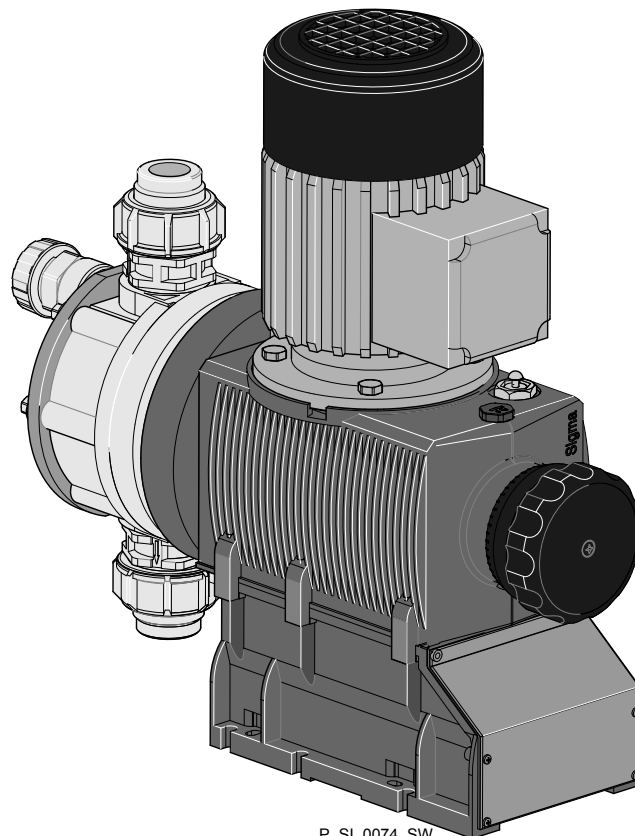


Operating instructions

Diaphragm Motor-Driven Metering Pump

Sigma / 2 Base Type S2Ba



P_SI_0074_SW

Two sets of operating instructions are required for the safe, correct and proper operation of the metering pumps: The product-specific operating instructions and the "General Operating Instructions for ProMinent® motor-driven metering pumps and hydraulic accessories".

Both sets of operating instructions are only valid when read together.

**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.**

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Supplementary information



Fig. 1: Please read!

Read the following supplementary information in its entirety! Should you already know this information, you have an even greater need of the Operating Instructions.

The following are highlighted separately in the document:

- Enumerated lists

- ➔ Instructions

- ⇒ Outcome of the handling instructions

- see (reference)

Information

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

Safety information

Safety information is identified by pictograms - see Safety Chapter.

User information

Two sets of operating instructions are required for the safe, correct and proper operation of the metering pumps: The product-specific operating instructions and the "General Operating Instructions for ProMinent® motor-driven metering pumps and hydraulic accessories".

Both sets of operating instructions are only valid when read together.

Please read these operating instructions carefully before use! Do not discard!

State the identity code and serial number

Please state identity code and serial number, which you can find on the nameplate when you contact us or order spare parts. This enables the device type and material versions to be clearly identified.

General non-discriminatory approach

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

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1 Identity code S2Ba

S2Ba	Sigma 2 basic type		
H	Main power end, diaphragm		
	Type:	Power (at 50 Hz)	
		bar	l/h***
	16050	10*	50
	16090	10*	90
	16130	10*	130
	07120	7	120
	07220	7	220
	04350	4	350
	Dosing head material		
	PV	PVDF	
	SS	Stainless steel	
	Seal material		
	T	PTFE seal	
	Displacement		
	S	Multi-layer safety diaphragm with optical break indicator	
	A	Multi-layer safety diaphragm with diaphragm rupture signalling (contact)	
	H	Diaphragm for hygienic pump head	
	Dosing head version		
	0	no valve springs	
	1	with 2 valve springs, Hastelloy C; 0.1 bar	
	4 **	with relief valve, FPM seal, no valve springs	
	5 **	with relief valve, FPM seal, with valve springs	
	6 **	with relief valve, EPDM seal, no valve springs	
	7 **	with relief valve, EPDM seal, with valve springs	
	H	Hygienic pump head with tri-clamp connectors (max. 10 bar)	
	Hydraulic connector		
	0	Standard threaded connector (in line with technical data)	
	1	Union nut and PVC insert	
	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 (standard)	
	1	Without ProMinent® Logo	

S2Ba		Sigma 2 basic type					
M	Modified*	* order-related version, for pump features see paperwork for order					
		Electric power supply					
S	3 ph, 230 V/400 V 50/60 Hz						
M	1 ph AC, 230 V 50 Hz						
N	1 ph AC, 115 V 60 Hz						
L	3 ph, 230 V/400 V, 50 Hz, (Exe, Exd)						
P	3 ph, 265 V/440 V, 60 Hz, (Exe, Exd)						
R	3 ph, variable speed motor, 230/400 V						
V(0)	Variable speed motor with integrated Frequency converter 1 ph, 230 V, 50/60 Hz						
Z	Speed control complete 1 ph, 230 V, 50/60 Hz (control motor + frequency converter)						
1	No motor, with B14 flange, size 71 (DIN)						
2	No motor, with C 56 flange (NEMA)						
3	No motor, with B 5, size 63 (DIN)						
		Degree of protection					
0	IP 55 (standard)						
1	Exe version ATEX-T3						
2	Exd version ATEX-T4						
		Stroke sensor					
0	No stroke sensor (standard)						
2	Pacing relay (reed relay)						
3	Stroke sensor (Namur) for hazardous locations						
		Stroke length adjustment					
0	Manual (standard)						
1	With servomotor, 230 V, 50/60 Hz						
2	With servomotor, 115 V, 50/60 Hz						
3	With control motor 0...20 mA 230 V, 50/60 Hz						
4	With control motor 4...20 mA 230 V, 50/60 Hz						
5	With control motor 0...20 mA 115 V, 50/60 Hz						
6	With control motor 4...20 mA 115 V, 50/60 Hz						

FPM = fluorine rubber

* for SST = 16 bar

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

*** Exact values - see "Technical Data" chapter.

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.
- In potentially explosive atmospheres in zone 1, device category II 2G of explosion group II C, the pump must only be operated according to the with the relevant nameplate (and the respective EC Declaration of Conformity) for pumps for potentially explosive atmospheres complying with Directive 94/9/EC in accordance with the European guidelines. The explosion group, category and protection class declared on the marking must correspond with or be better than the given conditions in the intended field of application.
- 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.
- Pumps without the relevant nameplate (and the respective EC Declaration of Conformity) for pumps for potentially explosive atmospheres must never be operated in potentially explosive atmospheres.
- The pump is not intended for the dosing of gaseous media or solids.
- The pump is not intended for unprotected outside use.
- The pump should only be operated by trained and authorised personnel.
- 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 personnel
Installation, installation of hydraulic system	Technical personnel
Installation, electrical	Electrical technician
Operation	Instructed personnel
Maintenance, repair	Technical personnel
Decommissioning, disposal	Technical personnel
Troubleshooting	Technical personnel, electrical technician, instructed personnel

Explanation of the terms:

Qualified personnel

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

Note:

A qualification of equal validity to a technical qualification can also be gained by several years 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 they 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 personnel

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 $L_{pA} < 70$ 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.
- Only transport the unit when the red gear bleeding plug is pushed in.
- 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.
2. ➤ Check if the red gear bleeding plug is pushed in.
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

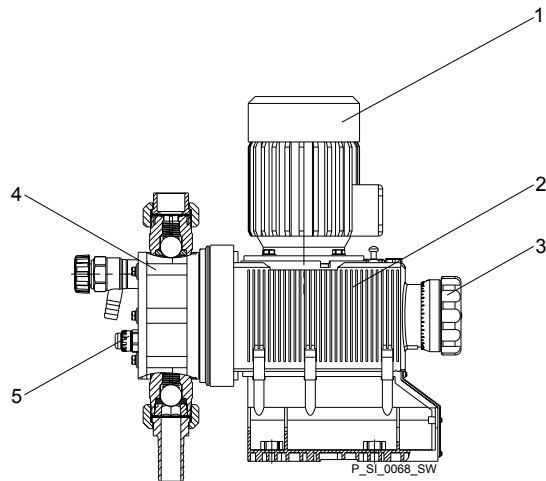


Fig. 2: Overview of equipment and control elements S2Ba

- 1 Drive motor
- 2 Drive unit
- 3 Stroke length adjustment knob
- 4 Liquid end with relief valve
- 5 Diaphragm rupture sensor

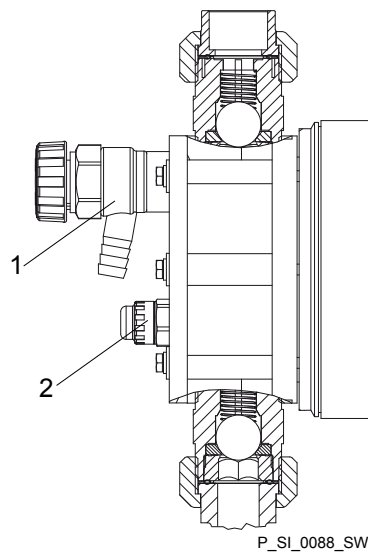


Fig. 3: Sigma control elements

- 1 Relief valve
- 2 Diaphragm rupture sensor (visual)

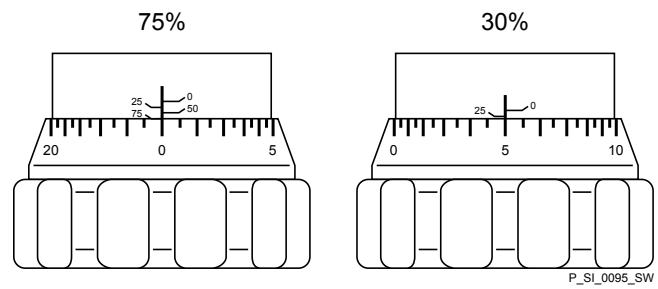


Fig. 4: Adjusting the stroke length

- 100 % = 4 rotations
- 25 % = 1 rotation
- 0.5 % = 1 scale mark on stroke adjustment dial

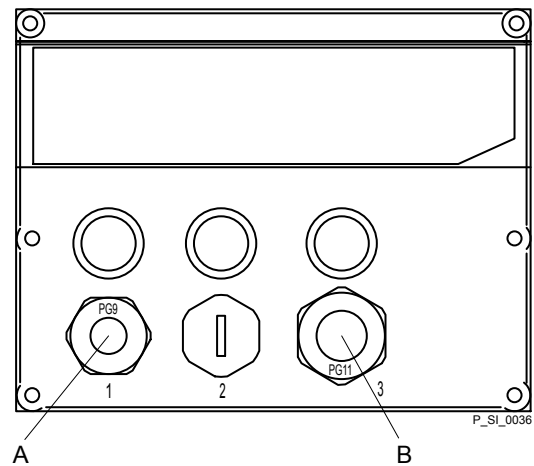


Fig. 5: Front cover for version with pacing relay

- A Pacing relay cable
- B Supply voltage cable for pacing relay PCB

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 by the stroke adjustment dial (6) and the shaft (7). The different stroke lengths are in effect caused by a limitation of the reciprocal strokes (see ↗ "Illustration of the stroke movement" on page 14). The slide rod transmits the stroke motion to the metering diaphragms.

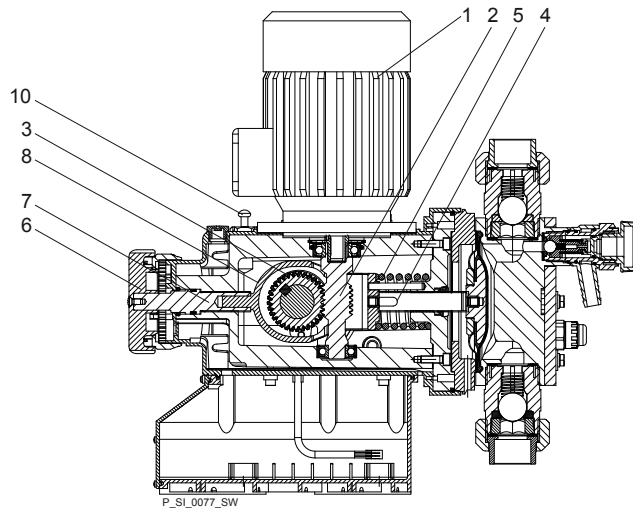


Fig. 6: Section through the drive unit Sigma 2

- 1 Electric motor
- 2 Worm gear
- 3 Eccentric cam
- 4 Slide rod
- 5 Return spring
- 6 Stroke adjustment dial
- 7 Shaft
- 8 Uptake fork

Illustration of the stroke movement

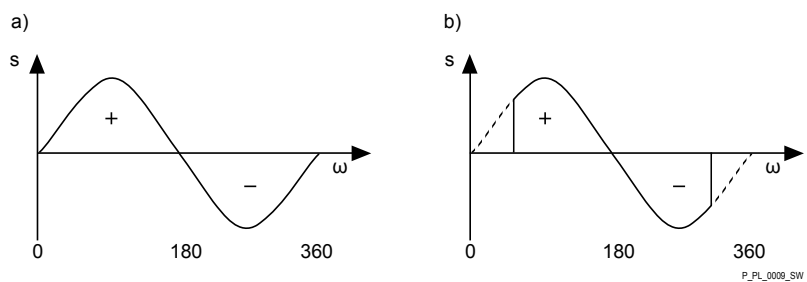


Fig. 7: Stroke movement at a) maximum stroke length and b) reduced stroke length.

- s Stroke velocity
- ω Angle of rotation of eccentric cam
- + Pressure 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.

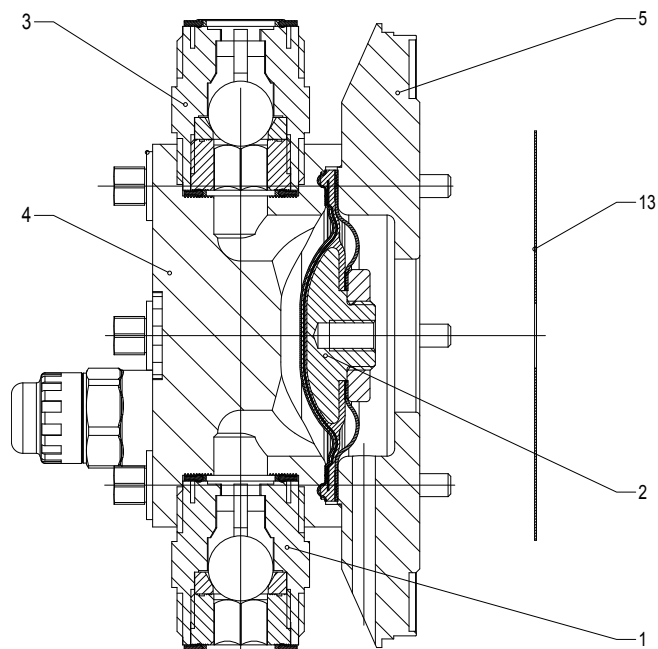


Fig. 8: Cross-section through the liquid end

- 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.

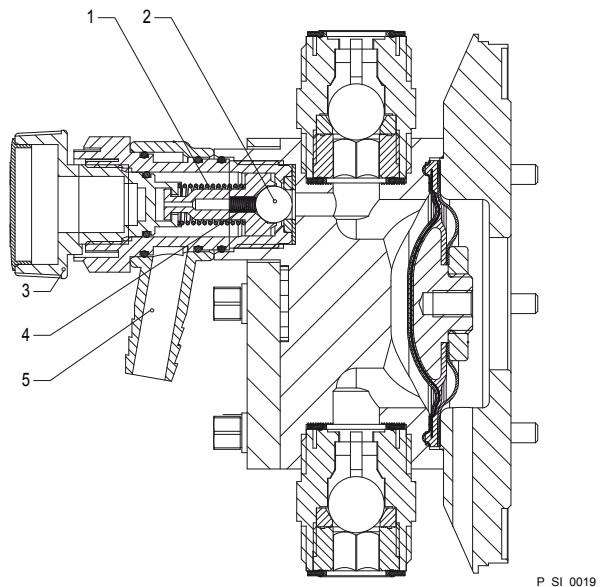


Fig. 9: Integral relief valve

- 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 visible - see Fig. 10.

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

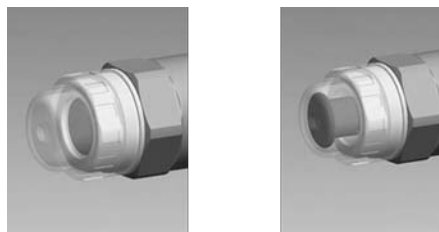


Fig. 10: Visual diaphragm rupture sensor, triggered and untriggered

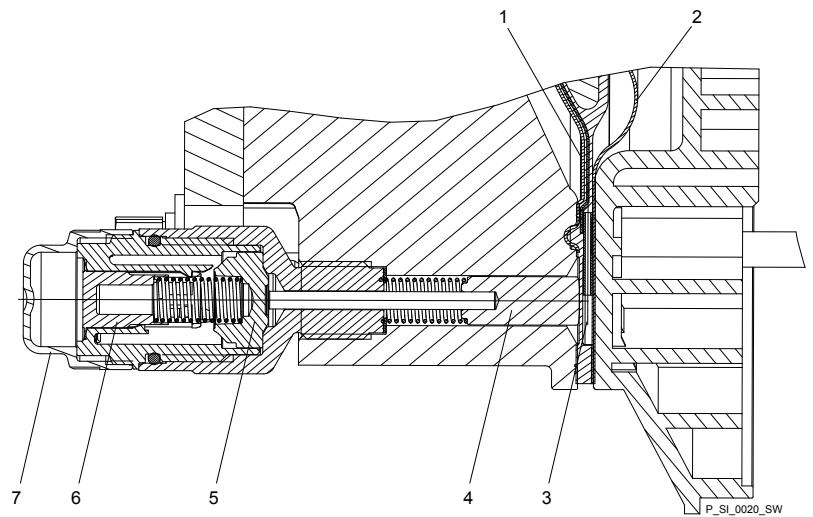


Fig. 11: Section through the visual membrane rupture sensor Sigma ("Visual break indicator" version)

- 1 Working layer ($\hat{=}$ operating diaphragm)
- 2 Safety layer ($\hat{=}$ safety diaphragm)
- 3 Flap
- 4 Piston
- 5 Diaphragm rupture sensor
- 6 Cylinder, red
- 7 Cover, transparent

6 Assembly



WARNING!

Warning about personal and material damage

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.



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.
- Only transport the unit when the red gear bleeding plug is pushed in.
- 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

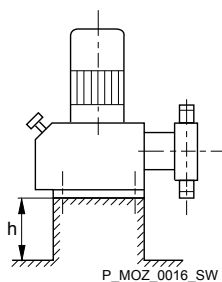


Fig. 12



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

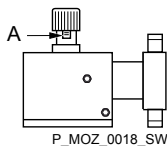
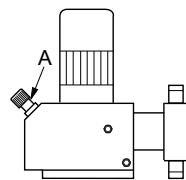


Fig. 13

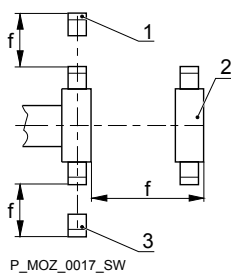


Fig. 14

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.

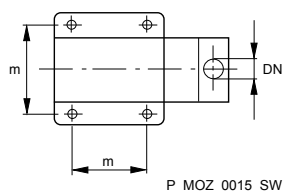



Fig. 15



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 ...).


- 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.



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

- The discharge valve must be upright.



Capacity too low
 Vibrations can disturb the valves of the liquid end.

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

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 about personal and material damage

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.



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!

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.



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. 16.
- In the event that an unflared insert is used (e.g. third party part), an elastomer flat seal must be used - see Fig. 17.

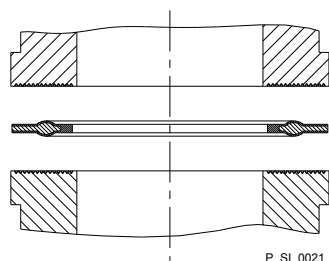


Fig. 16: Moulded composite seals with corrugated insert

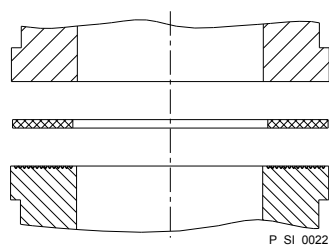


Fig. 17: Elastomer flat seal with an insert without flare



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.

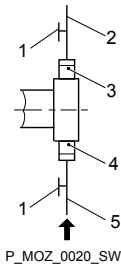


Fig. 18: Manometer connecting options

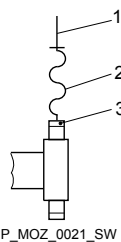


Fig. 19: Steel pipeline at the liquid end

Integral relief valve



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.

- 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.

- 1 Steel pipeline
- 2 Flexible pipe section
- 3 Plastic liquid end



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.



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. 20.

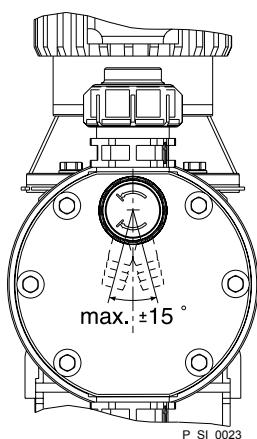


Fig. 20: Permissible alignment of the relief valve



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



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.



WARNING!

Warning about personal and material damage

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.



CAUTION!

Warning about personal and material damage

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

Personnel: Electrician

What requires electrical installation?

- Motor
- External fan (option)
- Stroke control drive (Option)
- Stroke adjusting drive (Option)
- Diaphragm rupture sensor (Option)
- Stroke sensor (Option)
- Pacing relay (option)
- Frequency converter (option)

Motor

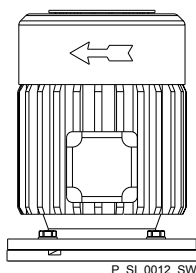


Fig. 21: Direction of rotation of motor



CAUTION!

Pump can be damaged

The pump can be damaged if the motor drives the pump in the wrong direction.

- When connecting the motor, pay attention to the correct direction of rotation indicated by the arrow on the fan cover, as shown in Fig. 21.

1. ➔ Install a motor protection switch, as the motors have no fuse.
2. ➔ Install an emergency cut-off switch or include the motor in the emergency cut-off management of the system.
3. ➔ Use a suitable cable between the motor terminal box and power supply.



- Key motor data can be found on the unit nameplate.
- Motor data sheets can be requested for more information.
- The terminal wiring diagram is located in the terminal box.
- Notes on the speed controlled motor with external fan and temperature monitoring can be found in the "General operating instructions for ProMinent® motor-driven metering pumps and hydraulic accessories"!

Diaphragm rupture sensor (Option)



WARNING!

Risk of electric shock

In event of a defect, there is a risk of electric shock when conductive feed chemical are used.

- For safety reasons we recommend connecting to a protective low voltage, e.g. in accordance with EN 60335-1 (SELV).



CAUTION!

Danger resulting from unnoticed diaphragm rupture

If the pump has been ordered with an electric diaphragm rupture sensor, it must also be electrically installed.

- Install the enclosed diaphragm rupture sensor electrically to a suitable monitoring device.

a) Diaphragm rupture sensor with switch contact



- The cable can be poled as required.

b) Namur sensor, inherently safe

The monitor / power supply installed by the customer must be able to evaluate the current variations of the Namur sensor for indicating a diaphragm rupture!

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

- ➔ Connect the stroke sensor to a suitable monitoring device according to the technical data provided with the monitoring device and that of the stroke sensor - see chapter "Technical data".

Pacing relay (identity code specification "Stroke sensor": 2)

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, it can be destroyed by heating.

- Fit a circuit breaker.

Pacing relay terminal output data

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

* at rated load

The contacts are potential-free.

The pacing relay is a N/O as standard.

Supply voltage for pacing relay PCB

Available supply voltages	Mains supply frequency	Power consumption
230 V AC (180-254 V)	50 / 60 Hz	10 mA (at 230 V, 50 Hz)
115 V AC (90-134 V)	50 / 60 Hz	15 mA (at 115 V, 60 Hz)
24 V DC (20-28 V)	-	10 mA (at 24 V DC)

Other units

- ➔ Install the other units according to their documentation.

8 Start up

Safety information

**WARNING!****Warning about personal and material damage**

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.

**WARNING!****Fire danger**

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

- When filling and draining the liquid end, the feed chemical must not come into contact with oxygen.

**CAUTION!****Warning about personal and material damage**

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

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

The metering pump may only be operated by trained personnel. The operator is responsible for ensuring that under the given operating conditions (pressure, temperature, corrosiveness, etc.) danger to the operating personnel is avoided by use of appropriate accident prevention measures.

**CAUTION!****Feed chemical could escape**

- Check suction and discharge lines, liquid end and valves for leak-tightness and tighten if necessary.
- Check whether the necessary flushing pipes are connected.

**CAUTION!**

Prior to commissioning check the drive motor and corresponding ancillary equipment is connected according to regulations.

**CAUTION!**

When using pumps with speed control, observe the instructions in the frequency converter operating instructions.



CAUTION!

Possible environmental and material damage

In event the red gear bleeding plug is sealed, during operation it prevents any pressure compensation between the drive housing and the surroundings. This ensure that oil can be pushed from the drive housing.

- Remove the gear bleeding plug before commissioning.

Remove the gearbox vent stopper

Before start up pull the red gearbox vent stopper off, see chapter "Overview of equipment and control elements".

Checking the oil level

When the pump is idle, check whether the oil level in the pump is in the middle of the oil level indicator.

This will rule out the pump losing oil and suffering damage.

Checking the direction of rotation

When commissioning the unit, check whether the drive motor is rotating correctly - check this against the arrow on the motor housing or the diagram in the chapter entitled "Electrical Installation."

Using the 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!

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.

Priming against pressure

1. ➤ Hydraulically isolate the discharge line from the pump using an isolation device.
2. ➤ Turn the rotary dial on the integral relief valve in a clockwise direction up to the "close" stop.
 - ⇒ The excess pressure escapes through the hose connector.
3. ➤ Run the pump until the feed chemical coming out of the hose connector is free from bubbles.
4. ➤ Turn the rotary dial on the integral relief valve in a clockwise direction up to the "close" stop.
 - ⇒ **The pump can be started.**



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

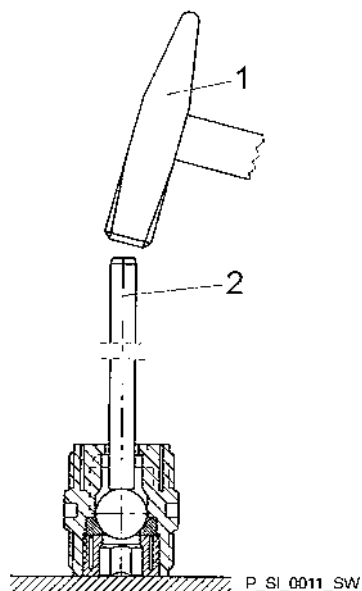


Fig. 22: Tapping the valve set disc

Adjusting the stroke length



Only adjust the stroke length when the pump is running. This is easier and also better for the pump.

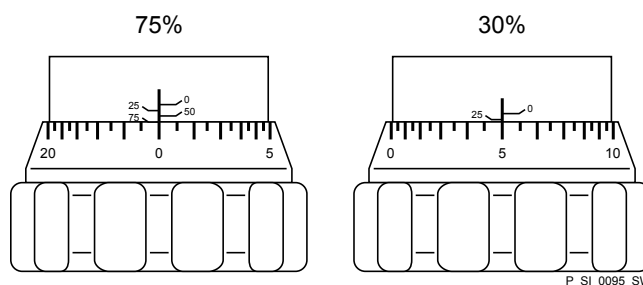


Fig. 23: Adjusting the stroke length

- 100 % = 4 rotations
- 25 % = 1 rotation
- 0.5 % = 1 scale mark on stroke adjustment dial

Correctly adjusting the pump:

- Select as large a stroke length as possible for viscous feed chemicals.
- Select as large a stroke length as possible for outgassing feed chemicals.
- Select as high a stroke rate as possible for good mixing.
- Do not set the stroke length at less than 30 % for precise dosing.

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.

9 Maintenance

Safety information



WARNING!

Warning about personal and material damage

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.



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
After approx. 5,000 operating hours	Change gear oil - refer to "Changing gear oil" in this chapter.	Instructed personnel
Quarterly	Check the oil level.	
Quarterly*	<ul style="list-style-type: none"> ■ 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 32. ■ 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.

Changing gear oil

Draining gear oil

1. ➤ Remove the vent screw (1).
2. ➤ Place an oil tray under the oil drain plug (2).

3. ➤ Unscrew the oil drain plug (2) out of the drive housing.
4. ➤ Allow the gear oil to run out of the drive.
5. ➤ Screw in the oil drain plug (2) with a new seal.

Filling with gear oil

Prerequisites: Gear oil according to the "Ordering information" chapter is available.

1. ➤ Start up the pump.
2. ➤ Slowly pour gear oil through the vent screw (1) opening until the oil inspection window (3) is half covered.
3. ➤ Allow the pump to run for a further 1... 2 minutes
4. ➤ Replace the vent screw (1).

10 Repairs

Safety information



WARNING!

Warning about personal and material damage

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.



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.

10.1 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).

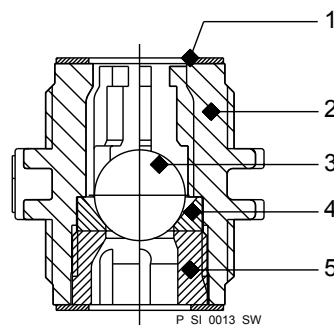


Fig. 24: Simple cross-section through ball valve

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

10.2 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. ➤ Empty 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. ➤ Loosen the diaphragm from the drive axle with a gentle backwards turn in the anti-clockwise direction.
 9. ➤ Completely unscrew the diaphragm from the drive axle.
 10. ➤ 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.

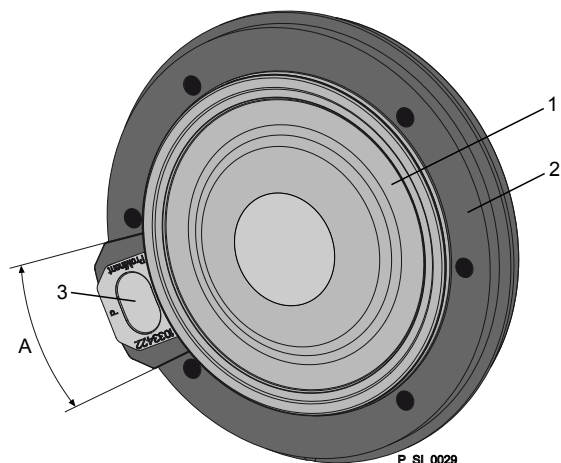


Fig. 25: Tolerance range of the flap on the backplate

- 1 Diaphragm
- 2 Backplate
- 3 Flap
- A Tolerance range

11. ➤ 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.

12. Place the dosing head with the screws onto the diaphragm - the suction connector must be pointing downwards in the pump's fitting position.
13. Tighten the screws gently to start with.
14. Screw the diaphragm rupture sensor into the dosing head.
15. Start up the pump and adjust the stroke length to 100 %.
16. Stop the pump and tighten the screws crosswise. Tightening torque - see ⚡ "Tightening torques" on page 32.
17. 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!

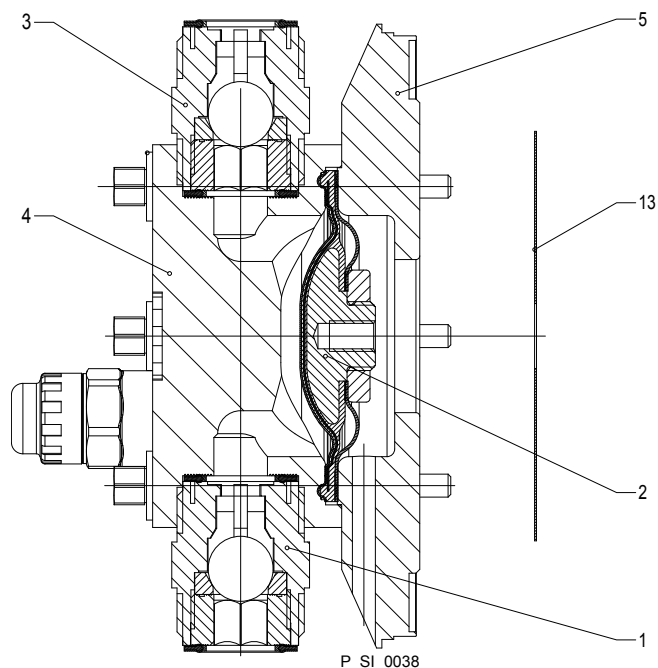


Fig. 26: Cross-section through the liquid end

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

11 Troubleshooting

Safety information



WARNING!

Warning about personal and material damage

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.



WARNING!

Danger of an electric shock

Personnel working on electrical parts can be electrocuted if all electrical lines carrying current have not been disconnected.

- Disconnect the supply cable before working on the motor and prevent it from being reconnected accidentally.
- Any separately driven fans, servo motors, speed controllers or diaphragm rupture sensors fitted should also be disconnected.
- Check that the supply cables are de-energised.



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.

Tasks

Fault description	Cause	Remedy	Personnel
Pump does not prime in spite of full stroke motion and bleeding	The valves are dirty or worn.	Repair the valves - see chapter entitled "Repair".	Technical personnel
	The feed chemical has particles larger than 3 mm.	Install a suitable filter in the suction line.	Technical personnel
Pump does not reach high pressure rates.	The valves are dirty or worn.	Repair the valves - see chapter entitled "Repair".	Technical personnel

Fault description	Cause	Remedy	Personnel
	The motor is wired incorrectly.	1. Check the mains voltage and mains frequency. 2. Wire the motor correctly.	Electrician
	The mains voltage has failed.	Eliminate the cause.	Electrician
Fluid is escaping from the end disc	The dosing head screws are no longer tight enough.	Tighten the screws crosswise to the specified tightening torque.	Technical personnel
	The diaphragm leaks.	Replace the diaphragm - refer to the "Repair" chapter.	Technical personnel
Large leaks occur at the relief valve.	The ball or ball seat are dirty or worn.	Clean or replace the ball and ball seat.	Technical personnel
The diaphragm rupture sensor has triggered.	The operating diaphragm has ruptured.**	Replace the diaphragm - refer to the "Repair" chapter.	Technical personnel
The drive motor is very hot.	The discharge line is seriously constricted.	Rectify any constriction of the discharge line.	Technical personnel
All other faults.	Other causes.	Call ProMinent ProMaqua customer services.	

* If necessary use the cross-section drawing of the integral relief valve in the "Functional Description" chapter.



WARNING!

Warning of eye injuries

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

- Wear protective glasses.

**



WARNING!

Warning of escaping feed chemical

When dosing 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.



CAUTION!

Warning of inaccurate dosing

Once the operating membrane has ruptured, precise dosing of the pump can no longer be guaranteed.

- Do not continue to use the pump for critical process dosing.
- For uncritical processes, the pump can continue to be operated for some time after the break in emergency service mode at full operating pressure and free from leaks up until replacement of the diaphragm.

12 Decommissioning

Decommissioning

**WARNING!****Warning about personal and material damage**

EX pumps only: When operating in EX areas, certain subjects must be observed.

- The chapter "Important supplements for metering pumps in EX zones" of the "General Operating Instructions on ProMinent® Motor-Driven Metering Pumps and Hydraulic Accessories" must be observed in all cases.

**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".

Final decommissioning

Personnel: Technical personnel

- Also drain the gear oil - refer to the chapter entitled "Maintenance".

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!

**CAUTION!****Environmental hazard due to gear oil**

The pump contains gear oil, which can cause damage to the environment.

- Drain the gear oil from the pump.
- Note the local guidelines currently applicable in your country!

13 Technical data

Only for "M - modified" version:



WARNING!

Risk of personal injuries

Please observe the "Supplement for modified version" at the end of the chapter!

It replaces and supplements the technical data!

13.1 Performance data

S2Ba under 50 Hz operation

Type	Minimum pump capacity at maximum back pressure			Maximum stroke rate	Suction lift	Permissible priming pressure, suction side	Connector size
	bar	l/h	ml/stroke				
16050 PVT	10	50	11.4	73	7	3	1" - 15
16050 SST	16	47	11.4	73	7	3	1" - 15
16090 PVT	10	88	11.4	132	7	3	1" - 15
16090 SST	16	82	11.4	132	7	3	1" - 15
16130 PVT	10	135	10.9	198	7	3	1" - 15
16130 SST	16	124	10.9	198	7	3	1" - 15
07120 PVT	7	120	27.4	73	5	1	20*
07120 SST	7	120	27.4	73	5	1	20*
07220 PVT	7	220	27.7	132	5	1	20*
07220 SST	7	220	27.7	132	5	1	20*
04350 PVT	4	350	29.4	198	5	1	20*
04350 SST	4	350	29.4	198	5	1	20*

All figures refer to water at 20 °C.

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



* For Sigma types 07120, 07220 and 04350 the valves in the dosing head are of type DN 25 (G1 1/2). As for these types of pipes, DN 20 is generally sufficient (see technical data, suction/discharge side connector), the connector parts that can be ordered under the identity code (e.g. inserts) are already reduced to DN 20, i.e. piping and accessories can be installed in DN 20.

Technical data

S2Ba under 60 Hz operation

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				
16050 PVT	10	145	60	15.9	87	7	3	1" - 15
16050 SST	16	232	57	15.1	87	7	3	1" - 15
16090 PVT	10	145	106	27.8	158	7	3	1" - 15
16090 SST	16	232	98	26	158	7	3	1" - 15
16130 PVT	10	145	156	41.0	238	7	3	1" - 15
16130 SST	16	232	148	39.2	238	7	3	1" - 15
07120 PVT	7	100	150	39.7	87	5	1	1 1/2" - 25*
07120 SST	7	100	150	39.7	87	5	1	1 1/2" - 25*
07220 PVT	7	100	264	69.7	158	5	1	1 1/2" - 25*
07220 SST	7	100	264	69.7	158	5	1	1 1/2" - 25*
04350 PVT	4	58	420	108	238	5	1	1 1/2" - 25*
04350 SST	4	58	420	108	238	5	1	1 1/2" - 25*

All figures refer to water at 20 °C.

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



* For Sigma types 07120, 07220 and 04350 the valves in the dosing head are of type DN 25 (G1 1/2). As for these types of pipes, DN 20 is generally sufficient (see technical data, suction/discharge side connector), the connector parts that can be ordered under the identity code (e.g. inserts) are already reduced to DN 20, i.e. piping and accessories can be installed in DN 20.

Accuracies

Data	Value	Unit
Reproducibility	±2	% *

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

13.2 Shipping weight

Types	Material version	Shipping weight
		kg
16050 ... 16130	PVT	15
	SST	20

Types	Material version	Shipping weight
		kg
07120 ... 04350	PVT	16
	SST	24

13.3 Wetted materials

Material version	Liquid end	Suction/discharge connector	Seals* / ball seat	Balls	Springs	Integral relief valve
PVT	PVDF	PVDF	PTFE/PTFE	Ceramic / glass **	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

** Types 07120, 07220, 04350

13.4 Ambient conditions

13.4.1 Ambient temperatures

Pump, compl.

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

13.4.2 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

13.4.3 Air humidity

Air humidity

Data	Value	Unit
Maximum air humidity *:	92	% rel. humidity

* non-condensing

13.5 Motor data

Electrical data

Identity code specification	Phase, protection	Nominal voltage	Mains supply frequency	Rated output	Remarks
S	3 ph, IP 55	220-240 V / 380-420 V	50 Hz	0.25kW	
		250-280 V / 440-480 V	60 Hz	0.25 kW	
M	1 ph AC, IP 55	230 V \pm 5 %	50/60 Hz	0.18 kW	
N	1 ph AC, IP 55	115 V \pm 5 %	60 Hz	0.18 kW	
L1	3 ph, II2GEEEx-elIT3	220-240 V / 380-420 V	50 Hz	0.18 kW	
L2	3 ph, II2GEEEx-dIICT4	220-240 V / 380-420 V	50 Hz	0.18 kW	with PTC, speed control range 1:5
P1	3 ph, II2GEEEx-elIT3	250-280 V / 440-480 V	60 Hz	0.18 kW	
P2	3 ph, II2GEEEx-dIICT4	250-280 V / 440-480 V	60 Hz	0.21 kW	with PTC, speed control range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	0.37 kW	with PTC, speed control range 1:20, with external fan 1ph 230 V; 50/60 Hz
V0	1 ph AC, IP 55	230 V \pm 5 %	50/60 Hz	0.37 kW	Variable speed motor with integrated frequency converter



Motor data sheets, special motors, special motor flanges, external fan, temperature monitoring

- For further information for the motor with identity code specification "S", refer to the "Supplementary information CD for ProMinent pump operating instructions". Motor data sheets can be requested for all other motors.
- For other motors "S", "M" or "N" as identity code specifications: Pay special attention to the operating instructions of the motors.
- Special motors or special motor flanges are possible on request.
- Notes on the speed controlled motor with external fan and temperature monitoring can be found in the "General operating instructions for ProMinent® motor-driven metering pumps and hydraulic accessories"!


13.6 Stroke actuator

Voltage	Mains supply frequency	Performance
230 V ±10 %	50/60 Hz	11.7 W
115 V ±10 %	60 Hz	11.7 W

13.7 Stroke control drive

Voltage	Mains supply frequency	Performance
230 V ±10 %	50/60 Hz	6.5 W
115 V ±10 %	60 Hz	6.5 W

13.8 Diaphragm rupture sensor


 *Install the sensor according to the chapter "Installation, electrical".*

a) Contact (Standard for identity code specification "Displacement body": A)

Contact loading, max.

at voltage	Maximum current
30 V DC	1 A
125 V AC	0.6 A
250 V AC	0.3 A

The diaphragm rupture sensor is an NC.

 – *For safety reasons we recommend connecting to a protective low voltage, e.g. in accordance with EN 60335-1 (SELV).*
 – *The cable can be connected as required.*

a) Namur sensor (for identity code specification "Displacement body": A)

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	+

13.9 Stroke sensor "Sigma"



Install the sensor according to the chapter "Installation, electrical".

a) Pacing relay (stroke sensor with ...) (Identity code specification "Stroke sensor": 2)

For more information, see "Pacing relay" in the "Relay" chapter.

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	+

13.10 Relay



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

13.11 Gear oil

Manufacturer	Name	Viscosity class (ISO 3442)	Part no.	Oil volume
Mobil	Mobil Gear 634 *	VG 460	555 325	0.5 l

* or comparative gear oil

13.12 Sound pressure level

Sound pressure level

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

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

13.13 Supplementary information for modified versions

(With identity code specification "Version": "M" - "modified")

Technical data

Technical data of pumps in the modified version can deviate from those of the standard pumps. They can be queried by stating the details of the serial number.

During operation with an automatic stroke length adjustment control together with a variable speed motor, the stroke rate must not fall below 30 strokes / min. Otherwise technical problems occur, because the mechanical resistance of the stroke adjustment spindle becomes too high.

motor


The motor data sheets for the modified version are valid. They may deviate from the standard motor data sheets.

Spare parts

With a modified version, it is absolutely necessary to specify the details of the serial number requesting and ordering the spare and replacement parts.

14 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:	<i>Metering pump, Series Sigma</i>
Product type:	<i>S2Ba... / S2Ca...</i>
Serial no.:	<i>refer to nameplate on the device</i>
Pertinent EC Directives:	<i>EC Machinery Directive (2006/42/EC) EC Low Voltage Directive (2006/95/EC) EC EMC Directive (2004/108/EC)</i>
Applied harmonised standards in particular:	<i>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</i>
technical documents have been compiled by:	<i>Norbert Berger Im Schuhmachergewann 5-11 DE-69123 Heidelberg</i>
Date / Manufacturer - Signature :	<i>04.01.2010</i> 
Details of the signatory:	<i>Joachim Schall, Head of Research and Development</i>

For pumps with explosion protection:

- Original -
EC - Declaration of Conformity

We hereby declare, **ProMinent Dosiertechnik GmbH**
Im Schuhmachergewann 5 - 11
D - 69123 Heidelberg

That the following designated product, based on its development and construction,
as well as the version marketed by us, complies with the relevant
EC safety and health directive.
This declaration loses its validity in the event of a modification to the product not agreed with us.

Identification of Product : **Diaphragm Metering Pump, Series Sigma 2,
Construction "Ex-Proof" according to "ATEX 95"**

Product Type: **S2BA-----XY--**
characteristic value "X" = "P" or "L",
and characteristic value "Y" = "1" or "2"
or "X" = "1, 2, 3, 4 or 5" and "Y" = "A"

Series - No. : **see nameplate on device**

Relevant EC Directives: **EC - Machine Directive (2006/42/EC)**
EC - EMV - Directive (2004/108/EC)
EC - Ex- Directive (94/9/EC)

Applied Pump without Motor: **EN ISO 12100-1/2, EN 809, EN 13463-1/5**
harmonised Motor Ex "e": **EN 50014, EN 50019**
standards Motor Ex "d": **EN 60079-0, EN 60079-1, EN 60079-7, EN 61241-0, EN 61241-1**
in particular: Hub sensor: **EN 60079-0, EN 60079-11, EN 60079-26**

The assembly of the components does not present any new Ex-relevant hazards

Ex-identification:
Pump without motor: **II 2G c IIC T4 X**
Motor (characteristic value "Y"="1") : **II 2G EEx e IIC T3**
Motor (characteristic value "Y"="2") : **II 2G Ex de IIC T4**
Diaphragm rupture sensor **II 1G Ex ia IIC T6**
Overall system: **II 2G c IIC T3 X (for "Y" = "1") or II 2G c IIC T4 X (for "Y" = "2" or "A")**

Technical documents compiled by: **Norbert Berger**
Im Schuhmachergewann 5-11
DE-69123 Heidelberg

Date / Manufacturer - Signature : **26.05.2010**



Details of the signatory **Joachim Schall, Head of Development**

The EC Declaration of Conformity, the EC type-examination certificates and the operating instructions for the individual components are also enclosed with the pump.

15 Decontamination declaration

ProMinent®

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 <small>Medium/ Konzentration</small>	Identi- fication <small>CAS No.</small>	flammable <small>entzünd- lich</small>	toxic <small>giftig</small>	corrosive <small>ätzend</small>	harmful/ irritant <small>gesundheits- schädlich/reizend</small>	other* <small>sonstiges*</small>	harmless <small>unbedenklich</small>
Process medium <small>Medium im Prozess</small>								
Medium for process-cleaning <small>Medium zur Prozessreinigung</small>								
Returned part cleaned with <small>Medium zur Endreinigung</small>								

* 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