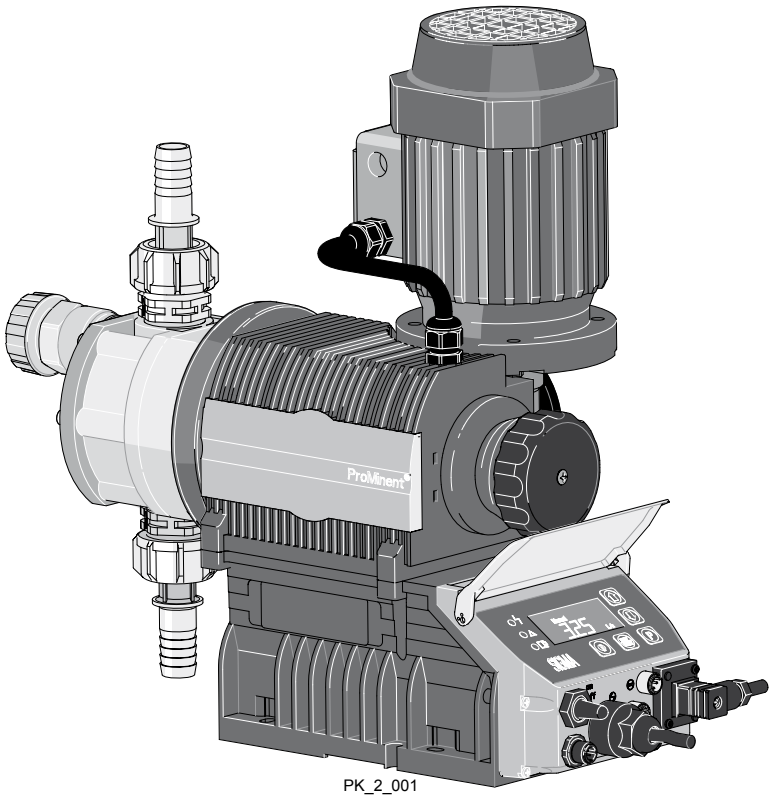
Operating instructions

Diaphragm Motor-Driven Metering Pump
Sigma/ 1 Control Type S1Ca



PK_2_001

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5-11
69123 Heidelberg
Germany
Telephone: +49 6221 842-0
Fax: +49 6221 842-617
email: info@prominent.com
Internet: www.prominent.com

3245432324324, 1, en_GB

Table of contents

1 Identity code S1Ca

S1Ca Sigma 1, Control Type, Version a									
Product range									
S1Ca									
	Drive types								
	H	Main power end, diaphragm							
		Type	Performance						
			bar	**l/h**					
		12017	10*	20					
		12035	10*	42					
		10050	10	50					
		10022	10	26					
		10044	10	53					
		07065	7	65					
		07042	7	50					
		04084	4	101					
		04120	4	120					
			Dosing head material						
			PV	PVDF					
			SS	Stainless steel					
				Seal material					
				T	PTFE				
					Displacement				
					S	Multi-layer safety diaphragm with optical break indicator			
					A	Multi-layer safety diaphragm with rupture signalling with *“pump stops”* function			
					B	Multi-layer safety diaphragm with rupture signalling with *“pump emits alarm”* function			
					H	Diaphragm for hygienic pump head (upon request)			
						Dosing head version			
						0	no valve springs		
						1	with 2 valve springs, Hastelloy C; 0.1 bar (standard for DN 32)		
						4**	with relief valve, FPM seal, no valve spring		
						5**	with relief valve, FPM seal with valve springs (standard for DN 32)		
						6**	with relief valve, EPDM seal, no valve springs		
						7**	with relief valve, EPM seal, with valve springs (standard for DN 32)		
						H	Hygienic pump head with tri-clamp connectors (max. 10 bar) (upon request)		
							Hydraulic connector		
							0	Standard threaded connector (in line with technical data)	
							1	Union nut and PVC insert	

S1Ca Sigma 1, Control Type, Version a																
							2	Union nut and PP insert								
							3	Union nut and PVDF insert								
							4	Union nut and SS insert								
							7	Union nut and PVDF hose nozzle								
							8	Union nut and SS hose nozzle								
							9	Union nut and stainless steel welding sleeve								
								Version								
								0	With ProMinent® Logo							
								1	Without ProMinent® Logo							
									Electric power supply							
									U	1 ph, 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					
											Relay					
											0	No relay				
											1	Fault indicating relay N/C 1x changeover contact 230 V- 2 A				
											3	Fault indicating relay magnetic 1x changeover contact 230 V- 2 A				
											4	as 1 + pacing relay 2x N/O 24 V - 100 mA				
											5	as 3 + pacing relay 2x N/O 24 V - 100 mA				
											A	Cut-off and warning relays N/C 2x N/O 24 V - 100 mA				
											C	4-20 mA output = stroke length x-frequency, 1x fault indicating relay N/O 24 V - 100 mA				
											F	Power relay N/C 1x changeover contact 230 V- 8 A				
												Control versions				
												0	Manual + external with pulse control			
												1	Man. + external + pulse control + analog			
												4	as 0 + process timer			
												5	as 1 + process timer			
												R***	As 1 + PROFIBUS® interface, M12			
												C***	As 1 + CANopen			
													Access code			

S1Ca Sigma 1, Control Type, Version a																
													0	no access code		
													1	with access code		
													2	As 0 + message in the event of a manual stop		
													3	As 1 + message in the event of a manual stop		
														Dosing monitor		
														0	Input with pulse evaluation	
															Stroke length adjustment	
															0	Manual
															C	Manual + calibration

FPM = fluorine rubber

* for SST = 12 bar

** Standard with tube nozzle in the bypass Threaded connection on request.

*** With the options PROFIBUS® and CANopen no relay can be selected

2 Safety chapter

Explanation of the safety information

The following signal words are used in these operating instructions to identify different severities of a hazard:

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

Correct and proper use

- The pump may only be used to dose liquid metering chemicals.
- Only SST design pumps may be used with combustible feed chemicals.
- The pump may only be started up after it has been correctly installed and commissioned in accordance with the technical data and specifications contained in the operating instructions.
- The general limitations with regard to viscosity limits, chemical resistance and density must be observed - see also ProMinent resistance list (In the product catalogue or at *www.prominent.com*)!
- Any other uses or modifications are prohibited.
-
- The pump is not intended for the metering of gaseous media or solids.
- The pump is not intended for operation in hazardous locations.
- The pump is not intended for exterior applications without use of suitable protective equipment.
- The pump should only be operated by trained and authorised personnel, see the following "Qualifications" table.
- You are obliged to observe the information contained in the operating instructions at the different phases of the device's service life.

Safety information

WARNING!

Warning of hazardous or unknown feed chemical

Should a hazardous or unknown feed chemical be used, it may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (protective eyewear, protective gloves, ...). Read the safety data sheet on the feed chemical.
- Drain and flush the liquid end before working on the pump.

CAUTION!

Warning of feed chemical spraying around

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

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

CAUTION!

Warning of feed chemical spraying around

An unsuitable feed chemical can damage the parts of the pump contacted by the chemical.

- Take into account the resistance of the material contacted by the chemical when selecting the feed chemical - refer to the ProMinent® resistance list in the product equipment catalogue or at *www.prominent.com*.

CAUTION!

Danger of personal and material damage

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

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

CAUTION!

Danger from incorrectly operated or inadequately maintained pumps

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

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

CAUTION!

Warning of illegal operation

Observe the regulations that apply where the unit is to be installed.

Information in the event of an emergency

In the event of an electrical accident, disconnect the mains cable from the mains or press the emergency cut-off switch fitted on the side of the system!

If feed chemical escapes, also depressurise the hydraulic system around the pump as necessary. Adhere to the safety data sheet for the feed chemical.

Qualification of personnel

Activity	Qualification level
Storage, transport, unpacking	Instructed person
Assembly, installation of hydraulic system	Technical personnel, service
Installation, electrical	Electrical technician
Operation	Instructed person
Maintenance, repair	Technical personnel, service
Decommissioning, disposal	Technical personnel, service
Troubleshooting	Technical personnel, electrical technician, instructed person, service

Explanation of the terms:

Technical 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 gained by several years employment in the relevant work area.

Electrical technician

Electrical technicians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible dangers independently based on their technical training and experience, as well as knowledge of pertinent standards and regulations.

Electrical technicians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations.

Electrical technicians 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.

Customer Service department

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

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)

3 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 the section on decommissioning!

Only send metering pumps with a filled in 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 in the Appendix or at *www.prominent.com*.

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.

Scope of supply

Compare the delivery note with the scope of supply:

- Metering pump with mains power cable
- If necessary, connector kit for hose/pipe connection
- Product-specific operating instructions with EC Declaration of Conformity and supplementary information CD for ProMinent pump operating instructions.
- As necessary, documents for options and accessories

Storage

Personnel: ■ Technical personnel

1. Place the caps on the valves.

3. Preferably place the pump standing vertically on a pallet and secure against falling over.

4. Cover the pump with a tarpaulin cover - allowing rear ventilation.

Store the pump in a dry, closed shop under the following ambient conditions.

Ambient conditions

Data	Value	Unit
Minimum storage and transport temperature	-10	°C
Maximum storage and transport temperature	+50	°C
Maximum air humidity *	95	% rel. humidity

* non-condensing

4 Overview of equipment and control elements

Overview of equipment

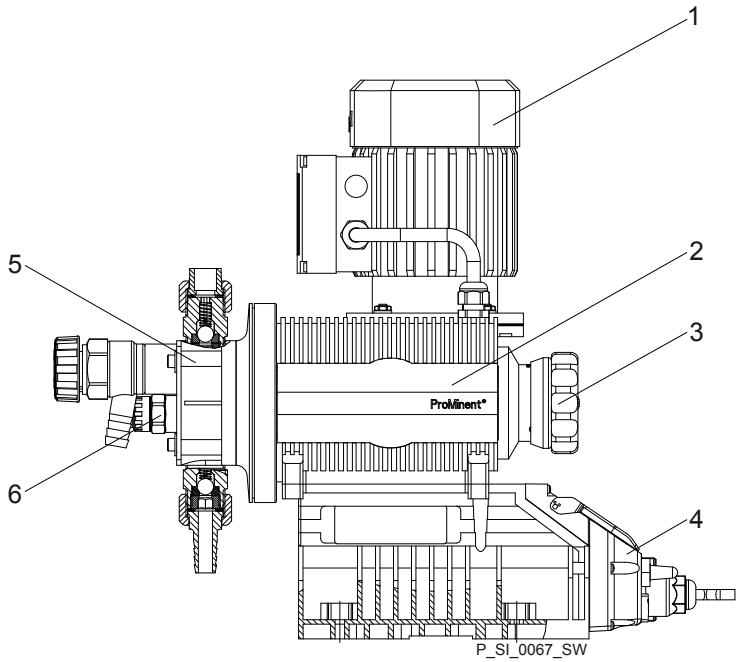


Fig. 1: Overview of equipment S1Ca

1 Drive motor
2 Drive unit
3 Control unit
4 Liquid end

Control elements

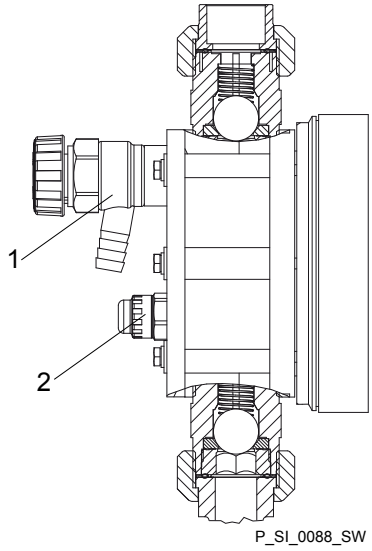


Fig. 2: Sigma control elements

1 Relief valve
2 Diaphragm rupture sensor (visual)

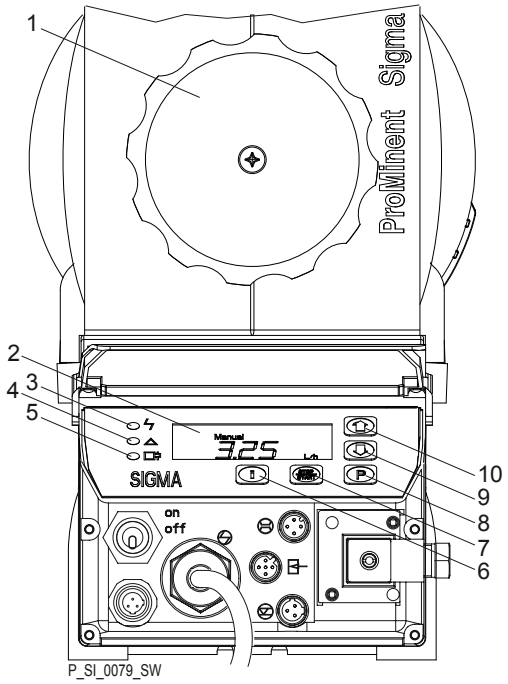


Fig. 3: Block diagram Sigma Control 1

1 Stroke adjustment dial
2 LCD screen
3 Operating indicator (green)
4 Warning indicator (yellow)
5 Fault indicator (red)
6 i *[key]*
7 *[START/STOP]* key
8 *[P]* key
9 *[DOWN]* key
10 *[UP]* key

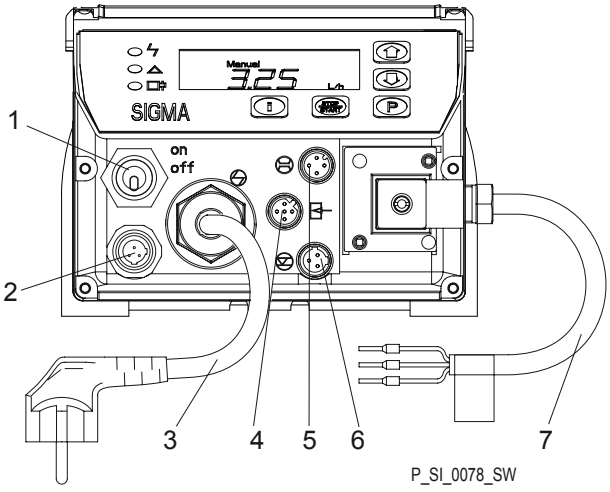


Fig. 4: Block diagram Sigma Control 2

1 Mains switch
2 "Diaphragm rupture" terminal
3 Mains Cable
4 "External control" terminal
5 "Dosing monitor" terminal
6 "Level Switch" terminal
7 Relay cable

5 Functional description

5.1 Drive unit

The metering pump is an diaphragm pump, the stroke length of which can be adjusted. An electric motor (1) drives the pump. A worm gear (2) steps down its drive rotation A cam (3), in conjunction with the uptake fork (8) converts this into an oscillation movement of the slide rod (4). A return spring (5) presses the uptake fork together with the slide rod positively against the cam thus producing the reciprocal stroke. The stroke length can be adjusted using the stroke adjustment dial (6) and the axle (7). The different stroke lengths are in effect caused by a limitation of the reciprocal strokes (see *"Illustration of the stroke movement" on page 15*). The slide rod transmits the stoke motion to the metering diaphragms.

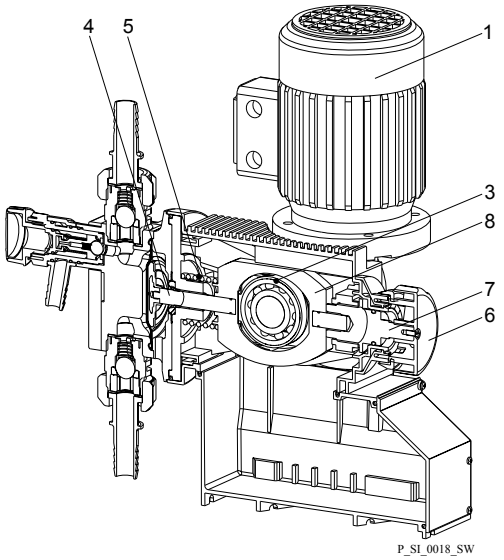


Fig. 5: Section through the drive unit Sigma 1

1 Electric motor
2 Worm gear (not visible)
3 Eccentric cam
4 Slide rod
5 Return spring
6 Stroke adjustment dial
7 Axle
8 Uptake fork

Illustration of the stroke movement

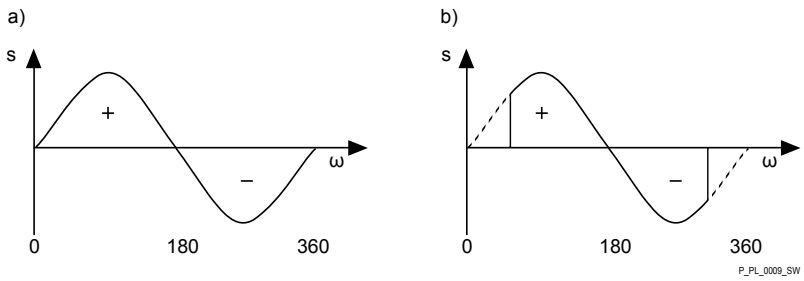


Fig. 6: Stroke movement at a) maximum stroke length and b) reduced stroke length.

s Stroke velocity
ω Cam rotational angle
\+ Discharge stroke
\- Suction stroke

5.2 Liquid end

The diaphragm (2) hermetically shuts off the pump volume of the dosing head (4) towards the outside. The suction valve (1) closes as soon as the diaphragm (2) is moved in to the dosing head (4) and the feed chemical flows through the discharge valve (3) out of the dosing head. The discharge valve (3) closes as soon as the diaphragm (2) is moved in the opposite direction due to the vacuum pressure in the dosing head and fresh feed chemical flows through the suction valve (1) into the dosing head. One cycle is thus completed.

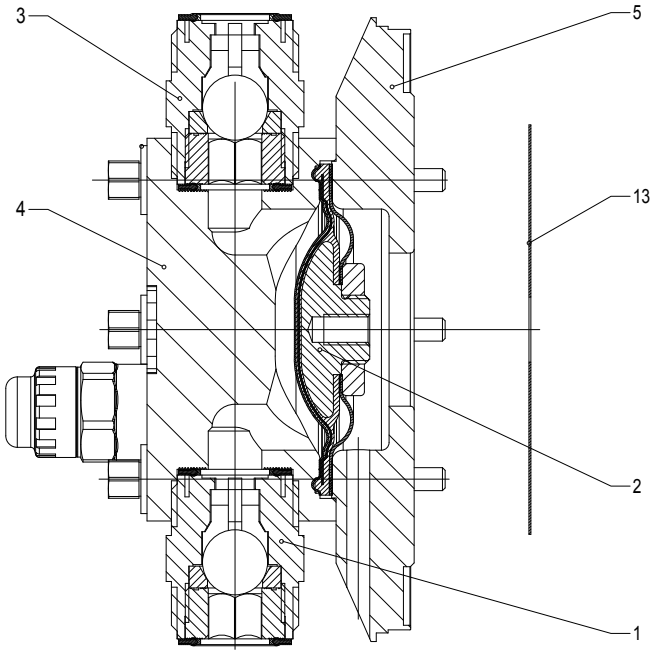


Fig. 7: Cross-section through the liquid end

1 Suction valve
2 Diaphragm
3 Discharge valve
4 Dosing head
5 Backplate
13 Safety diaphragm

5.3 Integral relief valve

The integral relief valve normally operates as a simple, directly controlled **bleeder valve**. As soon as the pressure exceeds the pressure value, which is set using the large spring (1), it lifts the ball (2). The feed chemical then flows out through the hose connection (5), e.g. into a storage tank.

The integral relief valve can only protect the motor and the gear, and then only against impermissible positive pressure that is caused by the metering pump itself. It cannot protect the system against positive pressure.

The integral relief valve works as a **bleed valve** if the rotary dial (3) is turned clockwise up to the "open" stop: This relieves the high force caused by the large spring (1) which was acting on the ball (2) - the ball is now controlled by the low force of the small spring (4). The integral relief valve is, when used in this way, a priming aid for starting up the pump against pressure.

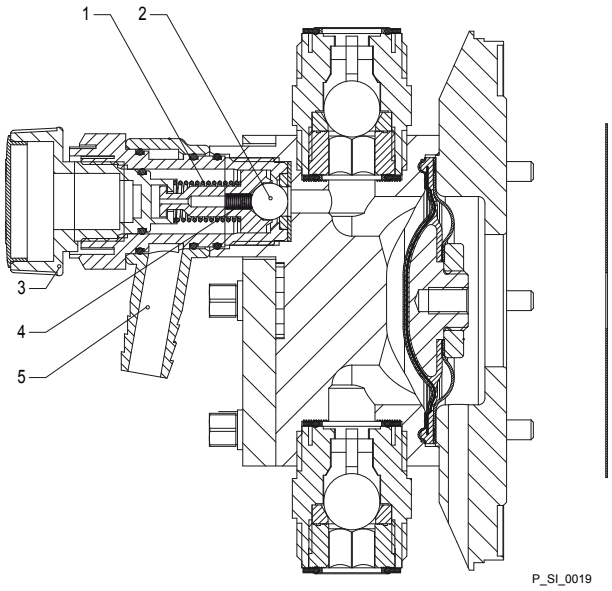


Fig. 8: Integral relief valve

1 Spring, large
2 Ball
3 Rotary dial
4 Spring, small
5 Hose connection

5.4 Multi-layer safety diaphragm

The multi-layer safety diaphragm has the same function as the conventional double diaphragm system with working and safety diaphragms; however it also has the advantage that both diaphragms are joined together in a single unit.

If the working layer (1) breaks, the feed chemical penetrates between the working and safety (2) layers and spreads out. The safety layer ensures that not feed chemical penetrates to the outside.

As soon as the feed chemical reaches the flap (3) on the edge of the multi-layer safety diaphragm, it inflates it. The flap presses a piston (4) in the membrane rupture sensor (5), so that this triggers.

With the **visual** diaphragm rupture sensor, the lowered red cylinder (6) springs forward beneath the transparent cover (7) so that it then becomes clearly visibleFig. 9.

With the **electrical** diaphragm rupture sensor, a switch is switched. A connected signalling device must signal the diaphragm rupture.

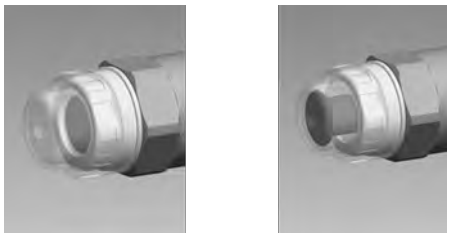


Fig. 9: Visual diaphragm rupture sensor, triggered and untriggered

The electrical diaphragm rupture sensor is connected to the "diaphragm rupture indicator" terminal. If a diaphragm rupture occurs, the red LED *"Fault"* indicator illuminates on the pump, the identifier *"Error"* and *"DIAPH"* flash on the LCD screen. Dependent on the identity code variant selected under "Displacement body", the pump either continues metering (*"Pump emits alarm"*) or stops (*"Pump stops"*).

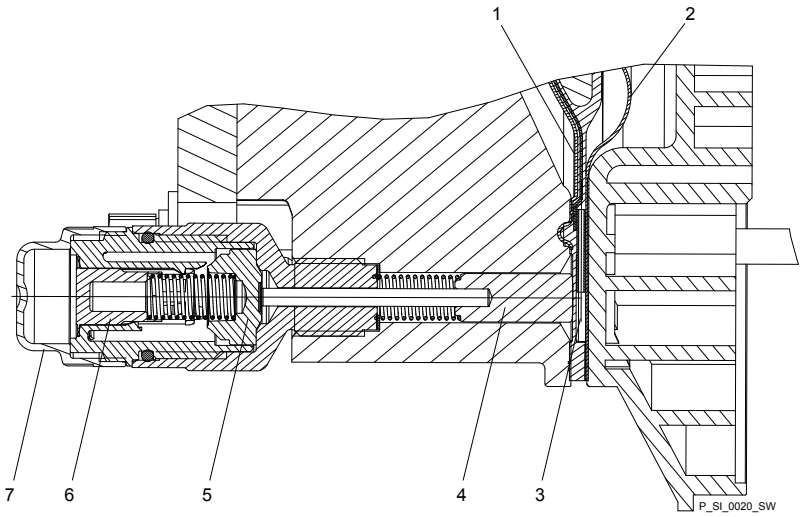


Fig. 10: Section through the Sigma diaphragm rupture warning system ("Visual break indicator" version)

1 Working layer (≙ operating diaphragm)
2 Safety layer (≙ safety diaphragm)
3 Flap
4 Piston
5 Diaphragm rupture sensor
6 Cylinder, red
7 Cover, transparent

5.5 Operating modes

The operating modes are selected via the *"MODE"* menu (dependent on the identity code, some operating modes may not be present):

"Analog" **operating mode** (Identity code, control variant: analog). The stroke rate is controlled using an analog current signal via the "External control" terminal Processing of the current signal can be preselected via the control unit.

"Manual" **operating mode** The stroke rate is set manually via the control unit. 100 % corresponds to 180 strokes/min.

"Contact" **operating mode:** This operating mode provides the option of making fine adjustments using small scaling or transfer factors. The metering can be triggered either by a pulse received via the "External control" terminal or through a contact or a semiconductor switching element. A metering quantity (batch) or a number of strokes (scaling or transfer factor 0.01 to 99.99) can be pre-selected via the control unit using the "Pulse Control" option.

"Batch" **operating mode:** This operating mode provides the option of working with large transfer factors (up to 65535). The metering can be triggered either by pressing the *[P]* key or by a pulse received via the "External control" terminal or through a contact or a semiconductor switching element. It is possible to pre-select a metering quantity (batch) or a number of strokes via the control unit.

"BUS" **operating mode** (Identity code, control variant: CANopen or PROFIBUS® This operating mode provides the option of controlling the pump via a BUS (see “Supplementary instructions for ProMinent® gamma/ L and ProMinent Sigma versions with PROFIBUS®".

5.6 Functions

The following functions can be selected using the SET menu:

"Calibrate" function: (Identity code, stroke length adjustment: manual + calibration) The pump can also be operated in the calibrated state in all operating modes. In this case, the corresponding continuous displays can then indicate the metering volume or the capacity directly. Calibration is maintained within a stroke rate range of 0 - 180 strokes/min. The calibration is also maintained when the stroke length is altered by up to ±10 % scale divisions.

"Auxiliary frequency" function: Enables a freely selectable and programmable stroke rate to be switched on in the *"SET"* menu, which can be controlled via the "External Control" terminal. This auxiliary frequency has priority over the operating mode stroke rate settings .

"Flow" function: Stops the pump when the flow is insufficient, provided a dosing monitor is connected. The number of defective strokes, after which the pump is switched off, can be set in the *"SET"* menu.

The following functions are available as standard:

"Level switch" function: Information about the liquid level in the chemical feed container is reported to the pump control. To do so, a two-stage level switch must be fitted; it is connected to the "Level switch" terminal.

"Pause" function: The pump can be remotely stopped via the "External Control" terminal. The "Pause" function only works via the "External Control" terminal.

The following functions are triggered by a key press:

"Stop" function: The pump can be stopped without disconnecting it from the power supply by pressing the *[STOP/START]* key.

"Prime" function: Priming (short-term transport at maximum frequency) can be triggered by simultaneous pressing of the two arrow keys in the "Stroke rate" continuous display.

5.7 Options

Relay option

The pump has two connecting options (not with PROFIBUS® or timer):

Option "Fault indicating relay" or "Power relay": In the event of fault signals, warning signals or tripped level switches, the relay connects to complete an electric circuit (for alarm horns etc.). The relay can be retrofitted via a knock-out in the drive unit.

"Fault indicating and pacing relay" option In addition to the fault indicating relay, the pacing relay can be used to make a contact every stroke. The relay can be retrofitted via a knock-out in the drive unit.

5.8 Function and fault Indicator

The operating and fault statuses are indicated by the three LED indicators and the *"Error"* identifier on the LCD screen, see also the "Trouble-shooting" chapter.

5.9 LCD screen

If a fault occurs, the identifier *"Error"* appears and an additional error message.

5.10 LED indicators

Operating indicator (green): The operating indicator illuminates if during pump operation there are no incoming fault or warning messages. It goes out briefly with every stroke.

Warning indicator (yellow): The warning indicator illuminates, if the pump electronics detect a condition which may lead to a fault, e.g. "liquid level low 1st stage".

Fault indicator (red): The fault indicator illuminates, if a fault occurs e.g. liquid level low 2nd stage".

5.11 Hierarchy of operating modes, functions and fault statuses

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

The following list shows the order:

1. - Priming
2. - Fault, Stop, Pause
3. - Auxiliary frequency (external frequency changeover)
4. - Manual, external contact

Comments:

re 1 - "Priming" can take place in any mode of the pump (providing it is functioning).

re 2 - "Fault", "Stop" and "Pause" stop everything apart from "Priming".

re 3 - The stroke rate of "Auxiliary rate" always has priority over the stroke rate specified by an operating mode or priority 4.

6 Assembly

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.

CAUTION!

Warning about personal and material damage

Personal and material damage may be caused if the unit is operated outside of the permissible ambient conditions.

- Please observe the permissible ambient conditions - refer to the chapter entitled "Technical Data".

Supporting floor

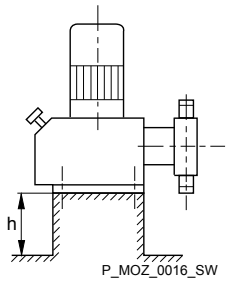


Fig. 11

WARNING!

Risk of electric shock

If water or other electrically conducting liquids penetrate into the drive housing, an electric shock may occur.

- Position the pump so that drive housing cannot be flooded.

WARNING!

The pump can break through the supporting floor or slide off it

- The supporting floor must be horizontal, smooth and permanently load-bearing.

Capacity too low

Vibrations can disturb the valves of the liquid end.

- *The supporting floor must not vibrate.*

Space requirement

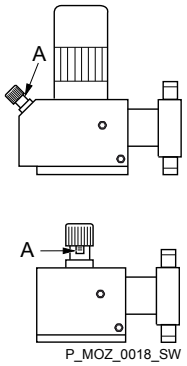


Fig. 12

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.

Position the pump so that control elements such as the stroke length adjustment knob, the indicating dial A or the oil inspection window are accessible.

In so doing, ensure there is enough space to carry out an oil change (vent screws, oil drain plugs, oil trough ...).

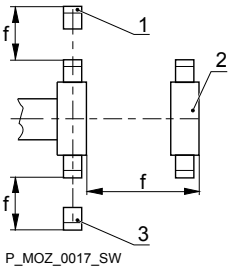


Fig. 13

1 Discharge valve
2 Dosing head
3 Suction valve

Ensure there is sufficient free space (f) around the dosing head as well as the suction and discharge valve so that maintenance and repair work can be carried out on these components.

Liquid end alignment

Capacity too low

If the valves of the liquid end do not stand upright, they cannot close correctly.

– *The discharge valve must be upright.*

Fastening

Capacity too low

Vibrations can disturb the valves of the liquid end.

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

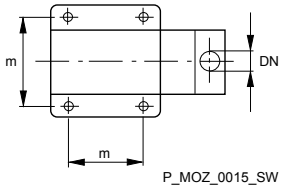


Fig. 14

Take the dimensions (m) for the fastening holes from the appropriate dimensional drawings or data sheets.

Fasten the pump base to the supporting floor using suitable screws.

7 Installation

CAUTION!

Danger of personnel injury and material damage

The disregard of technical data during installation may lead to personal injuries or damage to property.

– Observe the technical data- refer to chapter "Technical Data" and, where applicable, the operating instructions of the accessories.

7.1 Installation, hydraulic

WARNING!

Warning of feed chemical reactions to water

Feed chemicals that should not come into contact with water may react to residual water in the liquid end that may originate from works testing.

– Blow the liquid end dry with compressed air through the suction connector.
– Then flush the liquid end with a suitable medium through the suction connector.

WARNING!

The following measures are an advantage when working with highly aggressive or hazardous feed chemicals:

– Install a bleed valve with recirculation in the storage tank.
– Install an additional shut-off valve on the discharge or suction ends.

CAUTION!

Warning about personal and material damage

Also observe the "General Operating Instructions for ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories"!

CAUTION!

Suction problems possible

For feed chemicals with a particle size greater than 0.3 mm, the valves may no longer close properly.

– Install a suitable filter in the suction line.

CAUTION!

Warning against the discharge line bursting

With a closed discharge line (e.g. due to a clogged discharge line or by closing a valve), the pressure that the metering pump generates can reach several times the permissible pressure of the system or the metering pump. This could lead to lines bursting resulting in dangerous consequences with aggressive or toxic feed chemicals.

– Install a relief valve that limits the pressure of the pump to the maximum permissible operating pressure of the system.

CAUTION!

Warning against bursting of the suction or discharge lines

Hose lines with insufficient pressure rating may burst.

– Only use hose lines with the required pressure rating.

CAUTION!

Warning against lines disconnecting

With suction, discharge and relief lines installed incorrectly can loosen / disconnect from the pump connection.

– Only use original hoses with the specified hose diameter and wall thickness.
– Only use clamping rings and hose nozzles that correspond with the respective hose diameter.
– Always connect the lines without mechanical tension.

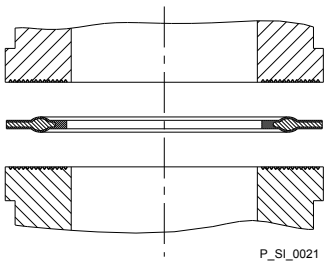


Fig. 15: Moulded composite seals with corrugated insert

CAUTION!

Warning against leaks

Leaks can occur on the pump connection depending on the insert used.

– The pump is supplied with PTFE moulded composite seals with a flare, which are used for the pump connections. They seal the connections between grooved pump valves and the grooved inserts from ProMinent - see Fig. 15.
– In the event that an unflared insert is used (e.g. third party part), an elastomer flat seal must be used - see Fig. 16.

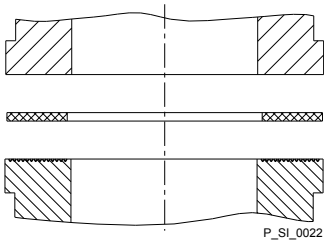


Fig. 16: Elastomer flat seal with an insert without flare

Numerous installation instructions with drawings are contained in the "General Operating Instructions for ProMinent® metering pumps and hydraulic accessories".

– *Precise metering is only possible when the back pressure is maintained above 1 bar at all times.*
– *If metering at atmospheric pressure, a back pressure valve should be used to create a back pressure of approx. 1.5 bar.*

CAUTION!

Warning of backflow

A back pressure valve, spring-loaded injection valve, relief valve, foot valve or a liquid end do not represent absolutely leak-tight closing elements.

– For this purpose use a shut-off valve, a solenoid valve or a vacuum breaker.

CAUTION!

Warning of illegal operation

Observe the regulations that apply where the unit is to be installed.

CAUTION!

To check the pressure conditions in the piping system it is recommended that connecting options are provided for a manometer close to the suction and pressure connector.

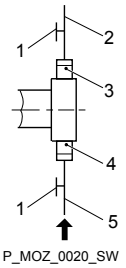


Fig. 17: Manometer connecting options

1 Manometer socket
2 Discharge line (pipe)
3 Discharge valve
4 Suction valve
5 Suction line (pipe)

CAUTION!

Connect the pipelines to the pump so that no residual forces act on the pump, e.g. due to the offsetting, weight or expansion of the line.

Only connect steel or stainless steel piping via a flexible piping section to a plastic liquid end.

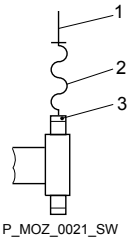


Fig. 18: Steel pipeline at the liquid end

1 Steel pipeline
2 Flexible pipe section
3 Plastic liquid end

Integral relief valve

CAUTION!

Danger due to incorrect use of the integral relief valve

The integral relief valve can only protect the motor and the gear, and then only against impermissible positive pressure that is caused by the metering pump itself. It cannot protect the system against positive pressure.

– Protect the motor and gear of the system against positive pressure using other mechanisms.
– Protect the system against illegal positive pressure using other mechanisms.

CAUTION!

Warning of feed chemical spraying around

If no relief valve was connected to the overflow line, the feed chemical sprays out of the hose connection as soon as the relief valve opens.

– An overflow line must always be connected to the integral relief valve and be fed back to the storage tank or - if required by the regulations - into a special storage tank.

CAUTION!

Danger of cracking

Cracking of the PVT liquid end can occur if a metal overflow line is connected to the relief valve.

– Never connect a metal overflow line to the relief valve.

CAUTION!

Danger of the integral relief valve failing

The integral relief valve no longer operates reliably with feed chemicals having a viscosity of greater than 200 mPa s.

– Only use the integral relief valve with feed chemicals having a viscosity up to 200 mPa s.

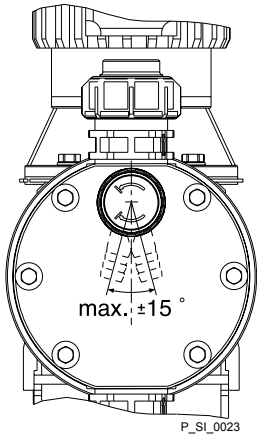


Fig. 19: Permissible alignment of the relief valve

CAUTION!

Warning against leaks

Feed chemical which remains in the overflow line at the relief valve, can attack the valve or cause it to leak

– Route the overflow line with a continuous slope and moreover with the tube nozzle pointed downwards - see Fig. 19.

If the overflow line is fed into the suction line, the bleed function is blocked.

Therefore lead the overflow line back into the storage tank.

When operating the integral relief valve close to the opening pressure, a minimal overflow into the overflow line can occur.

Diaphragm rupture sensor

CAUTION!

Danger resulting from unnoticed diaphragm rupture

If the pump has been ordered with an electric diaphragm rupture sensor, it still has to be installed.

– Screw the enclosed diaphragm rupture sensor into the liquid end (no seal necessary).

CAUTION!
Warning of unnoticed diaphragm rupture
Only above approximately 2 bar system back pressure is a signal generated upon a diaphragm rupture.

– Only rely on the diaphragm rupture sensor at back pressures greater than 2 bar.

7.2 Installation, electrical

General safety notes

WARNING!
Danger of electric shock
Unprofessional installation may lead to electric shocks.

– All cable cores cut to length must be provided with cable end sleeves.
– The Installation, electrical of the device may only be undertaken by technically trained personnel.

CAUTION!
Warning about personal and material damage
Also observe the "General Operating Instructions for ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories"!

What requires electrical installation?

What requires electrical installation?

- Level switch
- Diaphragm rupture sensor (Option)
- Dosing monitor (option)
- Relay (option)
- External control
- mA output (option)
- Bus connector (option)
- Timer (option)
- Pump, power supply

7.2.1 Control connectors

CAUTION!
Incoming signals can remain without effect
If the universal control wire, the external/pacing cable or the level monitoring cable is shortened below 1.20 m, the pump does not detect that it is connected. Consequently a warning message (for example) can be suppressed.

– Do not shorten this cable below 1.20 m.

Level switch, diaphragm rupture sensor (option) and dosing monitor (option)

Connect the plugs of the level switch, diaphragm rupture sensor and dosing monitor to the corresponding sockets on the front side of the control. In case of uncertainty - see chapter "Overview of equipment and control elements"

For technical data see "Technical Data" chapter.

Pacing relay (option)

1. Install the cable which originates from the pacing relay - see the figure in the chapter entitled "Overview of equipment and control elements": Cable A, left.

The cable polarity is unimportant.

2. Install the power supply cable to the pacing relay PCB - see the figure in the chapter entitled "Overview of equipment and control elements": Cable B, right.

CAUTION!

Warning of overload

If the current through the relay becomes too high, both it and the pump could be destroyed by overheating.

– Fit a circuit breaker.

Relay technical data

The contacts are potential-free.

As a NC fault indicating relay the relay closes immediately after the power is switched on and opens in the event of a fault.

As a N/O fault indicating relay, the relay closes in the event of a fault.

Use suitable interference suppression (e.g. RC members) when connecting inductive loads.

Fault indicating relay

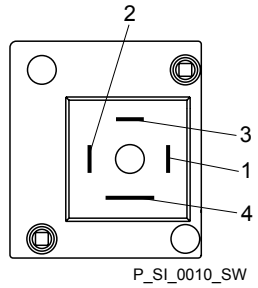


Fig. 20: Pump pin assignments

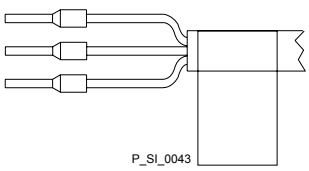
Data	Value	Unit
Maximum voltage	250	VDC (50/60 Hz)
Maximum current	2	A (resistive)
Closing duration	-	
Service life *	> 200 000	Play

* at rated load

Behaviour: - see identity code

The contacts are potential-free.

Fault indicating relay



Pin assignment

Fig. 21: Cable conductor assignments

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

- *As a NC fault indicating relay - the relay closes immediately after the power is switched on and opens in the event of a fault.*
- *As a N/O fault indicating relay, the relay closes in the event of a fault.*

Fault indicating and pacing relay option

Fault indicating relay

Data	Value	Unit
Maximum voltage	24	VAC (50/60 Hz)
Maximum current	100	mA
Closing duration	100	ms
Service life *	> 200 000	Play

* at rated load

Behaviour: - see identity code

The contacts are potential-free.

Pacing relay

Data	Value	Unit
Maximum voltage	24	VDC
Maximum current	100	mA
Closing duration	100	ms
Service life *	50 x 10^6 (10 V, 10 mA)	Play

* at rated load

Behaviour: - see identity code

The contacts are potential-free.

Fault indicating and pacing relay option

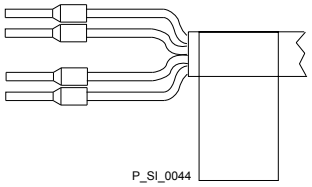


Fig. 22: Cable conductor assignments

Pin assignment

To pin	VDE cable	Contact	Relay
1	yellow	NO (normally open)	Fault indicating relay
4	green	C (common)	Fault indicating relay
3	white	NO (normally open)	Pacing relay
2	brown	C (common)	Pacing relay

– *As a NC fault indicating relay - the relay closes immediately after the power is switched on and opens in the event of a fault.*
– *As a N/O fault indicating relay, the relay closes in the event of a fault.*

Output relay

Data	Value	Unit
Maximum voltage	250	VDC (50/60 Hz)
Maximum current	16	A (resistive)
Closing duration	-	
Service life *	> 30 000	Play

* at rated load

Behaviour: - see identity code

The contacts are potential-free.

Output relay

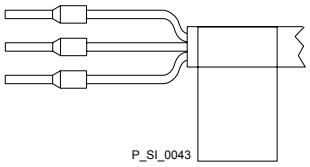


Fig. 23: Cable conductor assignments

Pin assignment

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

Fault indicating and pacing relay option

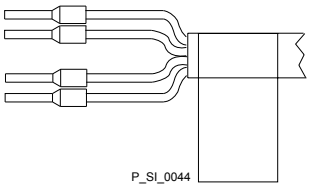


Fig. 24: Cable conductor assignments

Pin assignment

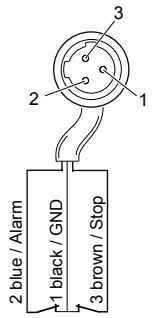
To pin	VDE cable	Contact	Relay
1	yellow	NO (normally open)	Fault indicating relay
4	green	C (common)	Fault indicating relay
3	white	NO (normally open)	Pacing relay
2	brown	C (common)	Pacing relay

External control

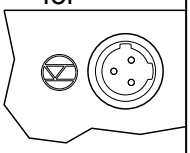
Wiring diagram

View of the cable plug from the front

Level switch cable



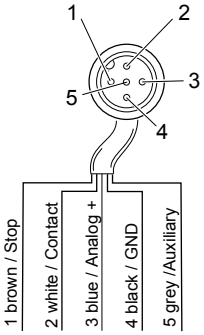
for



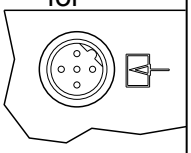
blue + black: open
-> Alarm message

brown + black: open
-> Alarm message + Pump stopped

Universal control wire (5-core)



for



Pause function:

brown + black: closed
-> Pump dosing

brown + black: open
-> Pump stopped

External/Contact:

white + black: close
-> Start contact for pump

(Pause function inactive?:
brown + black: closed)

Analog:

blue, black
-> Analog input 0/4-20 mA

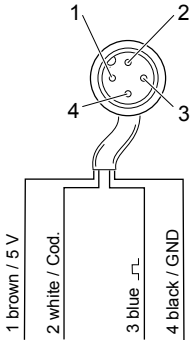
(Pause function inactive?:
brown + black: closed)

Auxiliary rate:

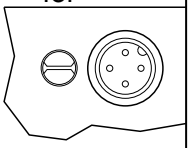
grey + black: closed
-> Pump dosing with preset stroke rate

➜ Wiring example - see next page

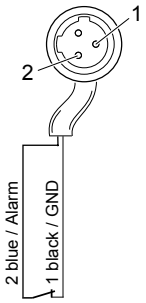
Dosing monitor cable



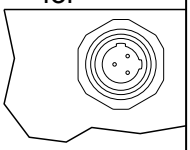
for



Diaphragm rupture sensor cable

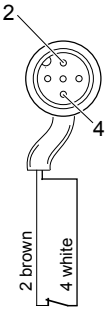


for

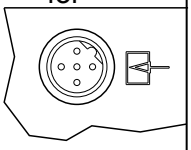


Contact open -> Alarm message +
For control type 0: Pump stopped

External/contact cable (2-core)



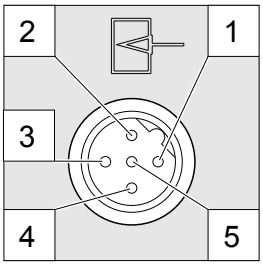
for



Close contact -> Metering stroke

P_SI_0090_SW

Technical data "external control"



P_BE_0014_SW

Semi-conductor switch elements with a residual voltage of -0.7 V (e.g. transistors in open-collector circuits) or contacts (relays) can be used as input switch elements.

Control type 0 (see identity code)

Pin		
Pin 1 = Pause input (activating function)	Voltage with open contacts:	approx. 5 V
	Input resistance:	10 kΩ
	Control:	■ Potential-free contact (approx. 0.5 mA) ■ Semiconductor switch (residual voltage < 0.7 V)
2 = contact input	Voltage with open contacts:	approx. 5 V
	Input resistance:	10 kΩ
	Control:	■ Potential-free contact (approx. 0.5 mA) ■ Semiconductor switch (residual voltage < 0.7 V)
	min. contact duration:	20 ms
	Max. pulse frequency:	25 pulses/s
3 = not assigned		
4 = GND		
5 = auxiliary input	Voltage with open contacts:	approx. 5 V
	Input resistance:	10 kΩ
	Control:	■ Potential-free contact (approx. 0.5 mA) ■ Semiconductor switch (residual voltage < 0.7 V)

Control type 1 (see identity code)

Pin		
Pin 1 = Pause input (activating function)	Voltage with open contacts:	approx. 5 V
	Input resistance:	10 kΩ
	Control:	■ Potential-free contact (approx. 0.5 mA) ■ Semiconductor switch (residual voltage < 0.7 V)
2 = contact input	Voltage with open contacts:	approx. 5 V
	Input resistance:	10 kΩ
	Control:	■ Potential-free contact (approx. 0.5 mA) ■ Semiconductor switch (residual voltage < 0.7 V)
	min. contact duration:	20 ms
	Max. pulse frequency:	25 pulses/s
3 =Analog input*	Input apparent ohmic resistance	approx. 120 Ω
4 = GND		
5 = auxiliary input	Voltage with open contacts:	approx. 5 V
	Input resistance:	10 kΩ
	Control:	■ Potential-free contact (approx. 0.5 mA) ■ Semiconductor switch (residual voltage < 0.7 V)

* The metering pump makes its first metering stroke at approx. 0.4 mA (4.4 mA) and starts continuous operation at approx. 19.2 mA.

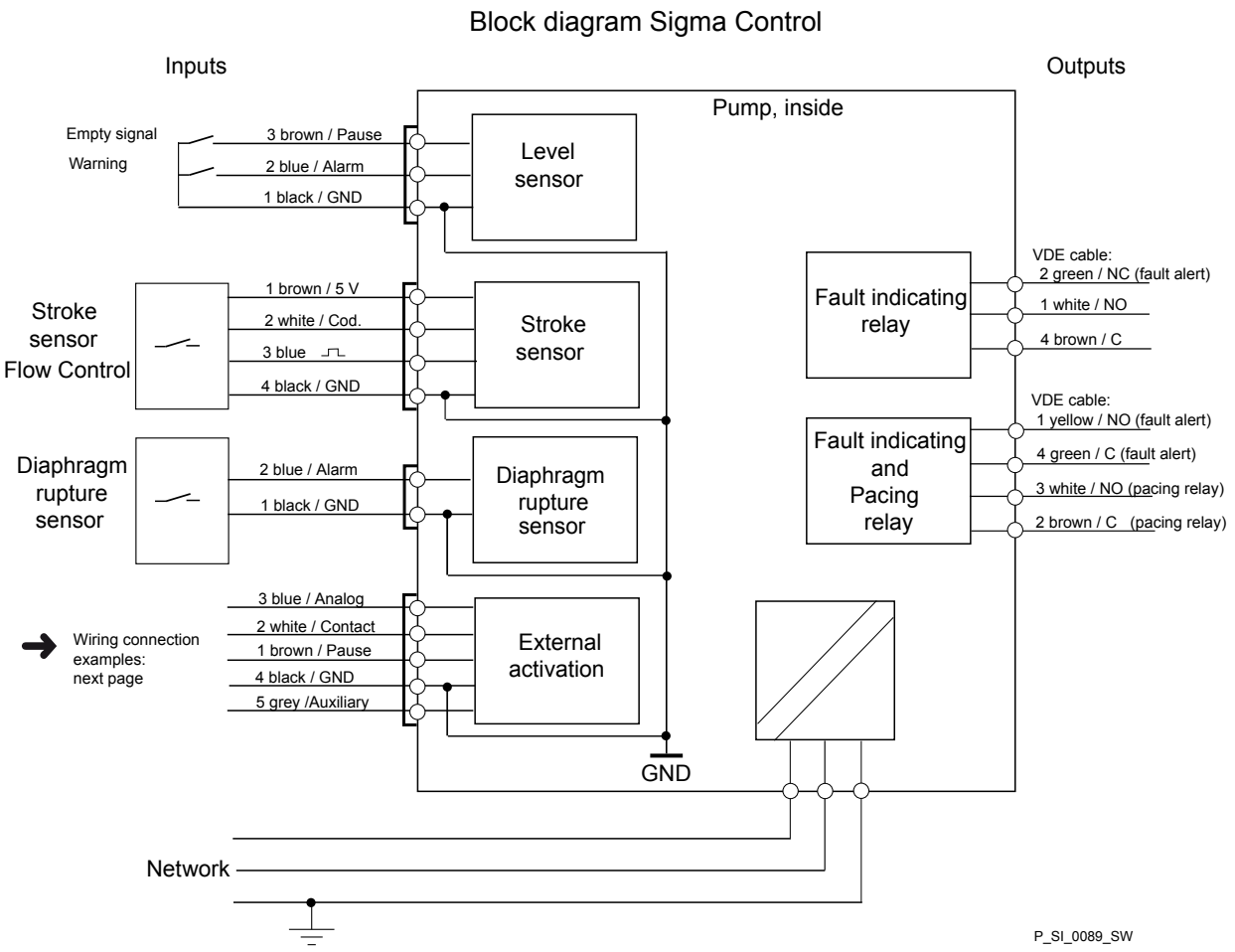
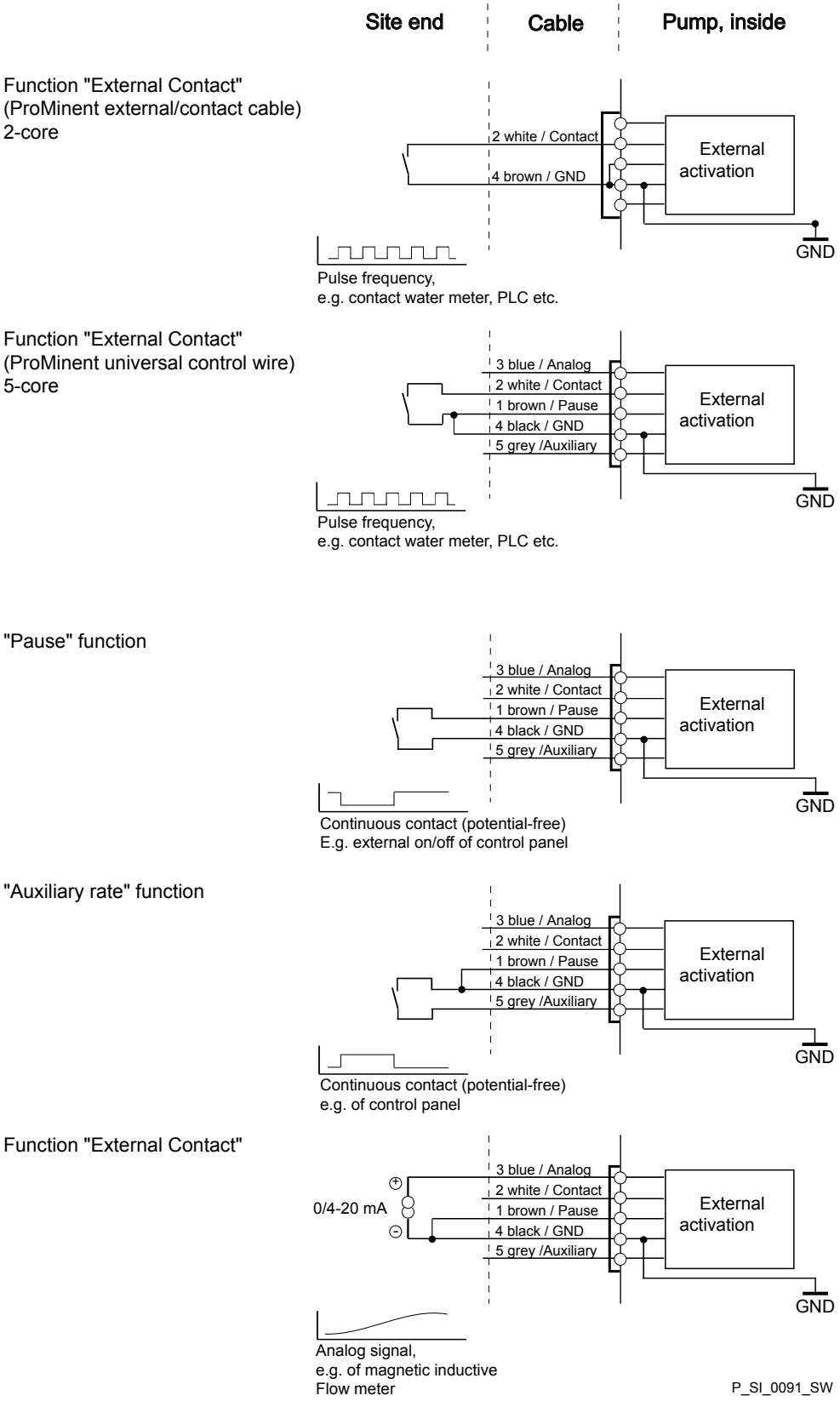


Fig. 25: Block diagram Sigma Control

Universal control wire connection diagram



7.2.2 Pump, power supply

1. Install an emergency cut-off switch or include the pump in the emergency cut-off management of the system.
2. Install the pump cable.

– *Key electrical data can be found on the pump nameplate.*

7.2.3 Other units

Other units

Install the other units according to their supplied documentation.

8 Adjustment

For supplementary information see "Control elements and key functions" in the chapter "Overview of equipment and control elements" and "Operating/setting overview" in the appendix.

The pump control returns to the continuous display, as soon as no key has been pressed for one minute.

8.1 Basic principles of pump adjustment

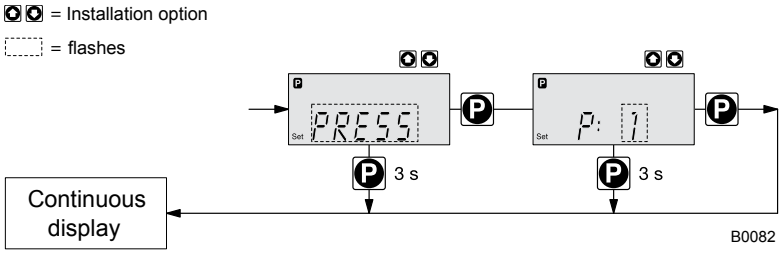


Fig. 26

Confirming an entry

Briefly press the *[P]* key

⇨ The display simultaneously changes to the next menu option or into a continuous display.

Quitting a menu point without confirming it

Press and hold the *[P]* key for 3 seconds

⇨ Entry is cancelled and you jump back to a continuous display.

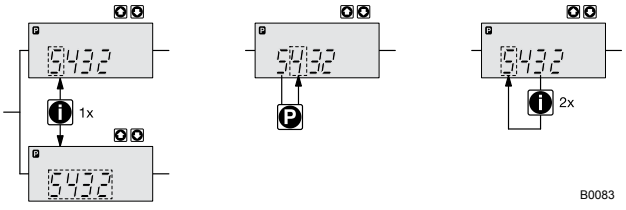


Fig. 27: a) Toggle between changing of individual digits and changing a number; b) Changes the position within the number; c) jump back in the number. More detailed explanations are given in the following text.

Incremental changing of a value

Press the *[i]* key once.

You can toggle between altering the digits of a value (“change individual digits” = standard) and incremental changing of a value (“change a number”).

Changing adjustable values

→ Press the arrow keys *[UP]* or *[DOWN]*.

⇨ The flashing digit or number counts up or down.

Confirming adjustable values

→ Under "change individual digits": confirm each digit by pressing the *[P]* key.

⇨ Upon confirming the last individual digit, the display simultaneously changes to the next menu option or into a continuous display.

→ Under "change a number": Press the *[P]* key 1x.

⇨ The display simultaneously changes to the next menu option or into a continuous display.

Correcting incorrectly set digits

→ Press the *[i]* key 2x.

⇨ You jump back to the first digit.

8.2 Checking adjustable values

Before you adjust the pump control, you can check the actual settings of the adjustable values:

→ Press the *[i]* key ("i" for "Info"), if the LCD screen shows a continuous display (The display does not contain the *[P]* key symbol).

⇨ Each press of the *[i]* key toggles the continuous display output to the screen to another continuous display.

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

8.3 Changing to adjustment mode

1. → In a continuous display press the *[P]* key for at least 2 seconds.

   ⇨ The pump control changes to adjustment mode.

2. → If *"CODE 1"* was set, then after pressing the *[P]* key, the code must first be entered.

The following menus can initially be chosen in adjustment mode - see also "Operating/setting overview" in the appendix:

- *"MODE"* menu
- *"CODE"* menu (option)
- *"SET"* menu
- *"CLEAR"* window

To match the pump to your process requirements, you must observe the following procedure:

1. In the *"MODE"* menu select the operating mode.
2. If necessary make the settings for this operating mode in the *"SET"* menu.

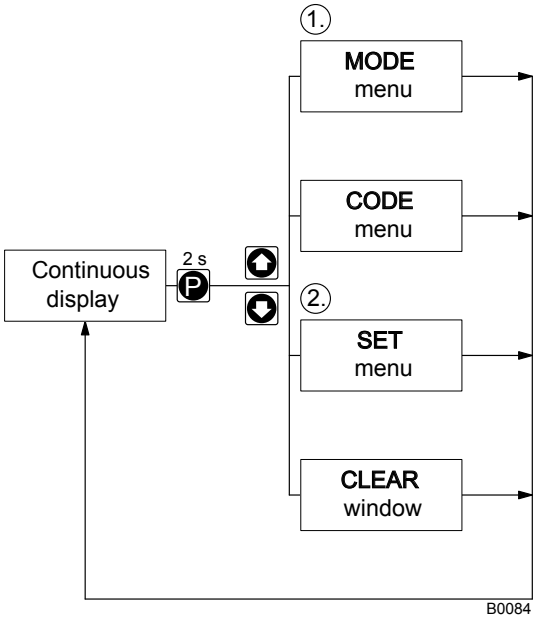


Fig. 28

Exceptions: Timer and PROFIBUS®.

Note the diagram.

8.4 Operating mode selection (MODE menu)

In the *"MODE"* menu (dependent on the identity code, some operating modes may not be present):

- *"Manual"*: for manual operation (identity code control variant: "Manual", available as standard)
- *"Analog"*: for current control (identity code control variant: "Analog current")
- *"Contact"*: for contact operation (identity code control variant: "External 1:1" / "External with pulse control")
- *"Batch"*: for batch operation (identity code control variant: "External with pulse control")

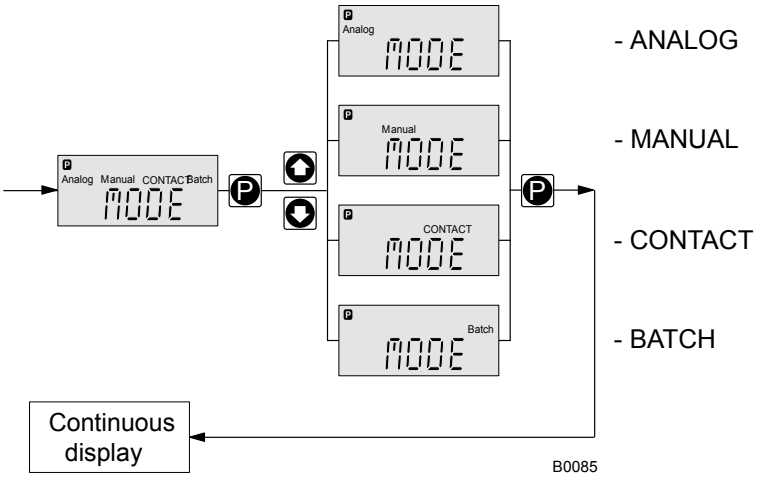


Fig. 29

8.5 Operating mode settings (SET menu)

First in the "MODE" menu select the operating mode!

Exceptions: Timer and PROFIBUS®.

In the *"SET"* menu, you can make various settings dependent on the selected operating mode.

Adjustment menus are available in all operating modes for the following programmable functions:

- Calibrate (*"CALIB"* menu)
- Auxiliary rate (*"AUX"* menu)
- Flow (*"FLOW"* menu; only available if a dosing monitor is connected) - see also the chapter "Programmable function settings (SET menu)".

As to whether or not a further setting menu is available, depends on the selected operating mode.

8.5.1 "Manual" operating mode settings

Other than those described in more detail in the chapter "Programmable function settings (SET menu)" there are no other setting menus available in *"Manual"* operating mode via the *"SET"* menu.

8.5.2 "Analog" operating mode settings (ANALG menu)

Overview

Alongside those described in more detail in the chapter "Programmable function settings (SET menu)" the *"ANALG"* menu is also available in *"Analog"* operating mode via the *"SET"* menu.

The stroke rate is controlled using an analog current signal via the "External control" terminal

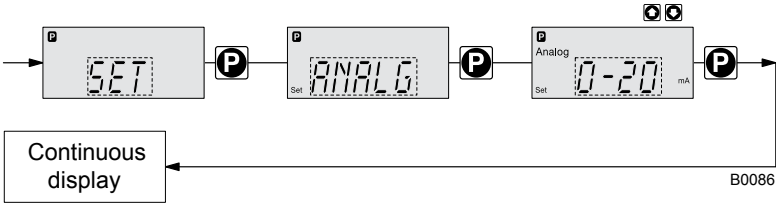


Fig. 30

You can select three types of current signal processing:

- *"0 - 20 mA"*:
  - At 0 mA the pump is stationary.
  - At 20 mA the pump works at the maximum stroke rate.
  - Between these values, the stroke rate is proportional to the current signal.
- *"4 - 20 mA"*:
  - At 4 mA the pump is stationary.
  - At 20 mA the pump works at the maximum stroke rate.
  - Between these values, the stroke rate is proportional to the current signal.
  - For current signals less than 3.8 mA a fault message appears and the pump stops (e.g. if a cable has broken).
- *"Curve"*: Under the *"Curve"* processing type, you can freely program the pump behaviour. There are three options:
  - Line ·····
  - Lower sideband --\--
  - Upper sideband --/--

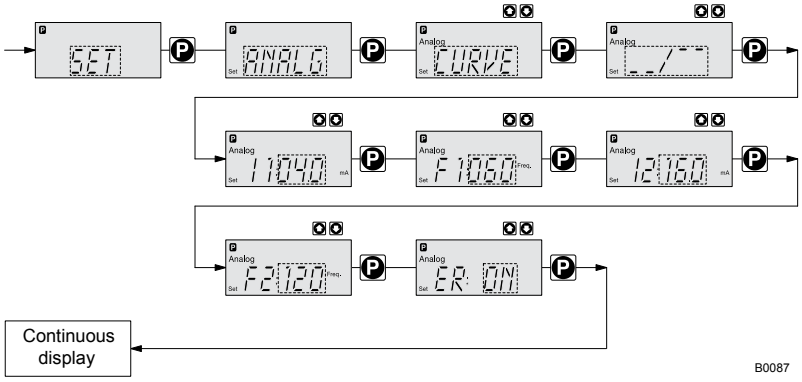


Fig. 31

Line

The symbol ····· appears on the LCD screen. You can enter any stroke rate- behaviour of the pump 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); this defines a straight line and thus the behaviour is specified:

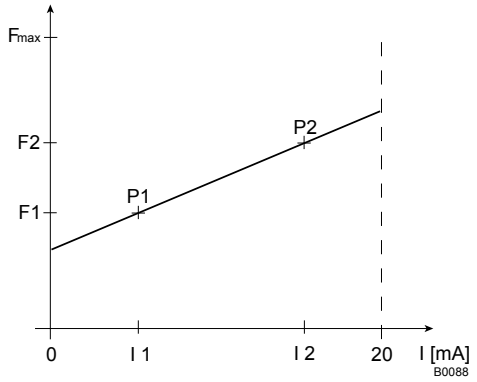


Fig. 32

F1 Stroke rate at which the pump should operate with current I1
F2 Stroke rate at which the pump should operate with current I2

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

Upper/lower sideband

Using these processing types, you can control a metering pump using the current signal as shown in the diagrams below.

Lower sideband:

The symbol ⁻⁻__ appears on the LCD screen. Below I1, the pump works at a rate of F1 - above I2 it stops. Between I1 and I2 the stroke rate varies between F1 and F2 in proportion to the signal current.

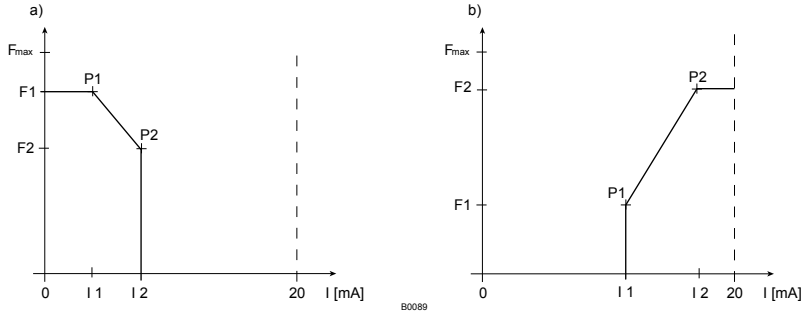


Fig. 33: Lower sideband, e.g. alkali pump

Upper sideband:

The symbol __/⁻⁻ appears on the LCD screen. Below I1, the pump is stationary - above I2 the pump works at rate F2. Between I1 and I2 the stroke rate varies between F1 and F2 in proportion to the signal current.

The smallest processable difference between I1 and I2 is 4 mA

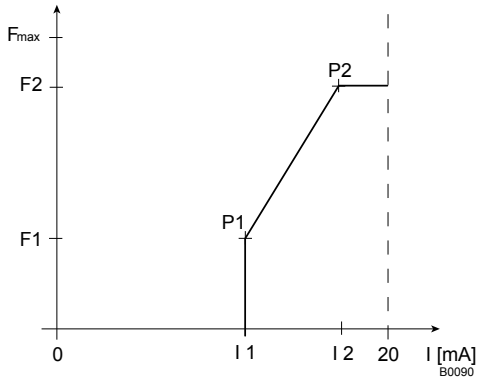


Fig. 34: Upper sideband, e.g. acid pump

Fault processing

Under menu option *"ER"* (Error) you can activate error processing for the *"Curve"* processing type. For current signals below 3.8 mA, a fault message appears and the pump stops.

8.5.3 "Contact" operating mode settings (CNTCT menu)

Alongside those described in more detail in the chapter "Programmable function settings (SET menu)" the *"CNTCT"* menu is also available in *"Contact"* operating mode via the *"SET"* menu.

"Contact" operating mode allows you to trigger individual strokes or a stroke series. 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 with a reduction (bridge) or small step-up into strokes.

CAUTION!
If you change into another operating mode, the factor is reset to "1".

With the identity code version "Contact - identity code: External with pulse control" you can enter after how many pulses a stroke should occur. "Contact - identity code: External with pulse control" is intended for small metering quantities.

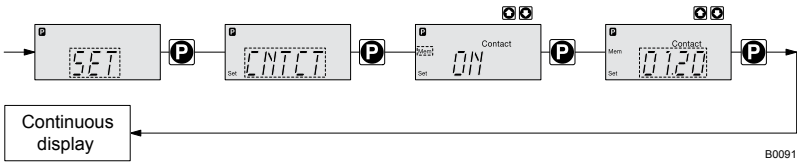


Fig. 35

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

Number of strokes executed = factor x number of incoming pulses

Example

Example table

	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)
Reduction	1	1	1
	0.50	2	1
	0.50	10	1
	0.50	100	1
	0.50	4	1
	0.50	2.5 (3 / 2)	(1 / 1)
	0.50	1.33 (2 / 1 / 1)	(1 / 1 / 1)

Explanation of step-up

Factor	Pulse and strokes
with a factor 1 ...	1 stroke is executed per pulse
with a factor 2 ...	2 strokes are executed per pulse
with a factor 25 ...	25 strokes are executed per pulse

Explanation of reduction

Factor	Pulse and strokes
with a factor 1 ...	1 stroke is completed after 1 pulse
with a factor 0.5 ...	1 stroke is completed after 2 pulses
with a factor 0.1 ...	1 stroke is completed after 10 pulses
with a factor 0.75 ...	1 stroke is completed after 2 pulses once, then 1 stroke is completed after 1 pulse twice and then (repeating) 1 stroke after 2 pulses, etc...

If a remainder is obtained when dividing by the factor, then the pump software 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.

"Memory" function extension

You can also activate the "Memory" function extension (identifier *"Mem"* appears on the LCD screen; *"Mem"* = memory). When "Memory" is activated, the pump software adds up the remaining strokes , which could not be processed, up to the maximum capacity of the stroke memory of 65,535 strokes. If this maximum capacity is exceeded, the pump goes into fault mode.

You can thus optimally match the pump to the process in question, for example in conjunction with contact water meters.

8.5.4 "Batch" operating mode settings (BATCH menu)

Alongside those described in more detail in the chapter "Programmable function settings (SET menu)" the *"BATCH"* menu is also available in *"Batch"* operating mode via the *"SET"* menu.

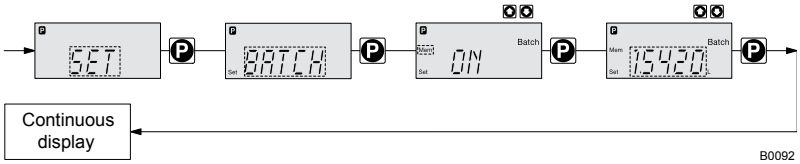


Fig. 36

The operating mode *"Batch"* is a variant of the operating mode *"Contact"* - in the first place see " *"Contact"* operating mode settings". Here also, you can select a number of strokes (no fractions, only integers from 1 to 65535), but also a metering quantity (Batch). To change between the input "Number of strokes" and "Metering quantity" press the *[i]* key 1x under the corresponding menu option (see "Operating / adjustment overview" in the appendix).

"Batch" operating mode is intended for large metering quantities.

The metering can be triggered either by pressing the *[P]* key or by a pulse received via the "External control" terminal.

The number of received pulses, which could not yet be processed, is stored by the pump control in the stroke memory. The stroke memory is limited to the Batch size if "Memory" is not activated, with "Memory" to 65535 strokes.

You can delete it by changing to another operating mode.

"Memory" function extension

You can also activate the "Memory" function extension (identifier *"Mem"* appears on the LCD screen; *"Mem"* = memory). When "Memory" is activated, the pump software adds up the remaining strokes , which could not be processed, up to the maximum capacity of the stroke memory of 65,535 strokes. If this maximum capacity is exceeded, the pump goes into fault mode.

You can thus optimally match the pump to the process in question, for example in conjunction with contact water meters.

8.6 Programmable function settings (SET menu)

Setting menus are available in the SET menu in all operating modes for the following programmable functions:

- Calibrate (*"CALIB"* menu)
- Auxiliary rate (*"AUX"* menu)
- Flow (*"FLOW"* menu; (only available if a dosing monitor is connected)

8.6.1 “Calibrate” function settings (CALIB menu)

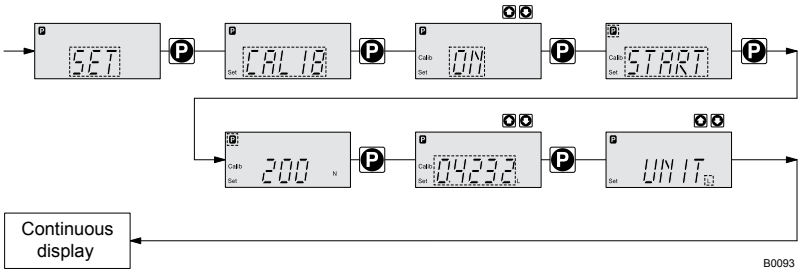


Fig. 37

The pump can also be operated in the calibrated state. In this case, the corresponding continuous displays then indicate the metering volume or the capacity directly. The calibration is maintained when the stroke length is altered by up to ±10 scale divisions (for a set stroke length of 40 % this corresponds to a range from 30 % ... 50 %). If the stroke length is changed by more than ±10 scale divisions, the yellow warning light illuminates, the continuous display flashes and the flashing identifier *“Calib”* appears.

– *Do not allow the stroke length to fall below 20 %! Otherwise the calibration becomes inaccurate.*
– *The calibration becomes more accurate, the more strokes the pump makes during calibration. Recommendation: at least 200 strokes.*

Calibration

CAUTION!
Danger with dangerous feed chemicals
Provided the following handling instructions are followed, contact with the feed chemical is possible.
– If the feed chemical is dangerous, take appropriate safety precautions when carrying out the following handling instructions.
– Observe the feed chemical safety data sheet.

1. Lead the suction hose into a measuring cylinder containing the feed chemical - the discharge hose must be installed in a permanent manner (operating pressure, ...!).
2. Prime the feed chemical (press both arrow keys simultaneously), should the suction hose be empty.
3. Record the level in the measuring cylinder and the stroke length.
4. Select the *“CALIB”* menu and press the *[P]* key to change to the first menu option.
5. With an arrow key select *“ON”* and press the *[P]* key to change to the next menu option.
6. To start the calibration, press the *[P]* key. The pump starts to pump and indicates the stroke rate - at certain intervals *“STOP”* appears. The pump works with the stroke rate set under *“MANUAL”*.
7. After a reasonable number of strokes, stop the pump with the *[P]* key.
8. Determine the required metering volume (difference initial volume - residual volume).
9. Enter this amount under the next menu option and then press the *[P]* key to change to the next menu option.
10. Under menu option *“UNIT”* select the units (*“L”* or *“gal”*) using the arrow keys and press the *[P]* key.

⇨ The pump is calibrated.

Consequence:

- The corresponding continuous displays indicate the calibrated values.
- Total number of strokes and total litres are set to "0" by calibrate.
- The pump is in the STOP state.

8.6.2 “Auxiliary frequency” function settings (AUX menu)

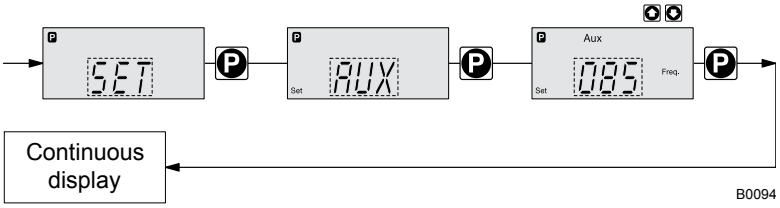


Fig. 38

The programmable function "Auxiliary frequency" facilitates the activating of an auxiliary stroke rate, which can be set in the *“AUX”* menu. It can be activated via the "External control" terminal. If the auxiliary frequency is being used, then the identifier *“Aux”* appears in the LCD screen.

This auxiliary frequency has priority over the stroke rate, which is specified by the currently selected operating mode.

8.6.3 “Flow” function settings (FLOW menu)

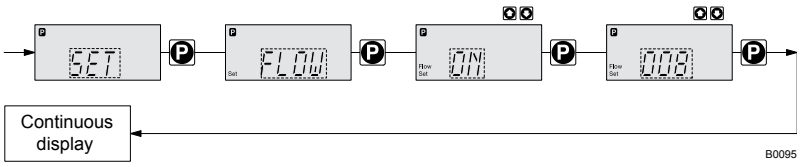


Fig. 39

The *“FLOW”* menu only appears if a dosing monitor is connected to the "Dosing monitor" terminal. The dosing monitor records the individual metering strokes of the pump at the discharge connector and reports them back to the pump control. If this feedback is sequentially missing for as often as set in the *“FLOW”* menu (after a fault or too low metering), the pump is stopped.

8.7 Setting the code (CODE menu)

In the *“CODE”* menu, you can enter whether you want to block parts of the adjustment options.

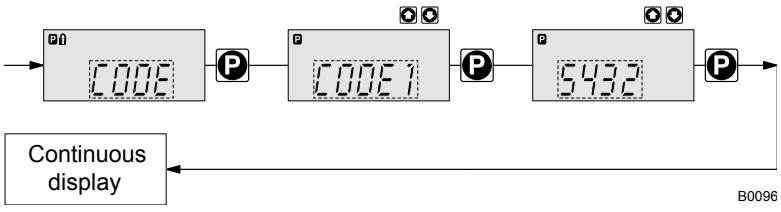


Fig. 40

In the first menu option, you can set either CODE 1 or CODE 2 (both use the same number).

- Select *"CODE 1"*, to block adjustment mode (① in "Operating / adjustment overview" in the appendix). In the next menu option, enter the number you want to use as the code.
- Select *"CODE 2"*, to block the option to adjust the directly changeable values in the continuous displays (① in "Operating / adjustment overview" in the appendix). In the next menu option, enter the number you want to use as the code.
- Select *"NONE"*, to clear a set security lock.

8.8 Deleting the total number of strokes or total litres (CLEAR window)

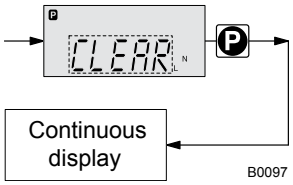


Fig. 41

In the *"CLEAR"* window, you can delete the stored total number of strokes and simultaneously the total litres (= reset to "0"). To do this quit the Window by quickly pressing the *[P]* key.

The values have been counted since pump commissioning or since they were last deleted.

9 Operation

This chapter describes all the operating options available to you if the pump control is showing a continuous display - then the display does not contain the symbol for the *[P]* key.

- *For supplementary information, please read the overviews "Control elements and key functions" and see the "Operating/setting diagram" at the end of the operating instructions.*
- *Also take note of the overview "Continuous displays". It shows which continuous displays are available in which operating mode and which variables are directly changeable in the relevant continuous display.*

9.1 Manual operation

Adjusting the stroke length

The stroke length can be continuously adjusted using the stroke length adjustment knob in the range 0 ... 100 %. The recommended stroke length range, in which the set metering quantity can, from a technical point of view, be accurately reproduced, is 30 ... 100 %

At low stroke rates the pump control switches to stop and go operation. This occurs with stroke rates, which are less than 1/3 of the maximum stroke rate.

This ensures adequate cooling of the motor at low stroke rates.

The following operating options are available via the keys - see the figure on the next page:

Stopping/starting the pump

Stop the pump: Press the *[START/STOP]* key.

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

Starting batch

In operating mode *"Batch"*: Briefly press the *[P]* key.

Loading factory settings

Press the [P] key for 15 s, if you want to reload the factory settings prior to calibration!

This deletes the current settings.

Changing to adjustment mode

In continuous display if you keep the *[P]* key pressed for 2 s, the pump control switches into adjustment mode - see "Adjustment" chapter.

If *"CODE 1"* was set, then after pressing the *[P]* key, the code must first be entered.

Checking adjustable values

Each press of the *[i]* key toggles the continuous display output to the screen to another continuous display. The number of continuous displays depends on the identity code, the selected operating mode and the connected additional devices.

Changing directly changeable variables

To change a value, see below, directly in the corresponding continuous display, press one of the *[arrow keys]* until the *[Set]* identifier appears.

(The delay period has been programmed in to prevent unintentional changing of values.)

If *"CODE 2"* was set, then after pressing an *[arrow key]*, the code must first be entered.

The **directly changeable variables** are in detail:

Stroke rate

In operating modes *"Manual"*, *"Contact"* and *"Batch"*:

You can change the stroke rate in the *"Stroke rate"* continuous display.

Capacity

In operating mode *"Manual"*:

You can change the capacity in the "Capacity" continuous display.

Factor

The factor is the number of strokes which are triggered upon an external pulse or pressing of key *[P]* (only in *"Batch"* operating mode).

In operating mode *"Batch"*:

You can change the factor from the "Remaining strokes" continuous display. A couple of seconds after your have set the factor, the pump control jumps back to the initial continuous display.

Displaying the program versions

Press the *[P]* key for 10 s to display the program versions.

"V1052" + *"X1010"*

Under "LOAD3" release the [P] key immediately!

Batch size

In operating mode *"Batch"*:

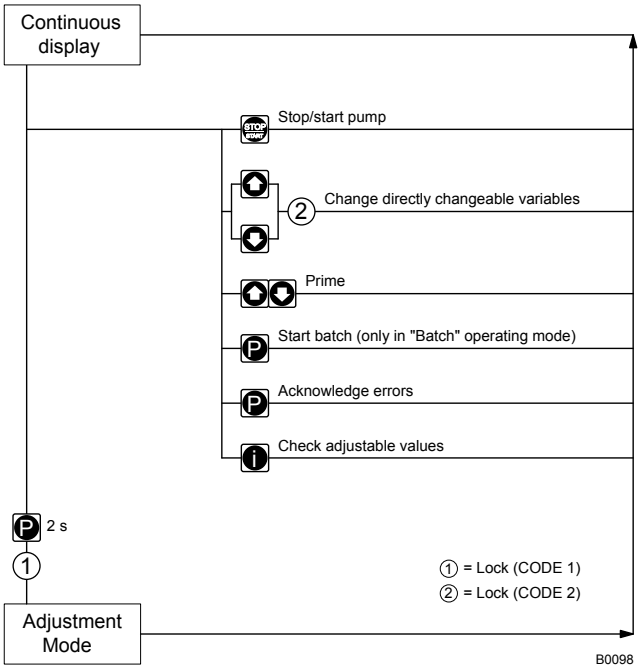
You can change the batch size from the "Batch size/Remaining litres" continuous display. A couple of seconds after your have set the factor, the pump control jumps back to the initial continuous display.

Priming

Simultaneous pressing of the two *[arrow keys]* triggers the "Priming" function.

Fault acknowledgement

Fault displays are acknowledged by brief pressing of the *[P]* key.



9.2 Remote operation

There is an option to control the pump remotely via a signal cable, PROFIBUS® or CAN bus - see chapter "Settings - selecting the operating mode (MODE menu)" and chapter "Operation", in the "Supplementary instructions for ProMinent® gamma/ L and ProMinent® Sigma versions with PROFIBUS®" as well as your system documentation.

10 Maintenance

Safety information

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

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

WARNING!

Warning of hazardous or unknown feed chemical

Should a hazardous or unknown feed chemical be used, it may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (protective eyewear, protective gloves, ...). Read the safety data sheet on the feed chemical.
- Drain and flush the liquid end before working on the pump.

WARNING!

Danger of an electric shock

When working on the motor or electrical auxiliary equipment, there is a danger of an electric shock.

- Before working on the motor, take note of the safety instructions in its operating instructions!
- Should external fans, servomotors or other auxiliary equipment be installed, these should also be disconnected and checked that they are voltage free.

Place a spare parts kit in stock ready for maintenance work. You can find order numbers in the enclosed "Supplementary information CD for ProMinent pump operating instructions" under "Ordering information" - "Spare parts kits".

Third party spare parts for the pumps may lead to problems when pumping.

- *Use only original spare parts.*
- *Use the correct spare part kits. In case of doubt, refer to the exploded views and ordering information contained in the "Supplementary information CD for ProMinent® pump operating instructions".*

Standard liquid ends:

Interval	Maintenance work	Personnel
Quarterly*	■ Check that the metering lines are fixed firmly to the liquid end. ■ Check that the suction valve and discharge valve are correctly seated. ■ Check that the dosing head screws are tight ■ Check the condition of the metering diaphragm - see *"Check the condition of the metering diaphragm" on page 53*. ■ Check that the flow is correct: Allow the pump to prime briefly. ■ Check that the electrical connections are intact	Technical personnel

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

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

Check the condition of the metering diaphragm

The metering diaphragm is a wear part, the service life of which is dependent upon the following parameters:

- System back pressure
- Operating temperature
- Feed chemical properties

When using abrasive feed chemicals, the diaphragm service life is reduced. In such cases, more frequent checking of the diaphragm is recommended.

Tightening torques

Data	Value	Unit
Tightening torques for dosing head screws:	4.5 ... 5.0	Nm

Liquid ends with integral relief valve

WARNING!

Warning of eye injuries

When opening the relief valve, a spring under high tension can jump out.

– Wear protective glasses.

11 Repairs

Safety information

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

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

WARNING!
Warning of hazardous or unknown feed chemical
Should a hazardous or unknown feed chemical be used, it may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (protective eyewear, protective gloves, ...). Read the safety data sheet on the feed chemical.
- Drain and flush the liquid end before working on the pump.

11.1 Cleaning valves

Unsuitable spare parts for the valves may lead to problems for the pumps.

- *Only use new components that are especially adapted to fit your valve (both in terms of shape and chemical resistance).*
- *Use the correct spare part kits. In case of doubt, refer to the exploded views and ordering information contained in the "Supplementary information CD for ProMinent® pump operating instructions".*

Personnel: ■ Technical personnel

Repairing ball valves

CAUTION!
Warning of personal injury and material damage
Feed chemical may escape from the liquid end, for example, if ball valves not repaired correctly.

- Only use new components which fit your valve - both in terms of shape and chemical resistance!
- Pay attention to the flow direction of the discharge and suction connectors when fitting the valve.

1. Unscrew the valve from the liquid end.
2. Screw the valve cap (5) on its suction side - see diagram.
3. Carefully remove the parts from the valve body (2).
4. Replace the worn parts.
5. Clean the remaining parts.
6. Check all parts.
7. Insert the valve ball (3 and the valve seat (4).
8. Screw on the valve cap (5).

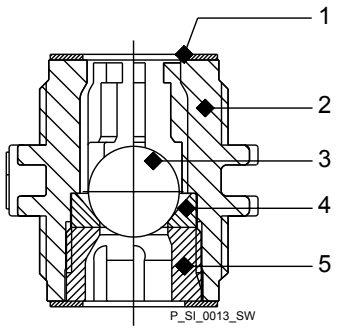


Fig. 42: Simple cross-section through ball valve

1 Flat seal
2 Valve body
3 Valve ball
4 Valve seat
5 Valve cap

11.2 Replacing the metering diaphragm

Third party spare parts for the pumps may lead to problems when pumping.

– *Use only original spare parts.*
– *Use the correct spare part kits. In case of doubt, refer to the exploded views and ordering information contained in the "Supplementary information CD for ProMinent® pump operating instructions".*

Personnel: ■ Technical personnel

Requirements:

- If necessary take protective measures.
- Observe the safety data sheet for the feed chemical.
- Depressurise the system.

1. Drain the liquid end: Place the liquid end on its head and allow the feed chemical to run out; flush out with a suitable medium; flush the liquid end thoroughly when using hazardous feed chemicals!
2. With the pump running, move the stroke adjustment dial to the stop at 0 % stroke length.

   ⇨ The drive axle is now difficult to turn.
3. Switch off the pump.
4. Unscrew the hydraulic connectors on the discharge and suction side.
5. Unscrew the diaphragm rupture sensor from the dosing head.
6. Remove the 6 screws on the dosing head.
7. Remove the dosing head.
8. Check the condition of the diaphragm rupture sensor - see ↻ *" Checking the condition of the diaphragm rupture sensor" on page 58*.
9. Loosen the diaphragm from the drive axle with a gentle backwards turn in the anti-clockwise direction.
10. Completely unscrew the diaphragm from the drive axle.
11. Tentatively screw the new diaphragm anticlockwise up to the stop on the drive axle.

    ⇨ The diaphragm now is now seated against the stop of the thread while the diaphragm flap is within the tolerance range.

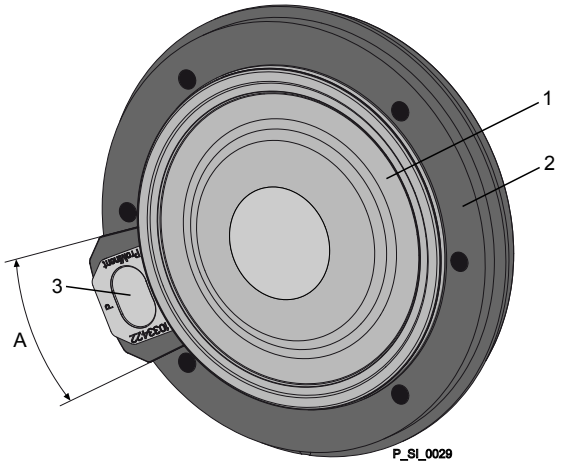


Fig. 43: Tolerance range of the flap on the backplate

1 Diaphragm
2 Backplate

3 Flap
A Tolerance range

12. Should this not work, remove dirt or swarf out of the thread and screw the diaphragm correctly onto the drive axle this time.

    ⇨ If this is still unsuccessful, contact ProMinent-ProMaqua customer service.

13. Place the dosing head with the screws onto the diaphragm - the suction connector must be pointing downwards in the pump's fitting position.

14. Tighten the screws gently to start with.

15. Screw the diaphragm rupture sensor into the dosing head.

16. Start up the pump and adjust the stroke length to 100 %.

17. Stop the pump and tighten the screws crosswise. Tightening torque - see *"Tightening torques" on page 53*.

18. Start the pump and at maximum pressure, check for leaks.

CAUTION!

Warning of escaping feed chemical

The liquid end may leak should it not be possible to check the tightening torque of the screws.

- Check the tightening torque of the screws after 24-hours of operation!
- With PP, PC and TT dosing heads also re-check the tightening torques quarterly!

Checking the condition of the diaphragm rupture sensor

1. If the inside of the diaphragm rupture sensor has become damp or dirt has penetrated it: replace.

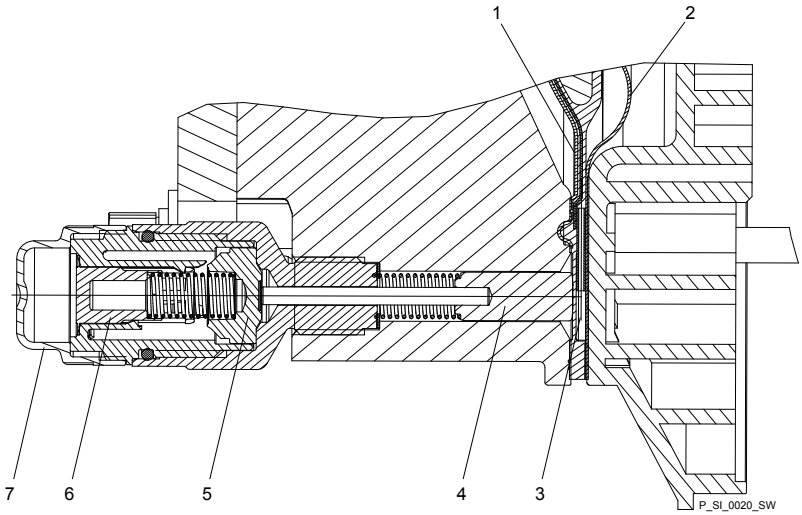


Fig. 44: Section through the Sigma diaphragm rupture warning system ("Visual break indicator" version)

1 Working layer (≙ operating diaphragm)
2 Safety layer (≙ safety diaphragm)
3 Flap
4 Piston
5 Diaphragm rupture sensor
6 Cylinder, red
7 Cover, transparent

2. If the piston of the diaphragm rupture sensor - see Fig. 44, item 4 - should have become dirty or damp, clean both it and the hole in which it runs.
3. Check whether it can move freely in the hole.
4. Refit the clean diaphragm rupture sensor with the clean piston.
5. Test the diaphragm rupture sensor.

Optical diaphragm rupture sensor

1. Unscrew the transparent cover from the diaphragm rupture sensor.
2. Press the red cylinder into the diaphragm rupture sensor until it engages.
3. Press the piston on the other side of the diaphragm rupture sensor with a blunt, smooth object into the dosing head (approximately 4 mm) until it triggers.

CAUTION!
Feed chemical may escape
If the expandable flap of the diaphragm is damaged, then feed chemical can escape when there is a diaphragm rupture.

The piston must not be scratched, it must remain completely smooth so that during operation it does not damage the expandable flap of the diaphragm.

4. Press the red cylinder into the diaphragm rupture sensor again and repeat the test.
5. If it does not trigger both times, replace the membrane rupture sensor.

6. After a successful test, screw the transparent cover onto the diaphragm rupture sensor and then continue at the top by fitting the diaphragm.

Electrical diaphragm rupture sensor

1. Press the piston of the diaphragm rupture sensor with a blunt, smooth object into the dosing head (approximately 4 mm) until the monitor triggers alarm.

CAUTION!

Feed chemical may escape

If the expandable flap of the diaphragm is damaged, then feed chemical can escape when there is a diaphragm rupture.

The piston must not be scratched, it must remain completely smooth so that during operation it does not damage the expandable flap of the diaphragm.

2. Repeat the test.
3. If the monitor does not trigger an alarm both times, replace the membrane rupture sensor.
4. After a successful test, continue at the top by fitting the diaphragm.

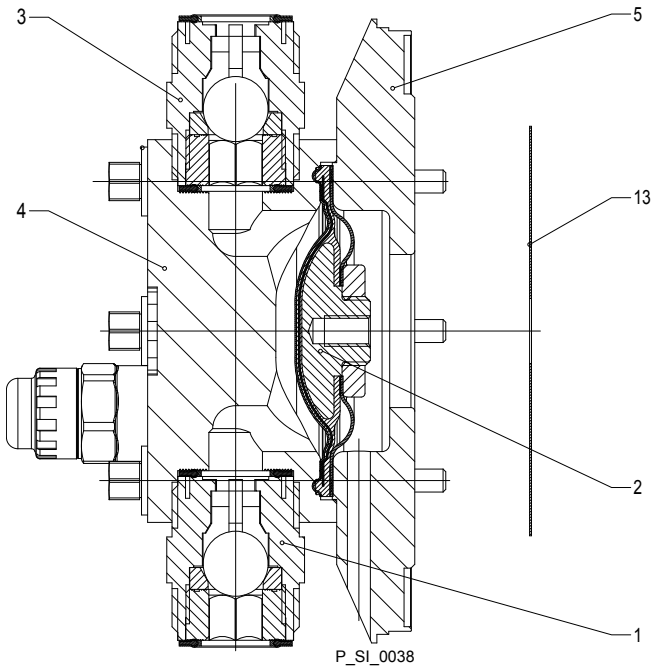


Fig. 45: Cross-section through the liquid end

1 Suction valve
2 Metering diaphragm
3 Discharge valve
4 Dosing head
5 Backplate
13 Safety diaphragm

Tightening torques

Data	Value	Unit
Tightening torques for dosing head screws:	4.5 ... 5.0	Nm

12 Troubleshooting

Safety information

WARNING!

Warning of hazardous or unknown feed chemical

Should a hazardous or unknown feed chemical be used, it may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (protective eyewear, protective gloves, ...). Read the safety data sheet on the feed chemical.
- Drain and flush the liquid end before working on the pump.

CAUTION!

Warning of feed chemical spraying around

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

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

12.1 Faults without a fault alert

Faults without a fault alert

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

Fault description	Cause	Remedy	Personnel
The optical diaphragm rupture sensor has triggered.	The operating diaphragm of the metering diaphragm has ruptured.	Replace the metering diaphragm.	Technical personnel

WARNING!

Warning of escaping feed chemical

When metering critical or combustible feed chemicals or in hazardous locations, under no circumstances must the second diaphragm also rupture.

- If the pump membrane rupture sensor triggers, stop the pump immediately and only restart once a new multi-layer safety diaphragm is fitted.

12.2 Faults with error message

12.2.1 Fault alerts

Fault description	Cause	Remedy
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"MINIM"* flash.	The liquid level in the storage tank has reached "liquid level low 2nd stage".	Fill storage tank.
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"ANALG"* flash.	The pump control is in *"Analog"* operating mode, a fault behaviour has been programmed in the *"ANALG"* menu and the control current has fallen below 3.8 mA.	Clear the cause of the low control current. Switch the programming of the fault behaviour to *"OFF"* - see chapter "Adjustment - Operating mode settings (SET menu)".
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"CNTCT"* flash.	Pump control is in the operating mode *"Contact"* or *"Batch"* and the function extension "Memory" has been set. Also a very large factor was set, too many contacts have been received or the key *[P]* has been pressed too often: Consequently a stroke memory overflow has occurred!	Press the *[P]* key, the memory content is deleted. Set up the pump again.
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"FLOW"* flash.	Dosing monitor not correctly connected.	Connect the dosing monitor correctly. Press the *[P]* key.
	The dosing monitor reported more defective strokes than was set in the *"FLOW"* menu.	Press the *[P]* key. Investigate and clear the cause.
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"MOTOR"* flash.	Due to too high back pressure, the motor cannot work accurately enough.	Reduce the back pressure. Press the *[P]* key (reset function).
	Motor has overheated.	Check the ambient temperature (max. 40 °C). Allow the motor to cool. Press the *[P]* key (reset function).
	Other motor faults.	Contact ProMinent Press the *[P]* key (reset function).
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"TEMPERATURE"* flash.	The temperature inside the pump housing is too high due to too high outside temperature.	Ensure lower outside temperatures. Allow the pump to cool. Press the *[P]* key (reset function).
	The temperature inside the pump housing is too high due to too high pump power consumption.	Check the installation, change if necessary. Allow the pump to cool. Press the *[P]* key (reset function).
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"DIAPH"* flash.	Metering diaphragm is ruptured.	Replace metering diaphragm according to chapter "Repairs".
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"FAN"* flash.	Error in connection with fan in pump housing.	Check the fan, replace if necessary. Press the *[P]* key (reset function).
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"SYSTEM"* flash.	Fault at the control.	Disconnect the pump from the mains then reconnect. If the error message reappears, the send the pump into ProMinent.

Fault description	Cause	Remedy
The red LED indicator illuminates, on the display, the identifiers *"Error"* and *"MEM"* flash.	Stroke memory overflow has occurred.	Eliminate cause. Press *[P]* key - bear in mind the consequences for your process.

12.2.2 Warning Alerts

Fault description	Cause	Remedy
Green LED indicator illuminates.	The liquid level in the storage tank has reached "liquid level low 1st stage".	Fill storage tank.
Green LED indicator illuminates and the identifier *"Calib"* flashes.	The pump is calibrated and the stroke length varies by more than ±10 scale divisions from the value at the time of the calibration.	Reset the stroke length or recalibrate the pump at the desired stroke length.

12.3 All Other Faults

Please contact the responsible ProMinent branch or representative!

13 Decommissioning

Decommissioning

WARNING!

Danger of an electric shock

When working on the motor or electrical auxiliary equipment, there is a danger of an electric shock.

- Before working on the motor, take note of the safety instructions in its operating instructions!
- Should external fans, servomotors or other auxiliary equipment be installed, these should also be disconnected and checked that they are voltage free.

WARNING!

Danger from chemical residues

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 relating to the "Storage, Transport and Unpacking" chapter is read before shipping or transporting the unit.
- Thoroughly clean the liquid end and the housing of chemicals and dirt. Adhere to the safety data sheet for the feed chemical.

WARNING!

Warning of hazardous or unknown feed chemical

Should a hazardous or unknown feed chemical be used, it may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (protective eyewear, protective gloves, ...). Read the safety data sheet on the feed chemical.
- Drain and flush the liquid end before working on the pump.

CAUTION!

Warning of feed chemical spraying around

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

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

WARNING!

Warning of eye injuries

When opening the relief valve, a spring under high tension can jump out.

- Wear protective glasses.

CAUTION!

Danger of damage to the device

The device can be damaged by incorrect and improper storage or transportation.

– Take into account the information in the "Storage, Transport and Unpacking" chapter if the system is decommissioned for a temporary period.

(Temporary) decommissioning

Personnel: ■ Technical personnel

1. Disconnect the pump from the mains power supply.
2. Depressurise and bleed the hydraulic system around the pump.
3. Empty the liquid end by turning the pump upside down and allowing the feed chemical to run out.
4. Flush the liquid end with a suitable medium - Observe the safety data sheet! Flush the dosing head thoroughly when using hazardous feed chemicals!
5. Possible additional work - see chapter "Storage, Transport and Unpacking".

Disposal

Personnel: ■ Technical personnel

CAUTION!

Environmental hazard due to incorrect disposal

– Note the local guidelines currently applicable in your country, particularly in regard to electronic waste!

14 Technical data

14.1 Performance data

S1Ca

Type	Minimum pump capacity at maximum back pressure				Maximum stroke rate		Suction lift	Permissible priming pressure, suction side	Connector size
	bar	psi	l/h	gph	Strokes/min	ml/stroke	m WS	bar	R"-DN
12017 PVT	12	174	20	5	88	3.9	7	1	3/4" - 10
12017 SST	12	174	20	5	88	3.9	7	1	3/4" - 10
12035 PVT	12	174	42	11	172	4.1	7	1	3/4" - 10
12035 SST	12	174	42	11	172	4.1	7	1	3/4" - 10
10050 PVT	10	145	49	13	200	4.1	7	1	3/4" - 10
10050 SST	10	145	49	13	200	4.1	7	1	3/4" - 10
10022 PVT	10	145	26	7	88	5.1	6	1	3/4" - 10
10022 SST	10	145	26	7	88	5.1	6	1	3/4" - 10
10044 PVT	10	145	53	14	172	5.1	6	1	3/4" - 10
10044 SST	10	145	53	14	172	5.1	6	1	3/4" - 10
07065 PVT	7	102	63	17	200	5.3	6	1	3/4" - 10
07065 SST	7	102	63	17	200	5.3	6	1	3/4" - 10
07042 PVT	7	102	50	13	88	9.6	3	1	1" - 15
07042 SST	7	102	50	13	88	9.6	3	1	1" - 15
04084 PVT	4	58	101	27	172	9.8	3	1	1" - 15
04084 SST	4	58	101	27	172	9.8	3	1	1" - 15
04120 PVT	4	58	117	31	200	9.8	3	1	1" - 15
04120 SST	4	58	117	31	200	9.8	3	1	1" - 15

All figures refer to water at 20 °C.

The suction lift applies to filled suction line and filled liquid end - when installed correctly.

Accuracies

Data	Value	Unit
Reproducibility	±2	% *

* - when installed correctly, under constant conditions, at least 30 % stroke length and water at 20 °C

14.2 Shipping weight

Types	Material version	Shipping weight
		kg
12017 ... 07065	PVT	8.0
	SST	11.0

Types	Material version	Shipping weight
		kg
07042 ... 04129	PVT	8.5
	SST	12.5

14.3 Wetted materials

Material version	Liquid end	Suction/discharge connector	Seals* / ball seat	Balls	Springs	Integral relief valve
PVT	PVDF	PVDF	PTFE/PTFE	Ceramic	Hastelloy C	PVDF / FPM or EPDM
SST	Stainless steel 1.4404	Stainless steel 1.4581	PTFE/PTFE	Stainless steel 1.4404	Hastelloy C	Stainless steel / FPM or EPDM

* Metering diaphragm is PTFE coated

14.4 Ambient conditions

14.4.1 Ambient temperatures

Pump, compl.

Data	Value	Unit
Storage and transport temperature	-10 ... +50	°C
Ambient temperature in operation (drive + motor):	-10 ... +40	°C

14.4.2 Media temperatures

PVT liquid end

Data	Value	Unit
Max. temperature long-term at max. operating pressure	65	°C
Max. temperature for 15 min at max. 2 bar	100	°C
Minimum temperature	-10	°C

SST liquid end

Data	Value	Unit
Max. temperature long-term at max. operating pressure	90	°C
Max. temperature for 15 min at max. 2 bar	120	°C
Minimum temperature	-10	°C

14.4.3 Air humidity

Air humidity

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

* non-condensing

14.4.4 Degree of Protection and Safety Requirements

Degree of protection

Protection against contact and humidity:

IP 55 in accordance with IEC 529, EN 60529, DIN VDE 0470 Part 1

Safety requirements

Degree of protection:

1 - Mains power connection with protective earth conductor

14.5 Electrical connection

The electrical data do not relate to the motor, but the pump, which is connected as a whole unit.

For the motor electrical data use the motor data sheet 1018455, 1018432, 1018433 in the appendix.

Electrical data S1Ca pump

Identity code specification "power supply" - "U": 100 - 230 V ± 10 %, 50/60 Hz

Electrical data at 100 V

Data	Value	Unit
Nominal power	130	W
Nominal current	2.2	A
Peak current during operation	3	A
Switch on peak current, (for approx. 100 ms)	8	A

Electrical data at 230 V

Data	Value	Unit
Nominal power	130	W
Nominal current	1.2	A
Peak current during operation	3	A
Switch on peak current, (for approx. 100 ms)	16	A

Fuses

Fuse	Value	Part no.
Fuse, internal	3.15 AT - (1.5 kV)	732414

Only use the original fuses from ProMinent! It is not sufficient to use a fuse with the above fuse rating.

14.6 Diaphragm rupture sensor

b) Reed switch (identity code specification "Stroke sensor": 2)

Pin	Allocation
1 (white	4.5 V ... 24 V, max. 10 mA
2 (brown)	OUT, open collector, 24 V, 20 mA
3 (green)	GND

Data	Value	Unit
Pulse width (low)*	≥4	ms

* depending on the gear and mains frequency

The polarity is unimportant.

b) Namur sensor (identity code specification "Stroke sensor": 3)

5–25 V DC, in accordance with Namur or DIN 60947-5-6, potential-free design.

Data	Value	Unit
Nominal voltage *	8	VDC
Power consumption - active surface uncovered	> 3	mA
Power consumption - active surface covered	< 1	mA
Rated switching distance	1.5	mm

* Ri ~ 1 kΩ

Cable colour	Polarity
blue	-
brown	+

14.7 Relay

The technical data for the relay are contained in the chapter "Installation, electrical".

14.8 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)

15 EC Declaration of Conformity

For pumps without explosion protection:

EC Declaration of Conformity

We hereby declare,

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

that the following designated product complies with the pertinent fundamental safety and health requirements of the EC Directive in terms of its design and construction and in terms of the version marketed by us.
This declaration loses its validity in the event of a modification to the product not agreed with us.

Description of the product:	***Metering pump, series Sigma***
Product type:	***S1Ba... / S1Ca...***
Serial no.:	***refer to nameplate on the device***
Pertinent EC Directives:	***EC Machinery Directive (2006/42/EC)*** ***EC Low Voltage Directive (2006/95/EC)*** ***EC EMC Directive (2004/108/EC)***
Applied harmonised standards in particular:	***EN ISO 12100-1, EN ISO 12100-2, EN 809,*** ***EN 60335-1, EN 60335-2-41, EN 60529,*** ***EN 61000-3-2, EN 61000-6-2***
technical documents have been compiled by:	***Norbert Berger*** ***Im Schuhmachergewann 5-11*** ***DE-69123 Heidelberg***
Date / Manufacturer - Signature :	*04.01.2010*
Details of the signatory:	*Joachim Schall, Head of Research and Development*

16 Decontamination declaration

Declaration of Decontamination

(see download: www.prominent.com)

Because of legal regulations and for the safety of our employees and operation equipment, we need the „declaration of decontamination", with your signature, before your order can be handled.
Please make absolutely sure to include it with the shipping documents, or – even better – attach it to the outside of the packaging.

Please return your products to:	

Type of instrument / sensor: _____ **Serial number:** _____
Gerätetyp: Seriennummer:

Process data: Temperature: _____ [°C] Pressure: _____ [bar]
Prozessdaten: Temperatur: Druck:

Mediums and warnings:
Warnhinweise zum Medium:

	Medium/ Concentration Medium/ Konzentration	**Identification** CAS No.	**flammable** entzündlich	**toxic** giftig	**corrosive** ätzend	**harmful/ irritant** gesundheitsschädlich/reizend	**other*** sonstiges*	**harmless** unbedenklich
Process medium Medium im Prozess								
Medium for process-cleaning Medium zur Prozessreinigung								
Returned part cleaned with Medium zur Endreinigung								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive
* explosiv; brandfördernd; umweltgefährlich; biogefährlich; radioaktiv

Please tick should one of the above be applicable, include security sheet and, if necessary, special handling instructions.

Reason for return:

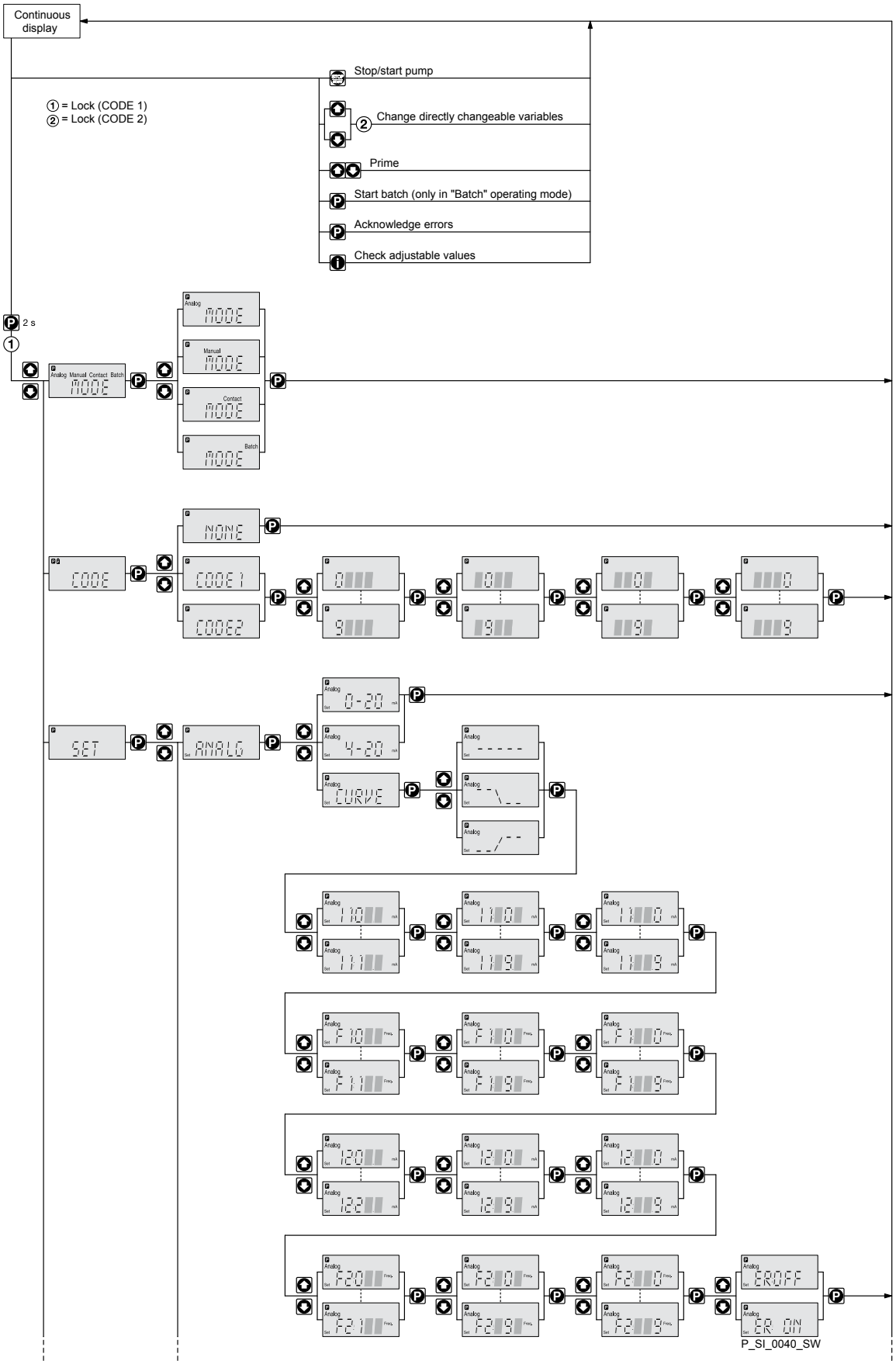
Company data:

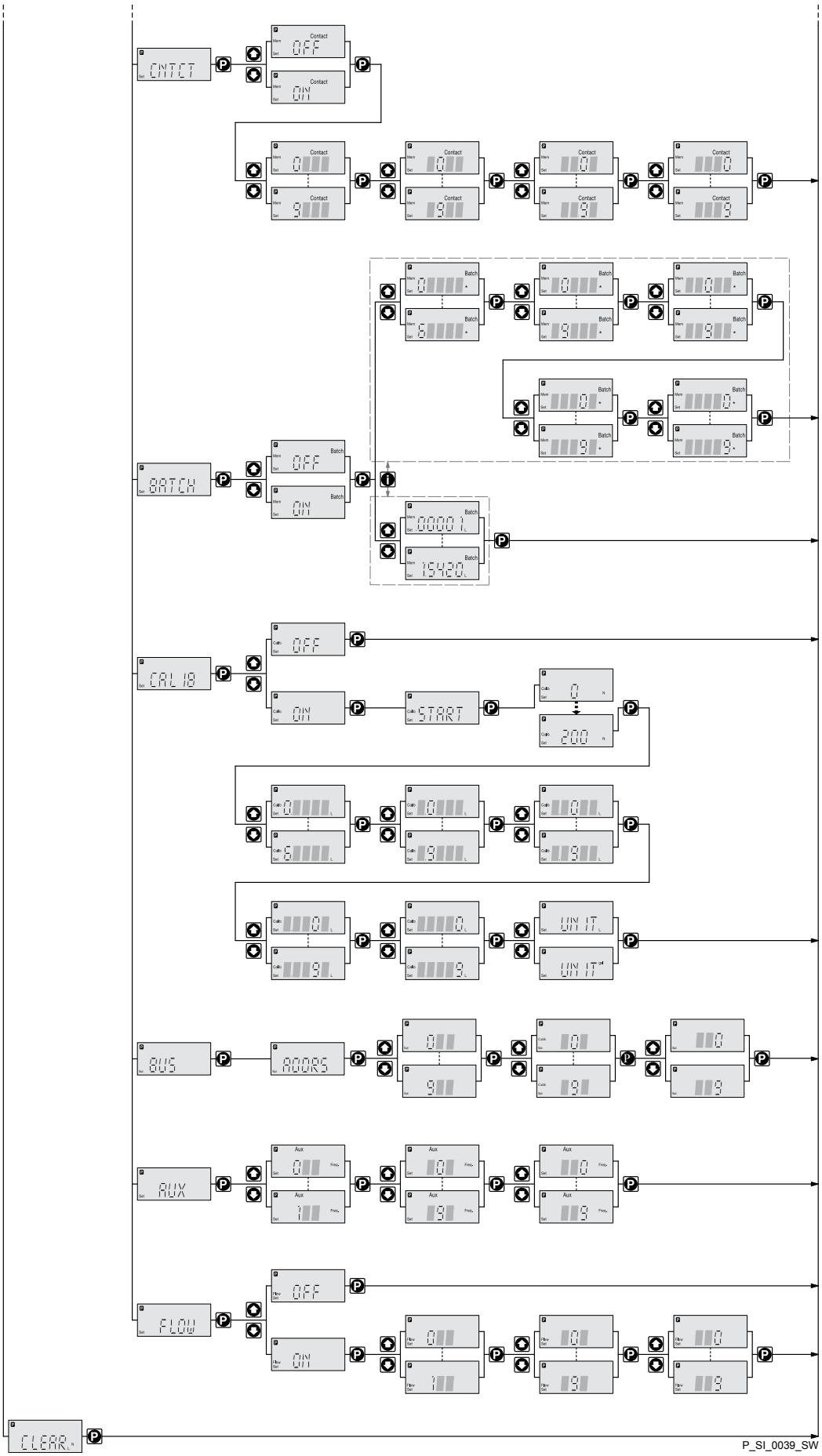
Company:	_____	Phone number:	_____
Contact person:	_____	Fax:	_____
Street:	_____	E-Mail:	_____
Address:	_____	Your order No:	_____

"We hereby certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free from any residues in dangerous quantities."

_____ _____
Place, date Company stamp and legally binding signature

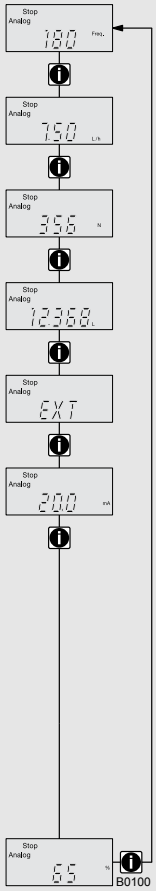
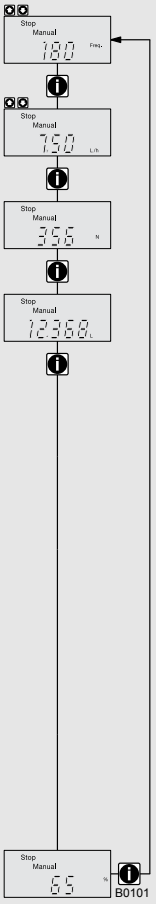
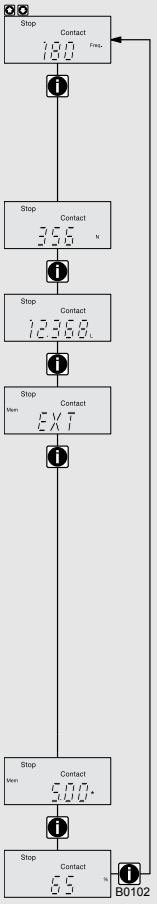
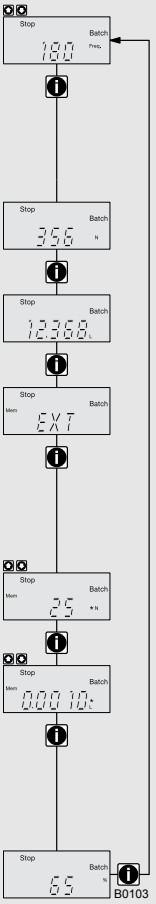
17 Operating / adjustment overview




CONTCT
Contact
OFF
Contact
ON
Contact
0
Contact
9
BATCH
Batch
OFF
Batch
ON
CALIB
OFF
ON
START
200
UNIT
BUS
ADDRS
AUX
Aux
FLOW
CLEAR
P_SI_0039_SW

18 Continuous displays

Continuous displays

Continuous display	Operating mode "Analog" 0...20 mA	"Manual" operating mode	Operating mode "Contact" with memory and transfer factor 5	"Batch" operating mode with memory
Stroke rate				
Capacity				
Total number of sti				
Total litres (metering quantity)				
"External" display				
Signal current				
Remaining strokes				
Batch size / Remaining litres				
Factor				
Stroke length				

B0100 B0101 B0102 B0103

= values which can be changed directly using the UP or DOWN arrow keys

Identifier "Mem" only in the event that function extension "Memory" is activated

19 Index