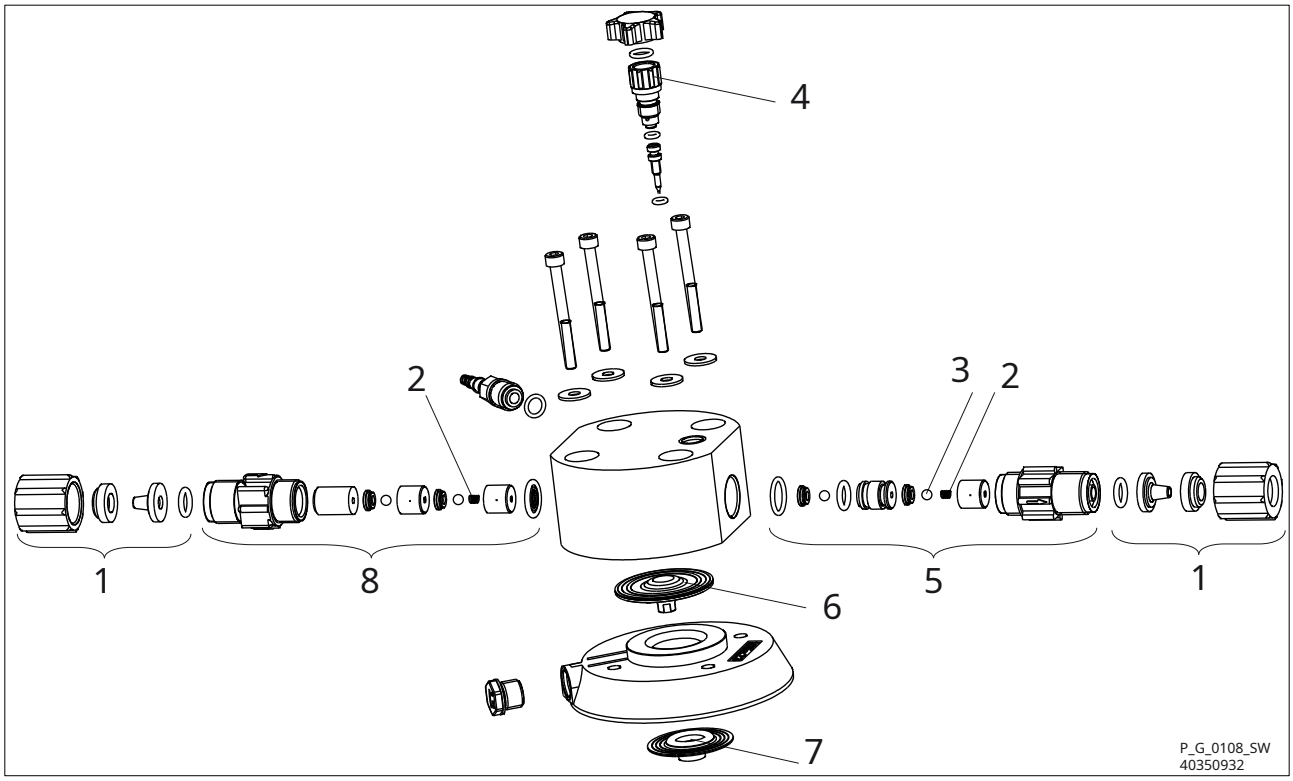


Fig. 48: Liquid end of gamma/ XL 1608 NPT7 SER

Tab. 35: Spare parts for liquid end gamma/ XL 1608 NPT7, self-venting SER

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

Liquid end gamma/ XL NPT 7

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

Liquid end 1612 - 0730 NPT7 SER

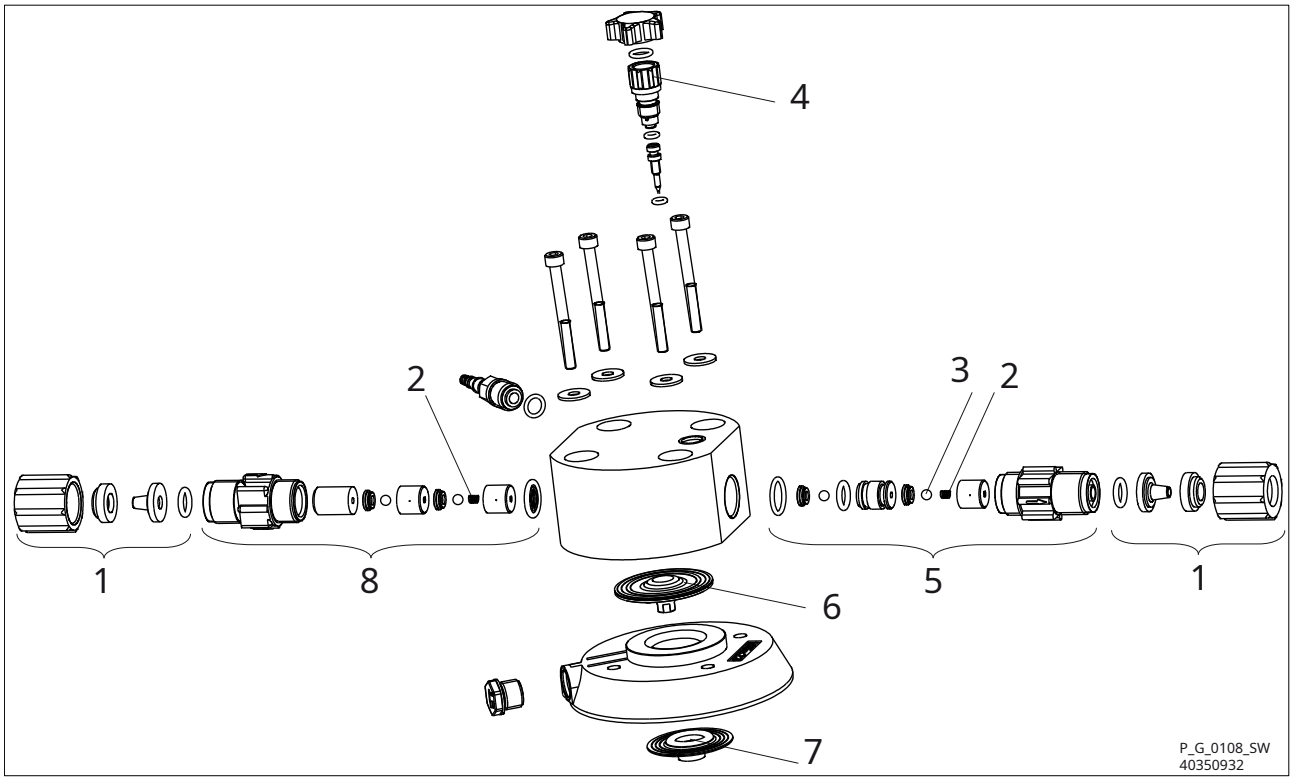


Fig. 49: Liquid end of gamma/ XL 1612 - 0730 NPT7 SER

Tab. 36: Spare parts for liquid end gamma/ XL 1612 - 0730 NPT7, self-venting SER

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

Liquid end gamma/ XL NPT 7

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

Liquid end 1608 / 2508 NP_0

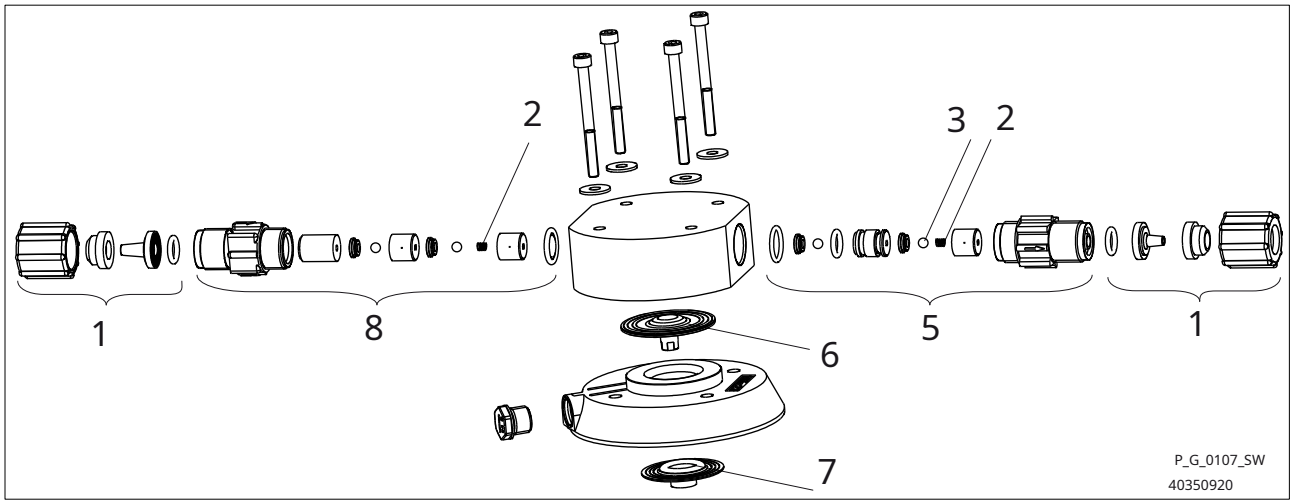


Fig. 50: Liquid end of gamma/ XL 1608 / 2508 NP_0

Tab. 37: Spare parts for liquid end gamma/ XL 1608 / 2508 NP_0

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

Liquid end gamma/ XL NPT 0

	1608	2508
Liquid end without vent valve	1096217	1096214
Spare parts kit	1030225	1095912
Diaphragm	1030353	1030353

Liquid end gamma/ XL NPE 0

	1608	2508
Liquid end without vent valve	1096175	1096216
Spare parts kit	1030620	1033172
Diaphragm	1030353	1030353

Liquid end gamma/ XL NPB 0

	1608	2508
Liquid end without vent valve	1096280	1096281
Spare parts kit	1030611	1033171
Diaphragm	1030353	1030353

Liquid end 1612 - 0730 NP_0

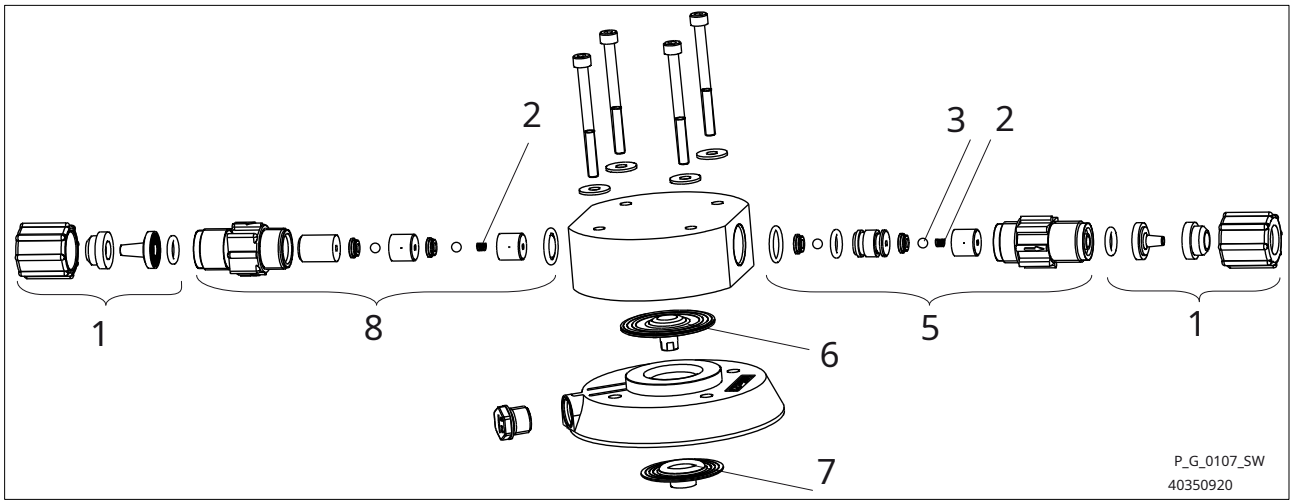


Fig. 51: Liquid end of gamma/ XL 1612 - 0730 NP_0

Tab. 38: Spare parts for liquid end gamma/ XL 1612 - 0730 NP_0

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

Liquid end gamma/ XL NPT 0

	1612	1020	0730
Liquid end without vent 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 vent 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 vent valve	1096284	1096285	1096262
Spare parts kit	1030525	1030526	1030612
Diaphragm	1000248	1000249	1045456

Liquid end 1608 PV_2

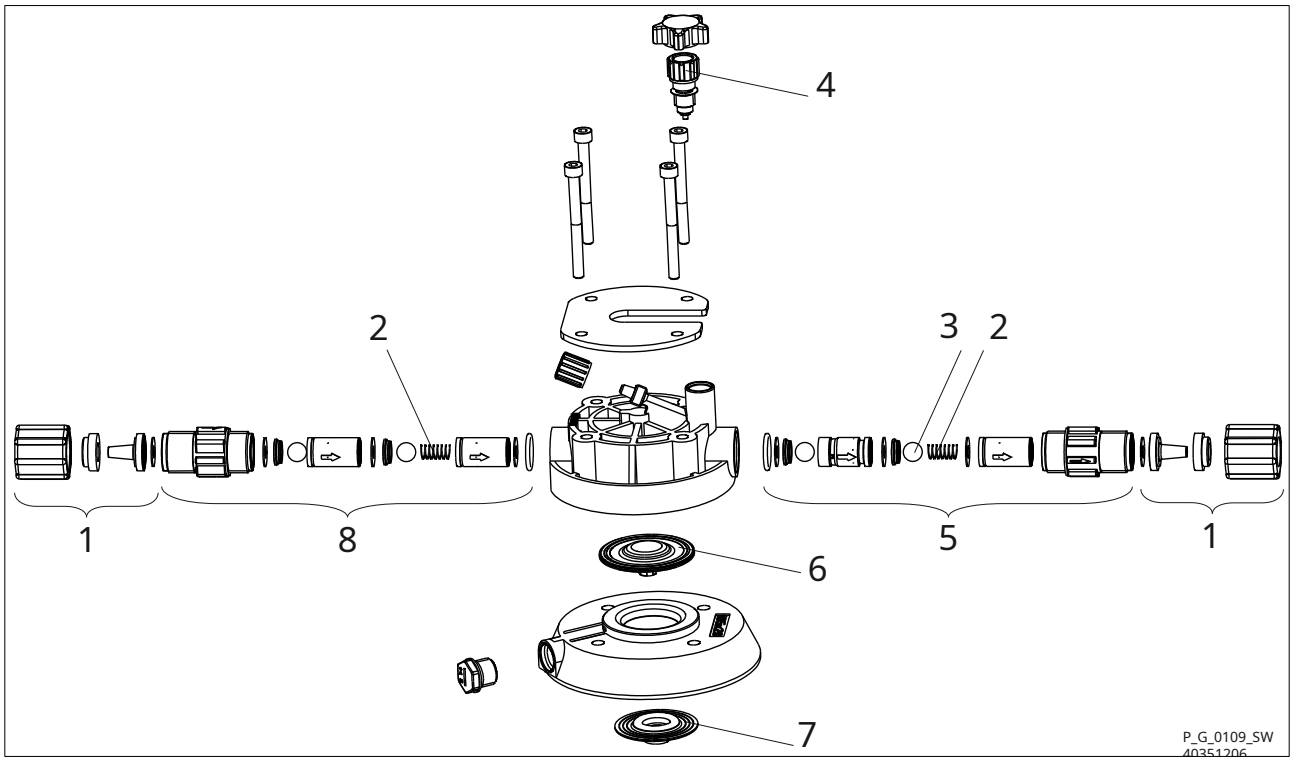


Fig. 52: Liquid end of gamma/ XL 1608 PV_2

Tab. 39: Spare parts for liquid end gamma/ XL 1608 PV_2

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

Liquid end gamma/ XL PVT 2

	1608
Liquid end with vent valve	1096265
Spare parts kit	1030225
Diaphragm	1030353

Liquid end gamma/ XL PVT 7, SER

	1608
Liquid end, self-venting SER	1096251
Spare parts kit	1047831
Diaphragm	1030353

Liquid end gamma/ XL PVF2, FDA

	1608
Liquid end with vent valve	1096252
Spare parts kit	1083565
Diaphragm	1030353

Liquid end 1612 - 0730 PV_2

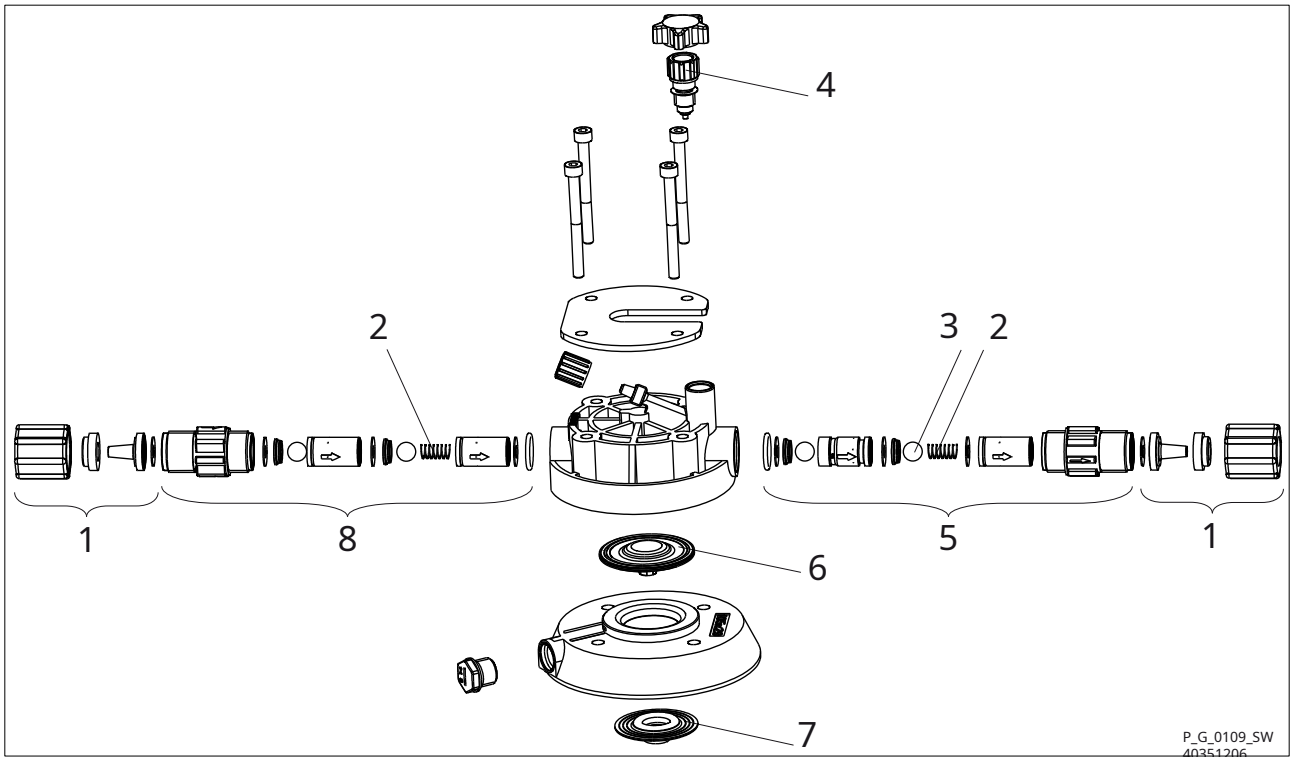


Fig. 53: Liquid end of gamma/ XL 1612 - 0730 PV_2

Tab. 40: Spare parts for liquid end gamma/ XL 1612 - 0730 PV_2

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

Liquid end gamma/ XL PVT 2

	1612	1020	0730
Liquid end with vent 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-venting 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 vent valve	1096246	1096247	1096248
Spare parts kit	1083569	1083570	1096089
Diaphragm	1000248	1000249	1045456

Liquid end 0450 / 0280 PV_2

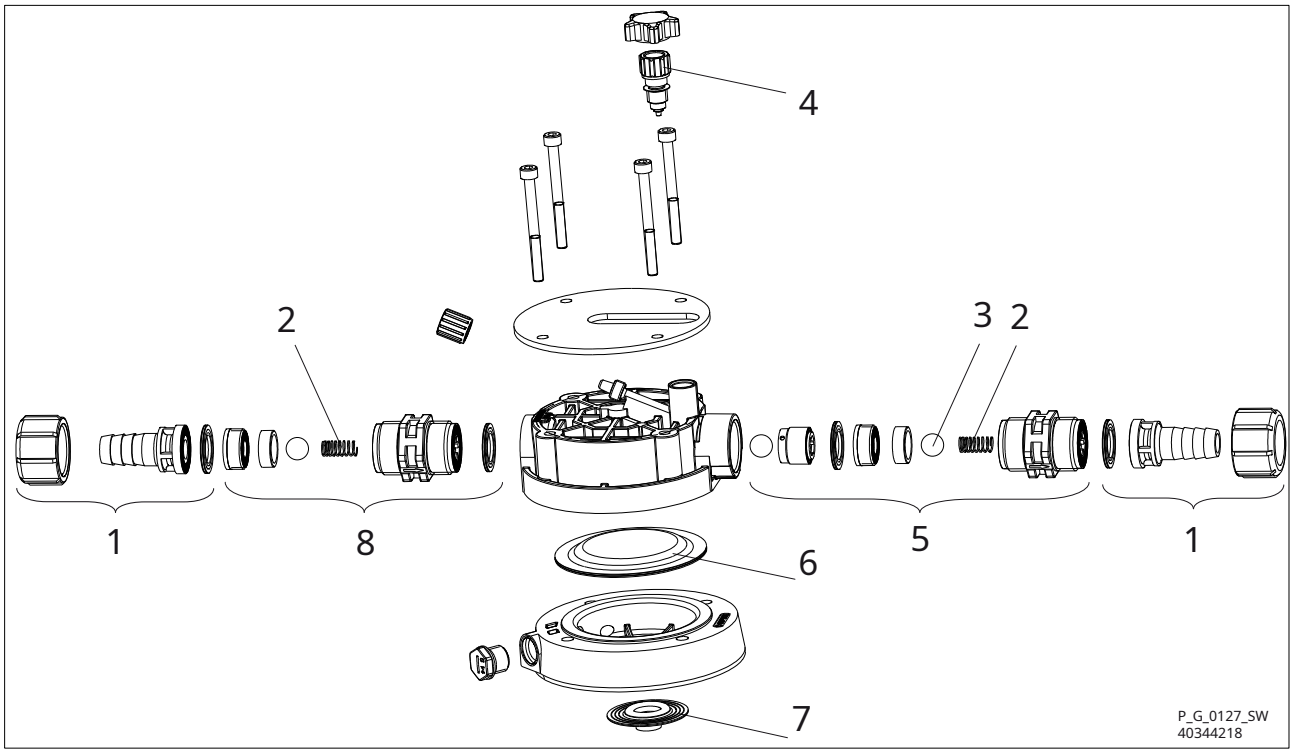


Fig. 54: Liquid end of gamma/ XL 0450 / 0280 PV_2

Tab. 41: Spare parts for liquid end gamma/ XL 0450 / 0280 PV_2

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

Liquid end gamma/ XL PVT 2

	0450	0280
Liquid end with vent valve	1096254	1096253
Spare parts kit	1095502	1095500
Diaphragm	1045443	1059691

Liquid end gamma/ XL PVF2, FDA

	0450	0280
Liquid end with vent valve	1096243	1096242
Spare parts kit	1096090	1096088
Diaphragm	1045443	1059691

Liquid end 1608 / 2508 SST0

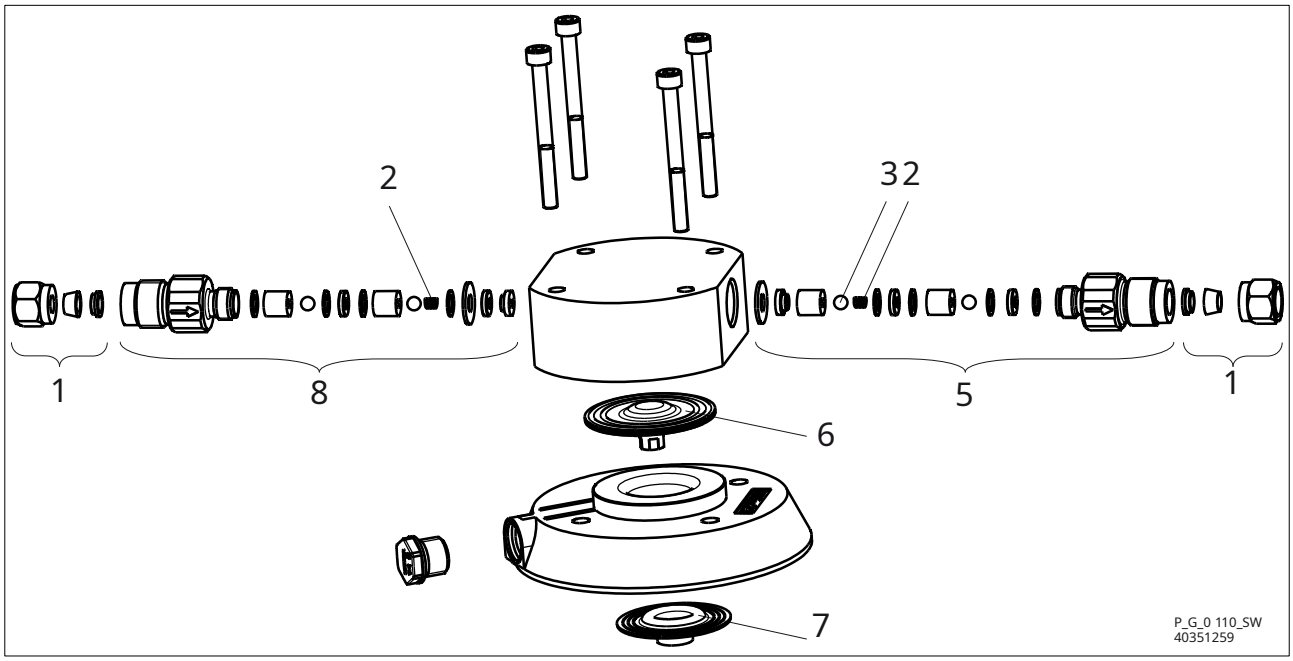


Fig. 55: Liquid end of gamma/ XL 1608 / 2508 SST0

Tab. 42: Spare parts for liquid end gamma/ XL 1608/2508 SST0

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

Liquid end gamma/ XL SST 0

	1608	2508
Liquid end without vent valve	1096245	1096244
Spare parts kit	1030226	1030226
Diaphragm	1030353	1030353

Liquid end 1612 - 0730 SST0

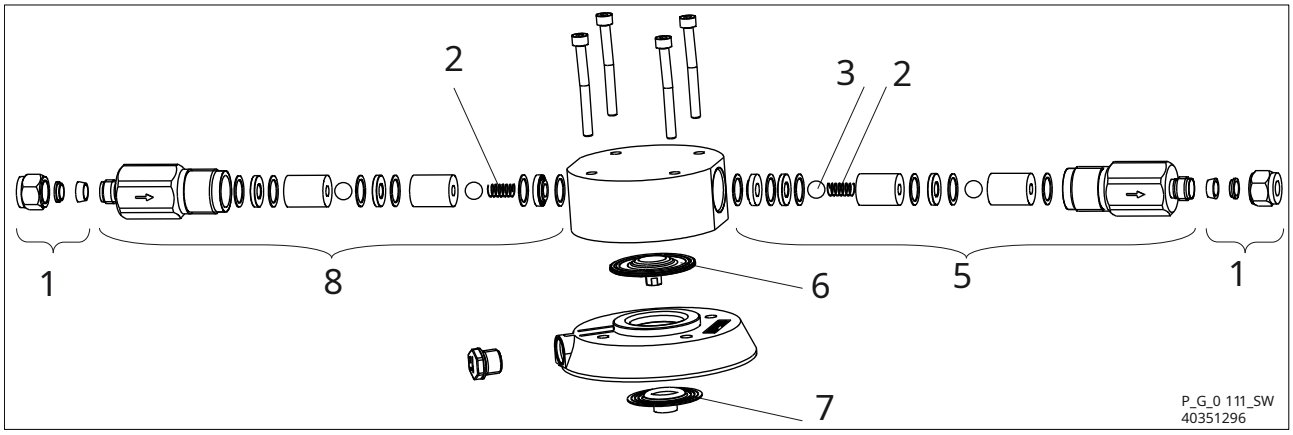


Fig. 56: Liquid end of gamma/ XL 1612 - 0730 SST0

Tab. 43: Spare parts for liquid end gamma/ XL 1612 - 0730 SST0

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

Liquid end gamma/ XL SST0

	1612	1020	0730
Liquid end without vent valve	1096239	1096236	1096237
Spare parts kit	1027086	1027087	1095501
Diaphragm	1000248	1000249	1045456

Liquid end 0450 - 0280 SST0

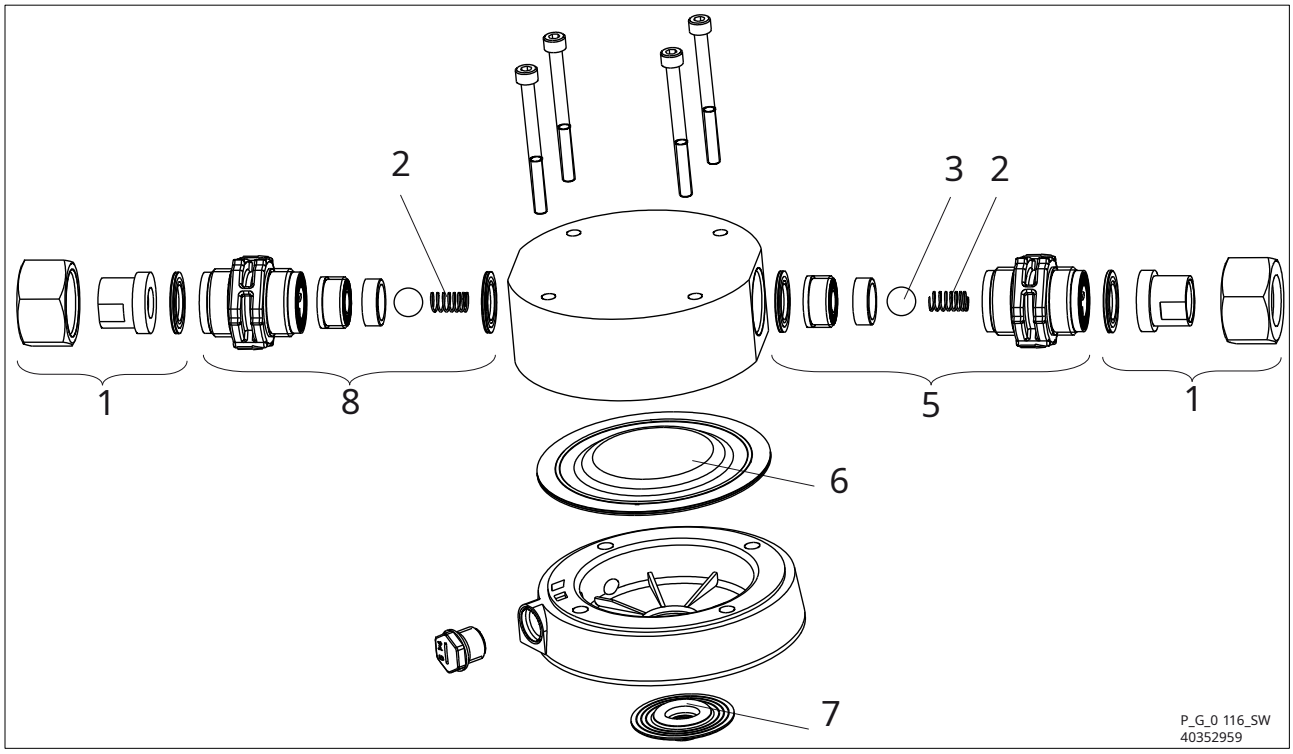


Fig. 57: Liquid end of gamma/ XL 0450 - 0280 SST0

Liquid end gamma/ XL SST0

	0450	0280
Liquid end without vent valve	1096218	1096235
Spare parts kit	1095625	1095624
Diaphragm	1045443	1059691

Liquid end gamma/ XL SSF0, FDA

	0450	0280
Liquid end without vent valve	1096234	1096223
Spare parts kit	1095625	1095624
Diaphragm	1045443	1059691

Liquid end 1608 / 1612 / 1020 PVT4, HV

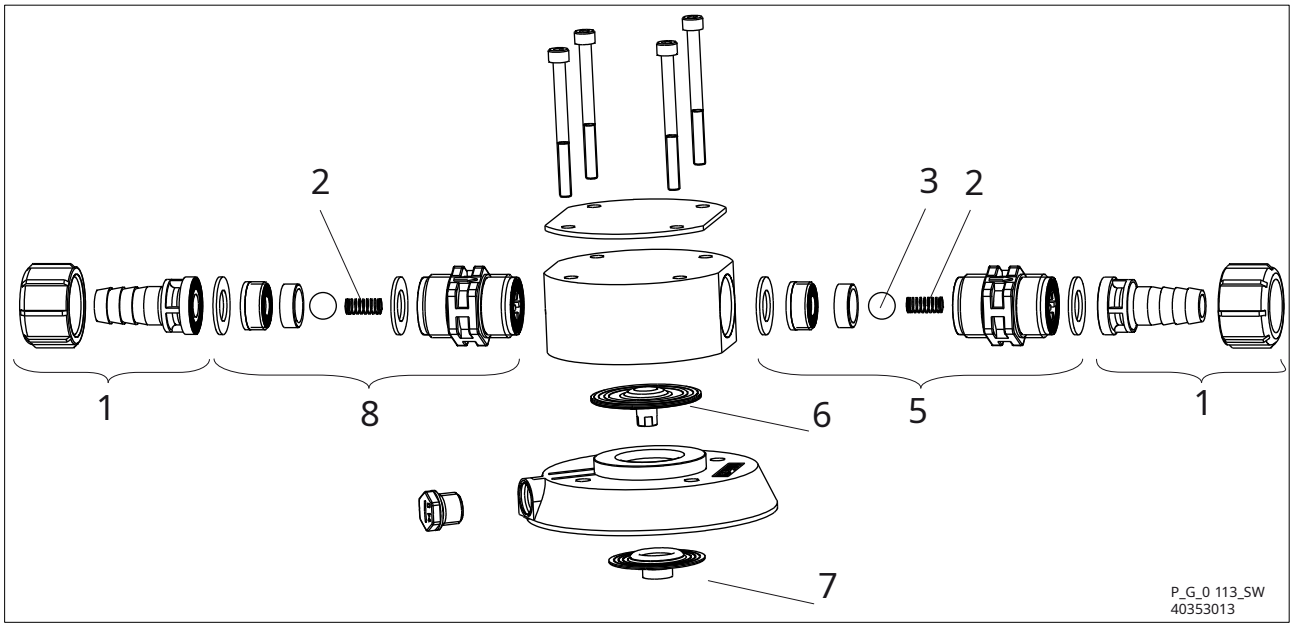


Fig. 58: Liquid end gamma/ XL 1608 / 1612 / 1020 PVT4, HV

Tab. 44: Spare parts for liquid end gamma/ XL 1608 / 1612 / 1020 PVT4, HV

Pos.	Designation
1	Connector kit with hose sleeve
6	Diaphragm

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

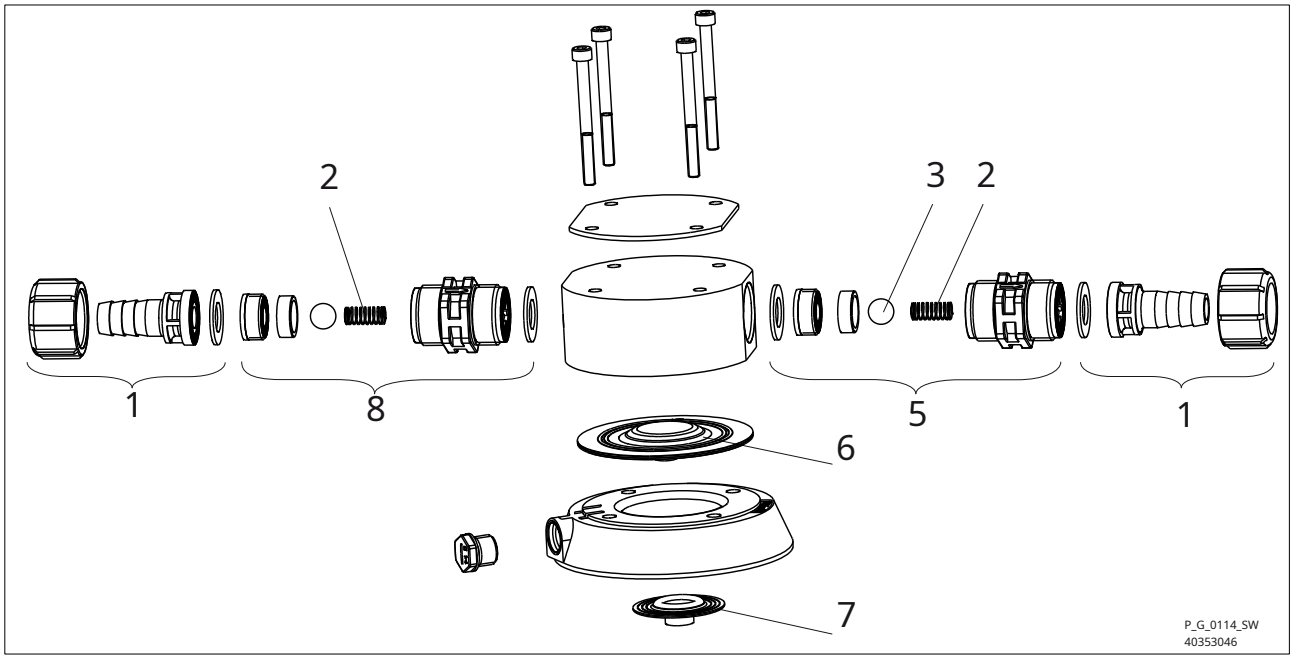


Fig. 59: Liquid end gamma/ XL 0730 PVT4, HV

Tab. 45: Spare parts for liquid end gamma/ XL 0730 PVT4, HV

Pos.	Designation
1	Connector kit with hose sleeve
6	Diaphragm

Liquid end gamma/ XL 0730 PVT4, HV

	0730
Liquid end HV	1096219
Spare parts kit	1095499
Diaphragm	1045456

Spare parts for the vPTFE diaphragm

The vPTFE diaphragm (full PTFE diaphragm) is replaced in the same way as the standard diaphragm - see "Repair" section.

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

A spare parts kit contains:

- vPTFE diaphragms
- Suction valve
- Discharge valve
- Connector kit
- Seal

Pump type	2.0 diaphragm complete	2.0 spare parts kit PVM	2.0 spare parts kit PVN
1612	1117433	1119828	1119829
1020	1117354	1121492	1121491
0730	1117352	1118459	1118464
0450	1117353	1120526	

20 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

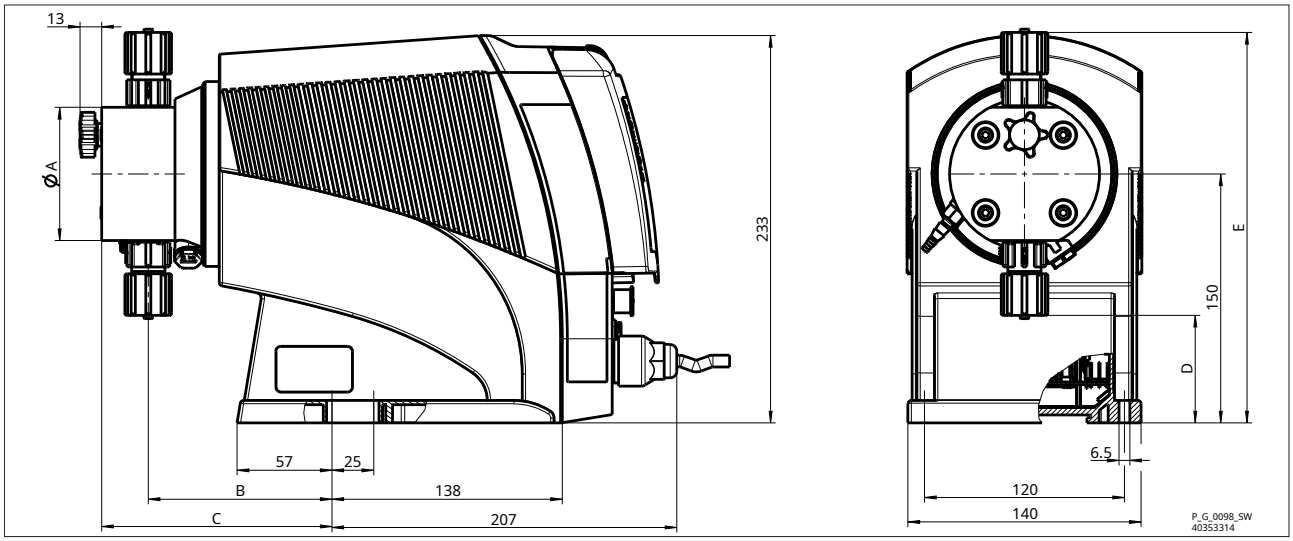


Fig. 60:

	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

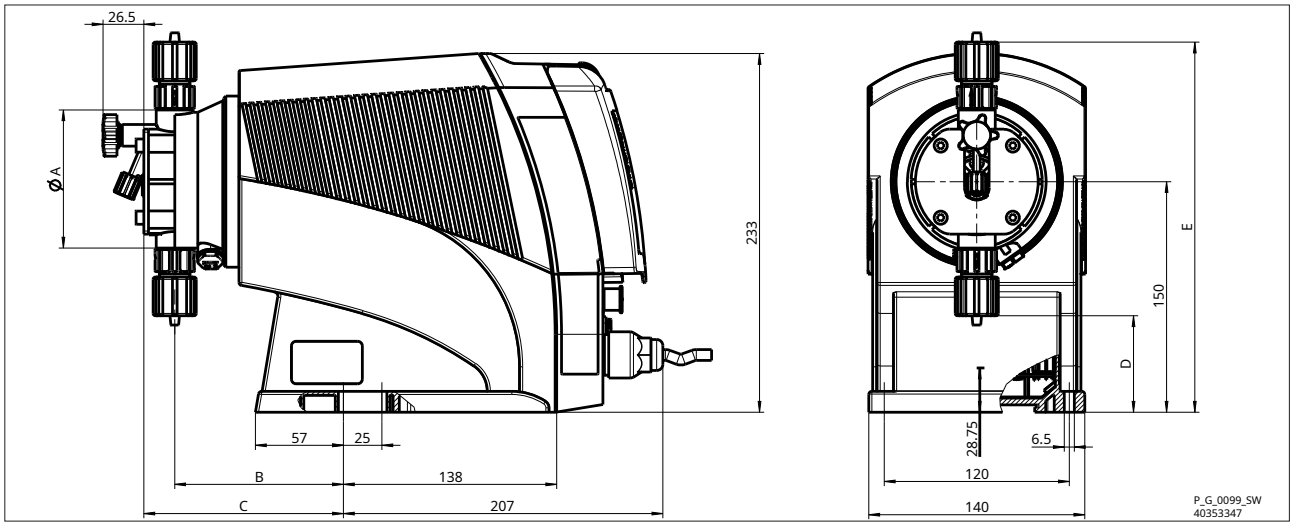


Fig. 61:

	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

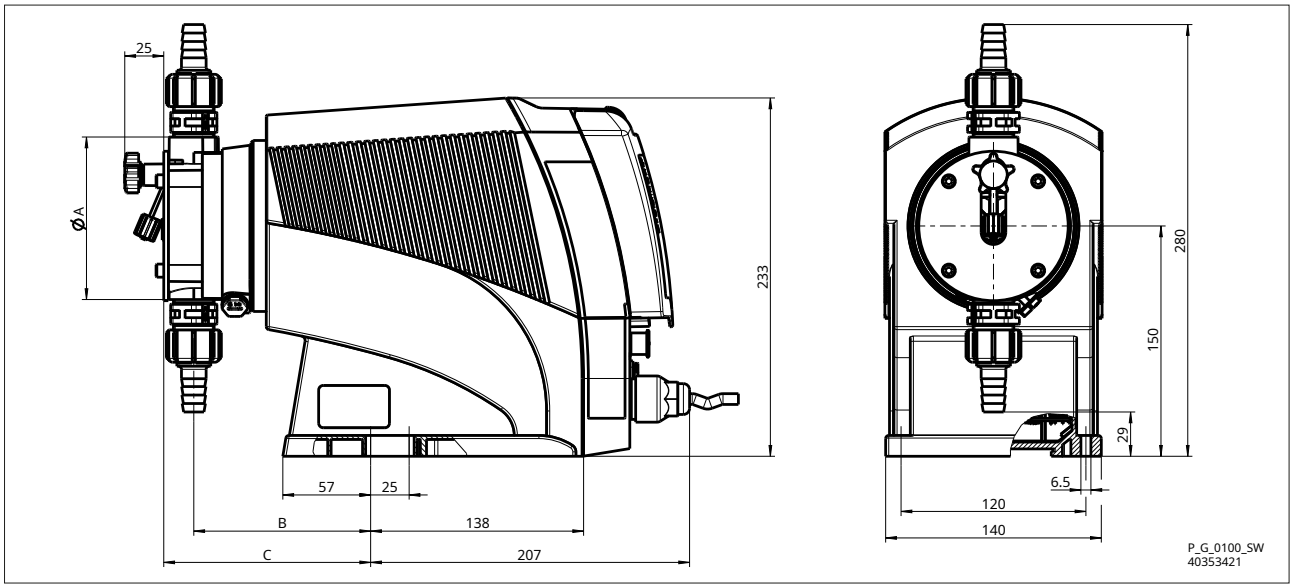


Fig. 62:

	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

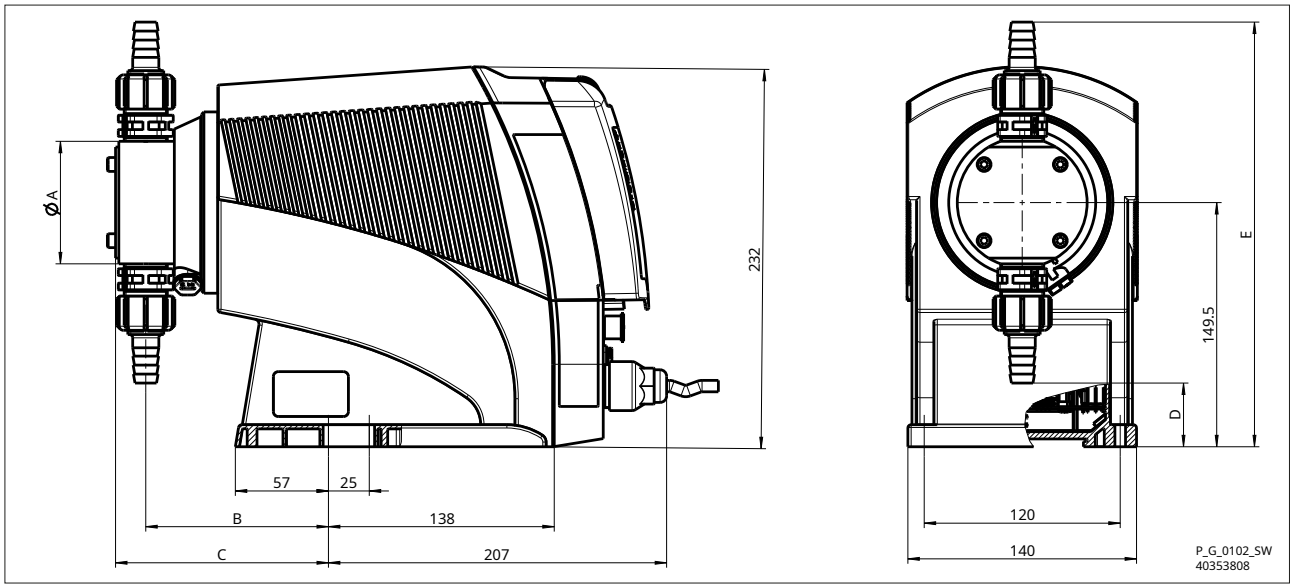


Fig. 63:

	1608	1612	1020	0730
ØA	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 1608/ 2508, material version SS

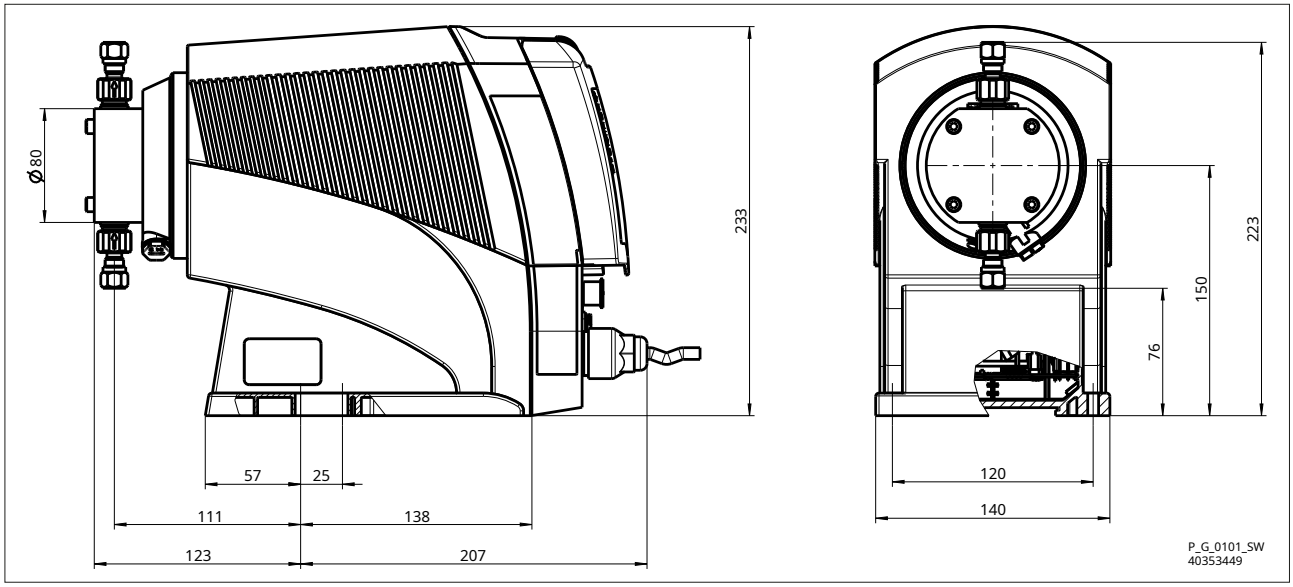


Fig. 64:

Dimensional drawing gamma/ XL, material version SS

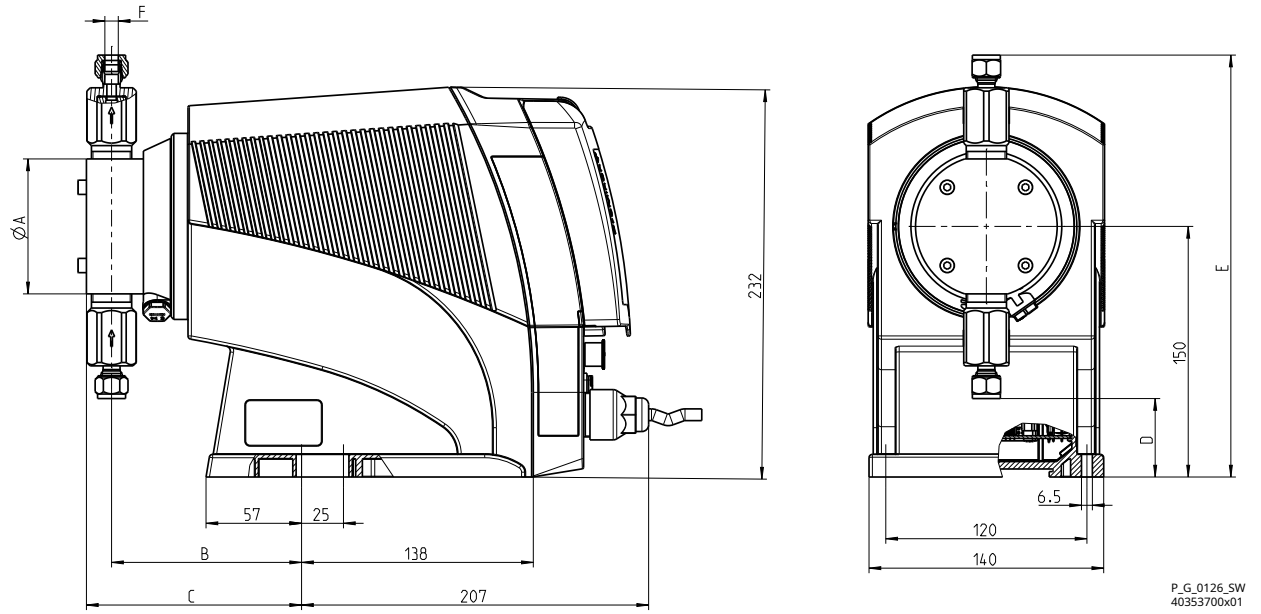


Fig. 65:

	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

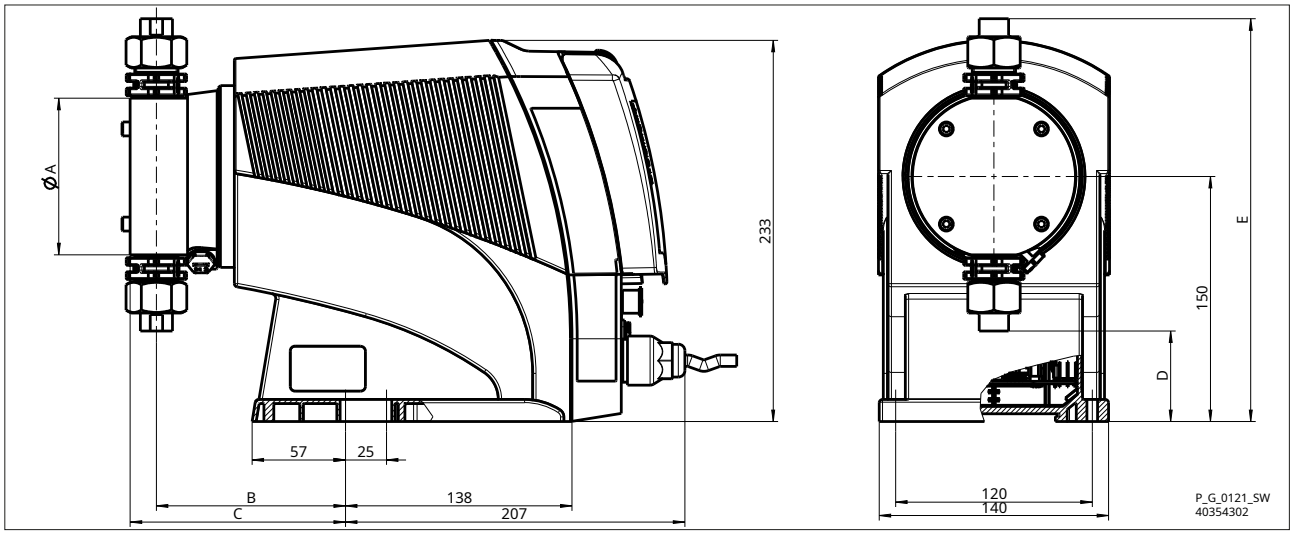


Fig. 66:

	0450	0280
ØA	100	100
B	115	115
C	132	132
D	55	55
E	246	246

21 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. 46: 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.

22 UK Declaration of Conformity

We,

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

herby declare that the product identified below conforms to the basic health and safety requirements of the Regulations, by virtue of its design and construction, and in the configuration placed on the market by us.

This declaration is no longer applicable if changes are made to the product without our authorisation.

Tab. 47: Extract from the Declaration of Conformity

Product description:	Dosing pump, gamma/ XL series
Product type:	GXLa _ _ _ _ _ _ _ _ _ _ _ _ U _ _ _ Y _ 0 _ _ Y = 0, 3, 4, 5, C, D, E, N, R
Serial no.:	see type plate on the unit
Applicable Regulations:	Supply of Machinery (Safety) Regulations 2008 The safety objectives of the Electrical Equipment (Safety) Regulations 2016 were complied with in accordance with Appendix 1, No. 1.5.1 of the Supply of Machinery (Safety) Regulations 2008 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
Applied standards, especially:	BS EN ISO 12100: 2010 BS EN 809:1998 + A1:2009 BS EN 61010-1:2010 + A1:2019 BS EN 61000-6-2:2005 BS EN 61000-6-3:2007 + A1:2011 BS EN 61000-6-4:2007 / A1:2011 for Y = E BS EN IEC 63000:2018
Date:	01.12.2020@

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

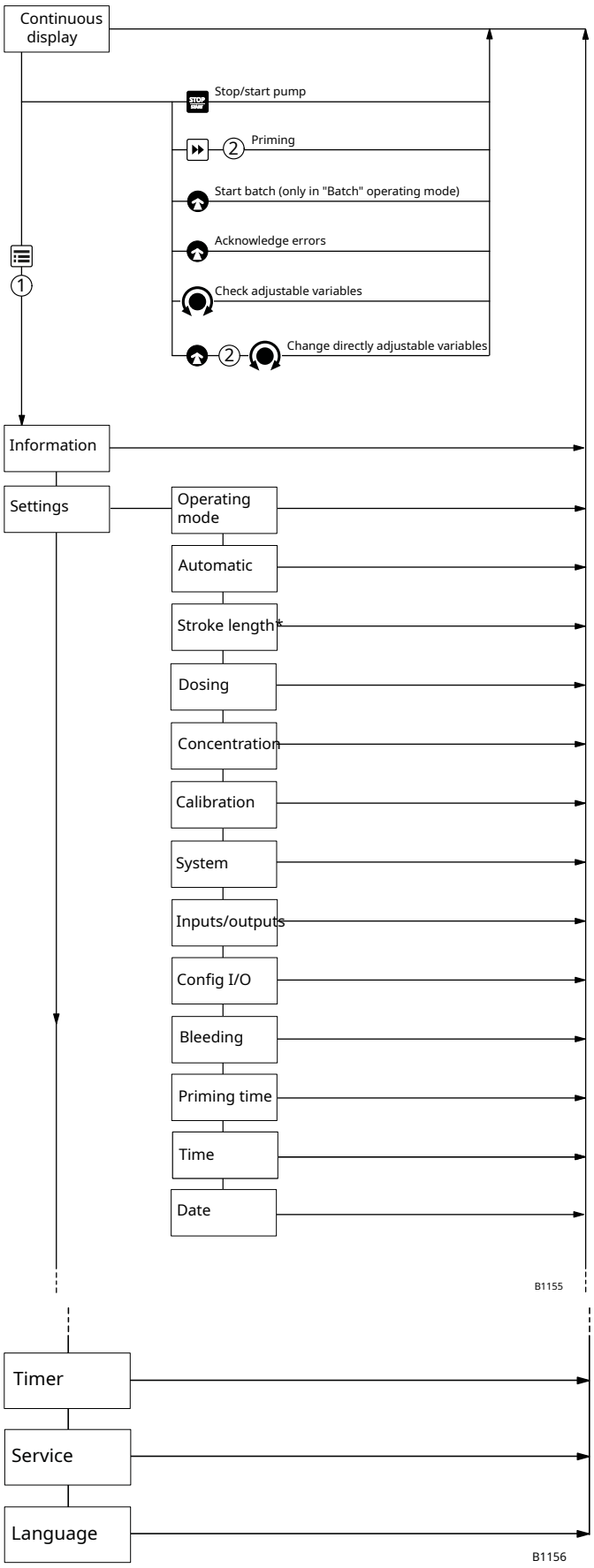
23 Approvals

Other certifications

The pump has CE approval and the following certifications:

Approval	Certificate no.
EAC	TC N RU D-DE.IA58.B.03108
MET Electrical Safety c us E113360	-
NSF Certified to NSF/ANSI/CAN 61	-

24 Operating / set-up overview gamma/ XL



25 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	*Adaptive* On Off	*Memory* On Off	...
					...
		Batch	*Memory* On Off	Metering volume *1	Metering time *1
				Factor *2	...
		Analogue	0...20 mA		
			4...20 mA		

1. level	2.	3.	4.	5.	xth
			Linear curve Lower side band Upper side band	Curve point 1 (I1,F1)	...
	Automatic	On Off			
	Stroke length *2	1 ... 100%			
	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 overpressure	Warning Fault Error+warning Inactive	
			Message when no pressure	Inactive Warning Fault Error+warning	
			Cavitation	Inactive Warning	
		Compensa-tion*1 *2	Inactive Active		

1. level	2.	3.	4.	5.	xth
		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		
		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	*Password?*	... bar	
		Start behaviour	always STOP always on last status		

1. level	2.	3.	4.	5.	xth
	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	
		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	...

1. level	2.	3.	4.	5.	xth
		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	...
		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		

1. level	2.	3.	4.	5.	xth
		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 Hemi-sphere Southern Hemi-sphere		
	Date	dd.mm.yyyy			
Timer	Timer status				
	Activation	Active Inactive			
	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	...

1. level	2.	3.	4.	5.	xth
	Clear all	No Yes			
Service	Access protec-tion	*Password?*	None Locking menu Lock all		
	Password	*Password?*	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 posi-tion			
	Display	Brightness			
		Contrast			
	Factory setting	*Password?*	Yes No		
	Diaphragm part number: -------				
	Spare parts kit part number: -------				
Language	English German Frenchç Spanishñ Italian ...				

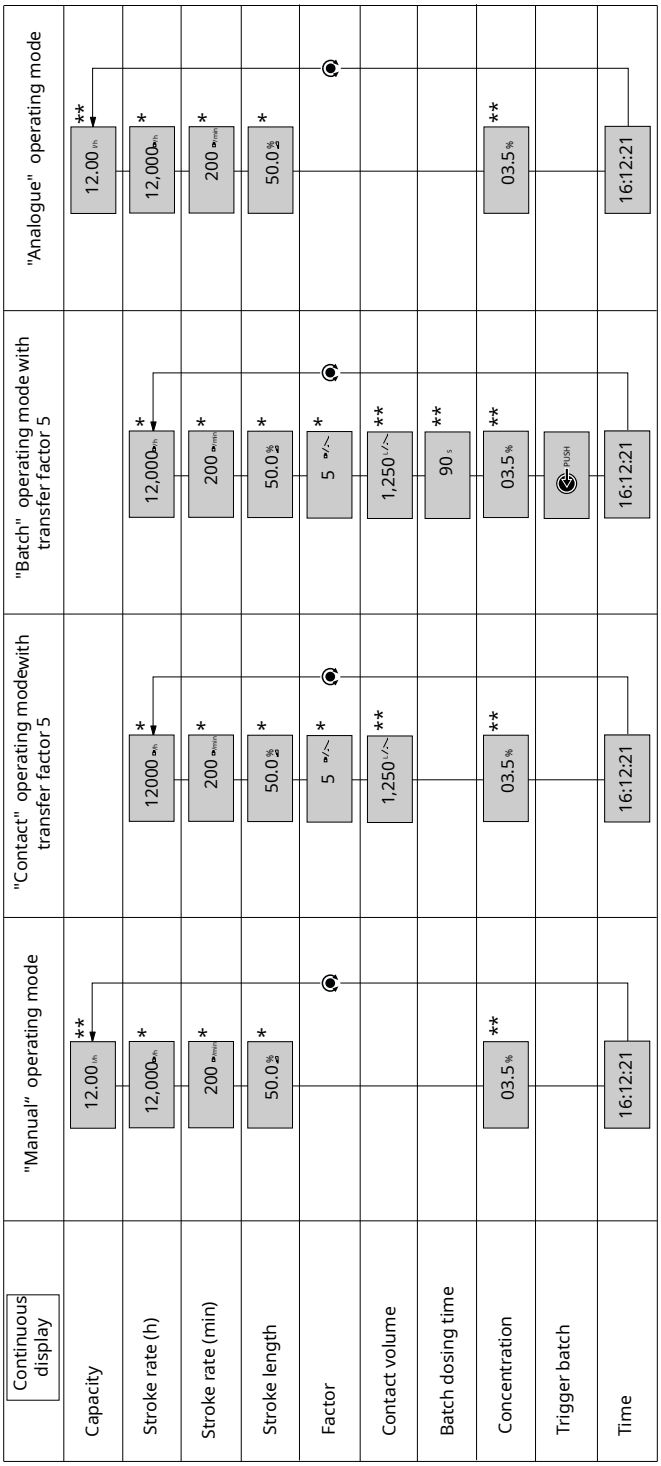
*1 with *'Automatic'* - *'on'* - see Chap. *'Set Up'* - *'Settings'* - *'Automatic'*

*2 with *'Automatic'* - *'off'* / with conventional operating mode

Menus may be missing or added depending on the design and equipment on the pump.

26 Continuous displays and secondary displays

Continuous displays



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↓ [1]	
Remaining litres			000,833↓ L [1]	
Total number of strokes	86500	86500	86500	86500
Stroke length	50 %	50 %	50 %	50 %
Signal current (at the input)				12,7 mA [2]
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

27 Installation instructions: Retrofitting, relays

Tab. 48: These installation instructions apply to:

Designation	Order no.
Fault indicating relay	1050643
Fault indicating and pacing relay	1050654
Fault indicating relay + 4-20 mA output	1050655

Materials

Torx spanner T 25.

A pocket torch can help to find the 4x2 contact in the slot for the relays more easily.

Requirement:

Personnel:

- Electrician

Scope of delivery

1 Relay board, fully assembled.

1 Relay cable, fully assembled, with connector.

1 Seal.

Live parts can be accessed if the slot for the relay has been opened.

- Disconnect the pump from the mains power supply before working on it.
- Only operate the pump with a liquid-tight screwed slot for the relay and connector for the relay cable.

1. Disconnect the pump electrically.
2. Remove the cover of the slot.
3. Hold the relay board by the edge of the relay cover.

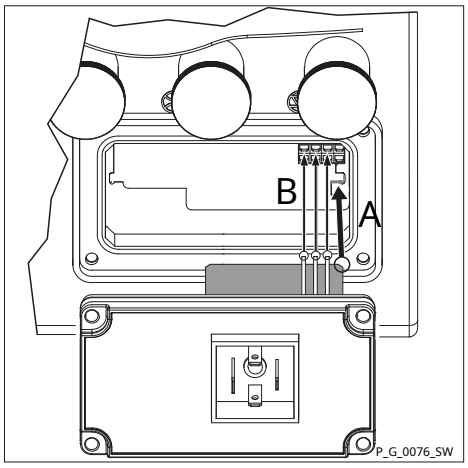


Fig. 67: Slot (B)

4. 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.
5. Push the relay board into the slot with gentle pressure.
6. Use the screws to screw the relay cover to the housing until liquid-tight.
7. Insert the seal connector of the relay cable into the relay cover.
8. Push the connector onto the pins of the relay cover and then tighten the screw into the connector until liquid-tight.

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