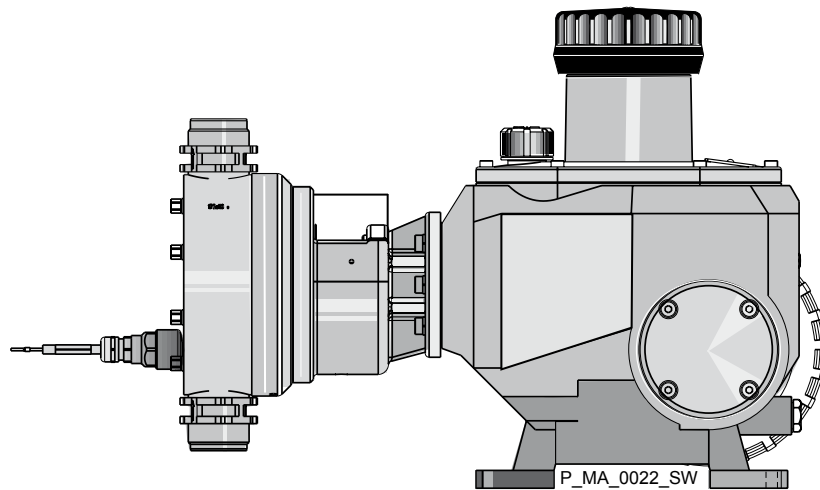


Operating instructions

Diaphragm metering pump

Makro TZ, TZMb

EN

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

Supplementary information



Fig. 1: Please read!

Read the following supplementary information in its entirety! Should you already know this information, you will benefit more from referring to the operating instructions.

The following are highlighted separately in the document:

■ Enumerated lists

➔ Operating guidelines

⇒ Outcome of the operating guidelines

- see (reference)

Information



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

Safety Information

Safety information is identified by pictograms - see Safety Chapter.

Information in supplier instructions

Refer to the precise designation of suppliers' components in the "Technical Data" chapter for ease of finding the relevant information.

Validity

These operating instructions conform to current EU regulations applicable at the time of publication.

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 unit type and material versions to be clearly identified.

EX pumps only

The nameplate stuck on the cover page is identical to the pump supplied so that there is a clear link between the operating instructions and the pump.

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
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1 Identity code

TZMb	Makro TZ diaphragm metering pump										
	Power end type										
	H	Main power end									
	D	Main power end, doubled									
	A	Add-on power end									
	B	Add-on power end, doubled									
	Type										
	-----	Performance data at maximum back pressure and type: refer to nameplate on the pump housing									
	Dosing head material										
	PC	PVC									
	PP	Polypropylene									
	TT	PTFE + 25% carbon									
	SS	Stainless steel									
	Material of seals / diaphragm										
	T	PTFE									
	Displacement body material										
	1	Multi-layer safety diaphragm with rupture signalling									
	Dosing head design										
	0	without valve spring									
	1	with valve spring									
	Hydraulic connector										
	0	Standard connection									
	1	Union nut and PVC insert									
	2	Union nut and PP insert									
	3	Union nut and PVDF insert									
	4	Union nut and SS insert									
	Design										
	0	with ProMinent® logo, no frame									
2	without ProMinent® logo										
A	with ProMinent® logo, with single frame										
B	with ProMinent® logo, with double frame										
C	with ProMinent® logo, with triple frame										
M	modified*		* order-specific design, see order paper-work for pump features								
Electric power supply											
S	3-phase, 230 V/400 V 50/60 Hz (WBS)										
R	4-pin speed stroke control motor, 230/400 V										
V(0)	Variable speed stroke control motor with integrated frequency converter										
Z	Speed control complete										

TZMb	Makro TZ diaphragm metering pump											
										L	3-phase, 230 V/400 V, 50 Hz, (Exe, Exd)	
										P	3-phase, 230 V/400 V 60 Hz (Exe, Exd)	
										V(2)	Variable speed stroke control motor with integrated frequency converter (Exd)	
										4	without motor, with flange 56 C	
										7	without motor, with flange 120/80	
										8	without motor, with flange 160/90	
										0	without motor, add-on power end	
										Degree of protection		
										0	IP 55 (standard) ISO class F	
										1	Exe design ATEX-T3 *	
										2	Exd design ATEX-T4 *	
										A	ATEX design of power end *	
										Stroke sensor		
										0	without stroke sensor	
										1	Stroke sensor (Namur), intrinsically safe	
										Stroke length adjustment		
										0	Stroke length adjustment, manual	
										1	Actuator 230 V	
										2	Actuator 115 V	
										3	Control drive 230 V 0-20 mA	
										4	Control drive 230 V 4-20 mA	
										5	Control drive 115 V 0-20 mA	
										6	Control drive 115 V 4-20 mA	
										Applications		
											0 standard	

* ATEX specification - refer to the nameplate on the pump, corresponding EU Declaration of Conformity for ATEX Machinery and  Chapter 2.2 'Explanation of the ATEX label' on page 21

2 Safety chapter





Identification of safety notes

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

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


Warning signs denoting different types of danger

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

Warning signs	Type of danger
	Warning – hand injuries.
	Warning – high-voltage.
	Warning – hot surface.
	Warning – danger zone.

Intended use

- Only use the pump to meter liquid feed chemicals.
- The pump is only approved for flammable feed chemicals if the operator takes appropriate safety measures.
- The pump may only be started up after it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions.
- Observe the general limitations with regard to viscosity limits, chemical resistance and density - see also the ProMinent Resistance List (in the Product Catalogue or at www.prominent.com)!
- All other uses or modifications are prohibited.
- The pump is not intended for the metering of gaseous media and solids.
- The pump is not intended for metering abrasive media.
- The pump is not intended for the metering of explosive substances and explosive mixtures.
- The pump is not intended for unprotected use outdoors.
- The pump is only intended for industrial use.
- Only allow trained and authorised personnel to operate the pump - see the following table.
- Other people may only access the pump if they have been informed about the dangers.

- You have a responsibility to adhere to the information contained in the operating instructions at the different phases of the unit's service life.
- You have a responsibility to observe the information contained in the operating instructions for the auxiliary equipment at the different phases of their respective service lives.
- ATEX designs only: Refer to the chapter  *Chapter 2.1 'Safety information for ATEX designs' on page 13.*

Qualification of personnel

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

Explanation of the table:

Trained, qualified personnel

A trained, qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognise possible hazards based on his training, knowledge and experience, as well as knowledge of pertinent regulations. A trained, qualified employee must be able to perform the tasks assigned to him/her independently with the assistance of drawing documentation and parts lists. The assessment of a person's technical training can also be based on several years of work in the relevant field.

Electrical technician

An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on his technical training and experience as well as knowledge of pertinent standards and regulations. An electrical technician must be able to perform the tasks assigned to him/her independently with the assistance of drawing documentation, parts lists, terminal and circuit diagrams. The electrical technician must be specifically trained for the working environment in which the electrical technician is employed and be conversant with the relevant standards and regulations.

Electrical technician with knowledge of ATEX explosion protection

An electrical technician with an additional explosion protection qualification should be specifically trained for the field of work in which he is employed and be familiar with the relevant standards and regulations. An electrical technician with an additional explosion protection qualification can work on electrical systems and independently recognise and avoid possible dangers based on his technical training and experience.

The electrical technician with an additional explosion protection qualification is familiar with all the standards and regulations applicable to explosion protection, in particular, but not exclusively, with all parts of EN 60079 [Electrical equipment for areas at risk of a gas explosion].

An electrical technician with an additional explosion protection qualification must comply with the provisions of the applicable statutory directives on accident prevention.

Recognised competent person

To carry out explosion hazard inspections the competent person must have:

- completed a relevant course of study or
- have a comparable technical qualification or
- another technical qualification combined with long-term experience of safety technology.

Make sure that the person is familiar with the relevant body of standards and regulations and has worked in the field for at least one year. The person needs to have opportunities for an exchange of experiences.

Specific requirements are placed on competent persons who perform tests on repaired devices/parts. They must be **recognised** by the responsible authorities (e.g., district council) in this respect.

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.

Trained user

A trained user is a person who fulfils the requirements demanded of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.

Service

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

Safety information



CAUTION!

These operating instructions include notes and extracts from German regulations relating to the operator's scope of responsibility. This information does not discharge the operator from his responsibility as an operator and is intended only to remind him or make him aware of specific problem areas. This information does not lay claim to being complete, nor applicable to every country and every type of application, nor to being unconditionally up-to-date.



WARNING!

Warning of hazardous feed chemical

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

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



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

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

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



WARNING!

Only with flammable feed chemicals Danger of explosion with isolating feed chemicals

A flammable feed chemical with a low electrical conductivity ($< 50 \text{ pS/m}$) can form explosive vapours with air in the liquid end and statically charge the diaphragm.

- It is essential that you avoid the liquid end running dry.



WARNING!

Risk of burns with hot feed chemicals

If hot feed chemicals can heat the liquid ends above the permissible surface temperatures, persons can suffer burns from them.

- Consider attaching a "Hot surface" label to the liquid end or ...
- fitting a guard plate.



WARNING!

Hot surface

In event the power end motor is loaded excessively, its surface may become very hot.

- Avoid contact.
- If necessary, mount a guard plate.



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 that come into contact with the chemical.

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



WARNING!

Danger of injury to personnel and material damage

The pump must only be opened at those points required to be opened by these operating instructions.

It may only be opened in other positions upon receipt of written authorisation from the ProMinent head office, Heidelberg.



CAUTION!

Danger of personnel injury and material damage

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

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



CAUTION!

Danger from incorrectly operated or inadequately maintained pumps

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

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

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.

Safety information for operating instructions

Prior to commissioning the system or system component, it is the responsibility of the system operator to obtain the latest safety data sheet for the chemicals / equipment to be used with the system from the supplier. Based on the information provided in the data sheets concerning health and safety, water and environmental protection, and taking into consideration the actual operating environment on site, it is the responsibility of the operator to create the legal framework for the safe operation of the system or system component, such as for example the preparation of operating instructions (operator's duties).

Safety equipment

Protective equipment

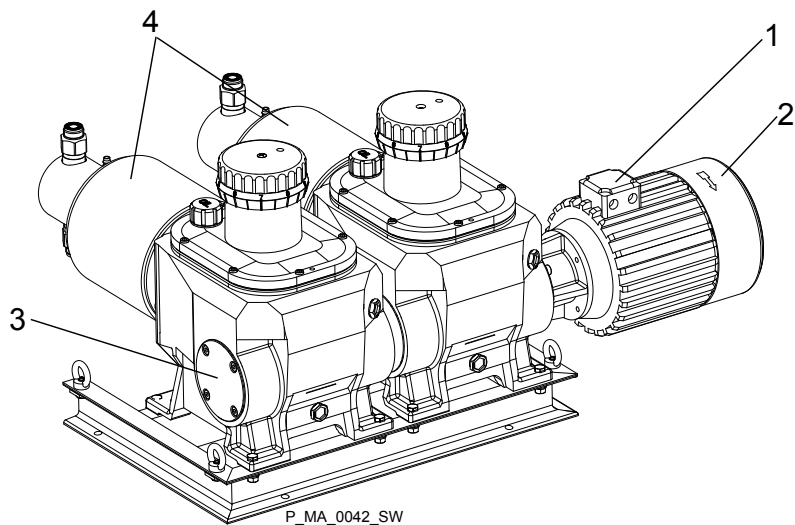


Fig. 2: Isolating protective equipment for Makro TZ with add-on power end (shown here for plunger design)

- 1 Motor terminal box cover
- 2 Protective cowling over the motor fan
- 3 Flange cover, side
- 4 Protective cover (diaphragm and plunger design only)

Pos.	Protective equipment	May only be removed by*:
1	Motor terminal box cover	Electrical technician, Service
2	Protective cowling over the motor fan	Service
3	Flange cover, side	Service
4	Protective cover (diaphragm and plunger design only)	Technical personnel, Service
-	Only with additional equipment: Their corresponding parts	Technical personnel, Service

* Only if required by the operating instructions and if the mains cable remains disconnected from the mains voltage.

Requirements if the motor is being installed independently

The operator must be able to:

- Perform a risk assessment
- Produce and attach a nameplate
- Issue an EC Declaration of Conformity
- Adapt the operating instructions, if necessary
- Install the motor correctly

Install the motor - with designs without motor

1. ➤ Select a suitable motor - it must correspond to the data for one of the motors from the "Motor data" table - see Chapter "Technical data"
2. ➤ Fit the motor correctly on the flange (qualified personnel).

3. ➤ As you have converted an "incomplete machine" into a complete machine, you must perform a conformity assessment, risk assessment, create a Declaration of Conformity, fit a company name-plate,
4. ➤ Complete the pump documentation / operating instructions.

Sound pressure level

Sound pressure level $L_{pA} < 75$ dB in accordance with EN ISO 20361:2010-10

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

2.1 Safety information for ATEX designs

This chapter lists all safety information for ATEX designs. Safety information is listed again at the relevant points in these operating instructions.

This safety information is supplementary to or replaces the safety information for non-ATEX designs. If the safety information for ATEX designs contradicts the other safety information, then the safety information in this chapter applies to ATEX designs.

Intended use

- Only operate an ATEX design pump in premises at risk from explosion in accordance with the applicable guidelines.
- The pump is not intended for metering flammable fluids in areas at risk from explosion.
- Do not expose the ATEX design to any sources of ionising radiation or electromagnetic high frequency radiation in the range $10^4 \dots 3 \times 10^{15}$ Hz or laser or ultrasound or lightning without putting in place measures in line with EN 80079-38.
- Do not use the ATEX design to meter media, which have a tendency to produce an exothermic reaction or self-ignite without measures in accordance with EN 80079-38.

Qualification of personnel

Task	Qualification
Planning the hydraulic installation	ATEX qualified person, ATEX electrical technician
Electrical installation	ATEX electrical technician
Start up	Skilled ATEX technician; Checking the electrical installation: Recognised competent person
Maintenance, repair	ATEX qualified person, ATEX electrical technician
Troubleshooting	Qualified ATEX technician or ATEX electrical technician - depending on the fault; Checking the electrical installation: Recognised competent person

Explanation of the table:

Recognised competent person

To carry out explosion hazard inspections the competent person must have:

- completed a relevant course of study or
- have a comparable technical qualification or
- another technical qualification combined with long-term experience of safety technology.

Make sure that the person is familiar with the relevant body of standards and regulations and has worked in the field for at least one year. The person needs to have opportunities for an exchange of experiences.

Specific requirements are placed on competent persons who perform tests on repaired devices/parts. They must be **recognised** by the responsible authorities (e.g., district council) in this respect.

Skilled technician with knowledge of ATEX explosion protection

The skilled technician with an additional explosion protection qualification should be specifically trained for the work area in which he is employed and be familiar with the relevant standards and regulations. The skilled technician with an additional explosion protection qualification can work on equipment and systems in areas protected from explosion and independently recognise and avoid possible dangers based on his technical training and experience.

The skilled technician with an additional explosion protection qualification is familiar with all the standards and regulations applicable to explosion protection.

The skilled technician with an additional explosion protection qualification must comply with the provisions of the applicable statutory directives on accident prevention.

Electrical technician with knowledge of ATEX explosion protection

An electrical technician with an additional explosion protection qualification should be specifically trained for the field of work in which he is employed and be familiar with the relevant standards and regulations. An electrical technician with an additional explosion protection qualification can work on electrical systems and independently recognise and avoid possible dangers based on his technical training and experience.

The electrical technician with an additional explosion protection qualification is familiar with all the standards and regulations applicable to explosion protection.

An electrical technician with an additional explosion protection qualification must comply with the provisions of the applicable statutory directives on accident prevention.

Summary of relevant ignition hazards and protective measures put in place for the Makro TZ in accordance with EN ISO 80079-36

Ignition hazard	Protective measures to be observed by the customer
Excessive surface pressure	Limitation of the maximum temperature of the feed chemical
Pump running hot	The customer must monitor and maintain the pump in accordance with the "Maintenance" chapter. The customer must monitor the capacity. The customer must fit a relief valve on the discharge side.
Mechanically generated sparks from the mechanism with low oil	The customer must monitor and maintain the pump in accordance with the "Maintenance" chapter.
Electrical stray current in the event of a short circuit	The customer must earth the pump and maintain the earthing of the individual components.
Electrical stray current in the event of a lightning strike	The customer must put in place measures in accordance with EN 1127-1, if necessary.

Ignition hazard	Protective measures to be observed by the customer
Static electricity	<p>The customer must earth the earthing points and maintain the potential equalisation cables of the individual components.</p> <p>The customer must pay attention to potential equalisation when dismantling.</p> <p>Paint should not be applied too thickly.</p> <p>Dosing heads made of electrically non-conductive materials must not be used.</p> <p>The customer must wire the diaphragm rupture indicator in such a way that it immediately stops the pump.</p>
Electromagnetic waves (also lasers), ionising radiation and ultrasound have an impact on the pump	The customer must put in place measures in accordance with EN 1127-1, if necessary.
Adiabatic compression and shock waves	Non-conductive feed chemicals: Do not allow the unit to run dry – even when filling and emptying the liquid end.
Deposits of dust	Regularly clean the outside of the pump with a damp cloth.
Flammable feed chemicals	<p>The pump must only be allowed to meter flammable feed chemicals with electrically well-conducting dosing heads.</p> <p>Make sure that the diaphragm rupture indicator stops the pump immediately in the event of a diaphragm rupture.</p>
Ignition hazard with bought-in motor components	<p>Refer to the documentation for the motor.</p> <p>Comply with the monitoring intervals.</p> <p>The insulation resistance must be greater than 5 MOhm.</p> <p>Provide a time-delay residual current device.</p> <p>Provide overload protection by means of a motor protection switch or an equivalent protective device.</p> <p>Observe the minimum spacing between the air inlet on the fan hood and any obstacles.</p> <p>Avoid deposits of dust more than 5 mm deep.</p> <p>Connect the earth wire.</p> <p>Max. installation height: 1,000 m.a.s.l.</p>
Ignition hazard with bought-in actuator or control drive components	<p>Refer to the documentation for the actuator.</p> <p>Wait 3 minutes after switching off before opening the housing.</p>
Ignition hazard with bought-in BoWex coupling	Refer to the documentation for the coupling (maintenance, alignment, ...).
Ignition hazard caused by bought-in proximity switch NJ1.5-8GM-N (stroke sensor)	Refer to the documentation for the proximity switch (electrical installation, ...).

Safety information



WARNING!

ATEX pumps in areas at risk from explosion

- The operator must observe the Operator Directive when operating equipment in areas at risk of explosion.
- Only clean plastic parts carefully with a damp cloth to avoid electrostatic charges and sparks.

**WARNING!****Motor may overheat**

If the necessary cooling air supply is not guaranteed, the motor may overheat. In an area at risk from explosion, it could trigger an explosion.

- Maintain sufficient clearance between the air intake opening and the walls. The distance should be greater than 1/4 of the diameter of the air intake opening.
- The fan must not suck in the exhaust air from other devices.

**WARNING!****ATEX pumps in areas at risk from explosion**

- Metering pumps must have an appropriate safety relief valve on the discharge side (to protect against excessive heating due to overloading or impact sparks caused by the breakage of power end parts).

**WARNING!****ATEX pumps in areas at risk from explosion**

- A flow control is needed to stop the pump as soon as no flow is detected.

**WARNING!****ATEX pumps and flammable media**

Only with material versions PP_, PV_ and PC_: The ignition temperature is reduced significantly below the ignition temperature at atmospheric pressure due to compression with the discharge stroke of the possibly ignitable vapour-air mixture.

- Do not allow it to run dry. Take appropriate protective measures.
- Immediately switch off the pump in the event of a diaphragm rupture.

**WARNING!****ATEX pumps in areas at risk from explosion**

If feed chemicals are metered, which tend to produce exothermic reactions or self-ignite, they can lead to high temperatures and ignition.

- Put in place measures in accordance with EN 80079-38.

**WARNING!****ATEX pumps in areas at risk from explosion**

- Electrically connect the electrical units listed on the earthing diagram in the appendix, cleanly and permanently, to an electrically clean earthing point, - e.g., with an earthing bar on your system.
- Electrically connect the electrical units fitted with a potential equalisation cable to each other, cleanly and permanently, to an electrically clean potential equalisation point - e.g., with a potential equalisation bar on your system.
- Note the enclosed documentation for the individual electrical components.



WARNING!

ATEX pumps in areas at risk from explosion

- Use a suitable motor protection switch to protect power end motors. Use motor protection approved for this application with Ex"e" motors. (Protection against warming caused by overloading)
- Provide a time-delay residual current device.
- Observe the enclosed operating instructions for the Ex motor.



WARNING!

The following applies in areas at risk from explosion:

- Note the details of the type examination certificate PTB 00 ATEX 2048 X for the Namur sensor NJ1.5-8GM-N as well.



WARNING!

ATEX pumps in areas at risk from explosion

- Make sure that a suitably competent person checks whether the appropriate installation information from the "Installation" chapter has been implemented correctly.
- Make sure that a "recognised competent person" checks the electrical installation and in particular the intrinsically safe power circuits.
- Set the opening pressure of the relief valve to a maximum of no more than 1.5 times the nominal pressure of the pump.



WARNING!

ATEX pumps in areas at risk from explosion

- Carry out a general check to ensure that the system is working properly, particularly the power end and bearings, by regularly monitoring it (for leaks, noises, temperatures, smell, etc.).
- Do not allow the pump to run hot due to a lack of oil. With lubricated metering pumps, regularly check for the presence of lubricant, for example by checking the liquid level, visual leak control, etc. If oil is leaking, examine the leakage point immediately and eliminate the cause.
- Check the correct operation of the relief valve downstream of the pump. In premises at risk from explosion, the relief valve should prevent the gear from becoming overloaded and becoming hot.
- Observe the enclosed operating instructions for the Ex motor.
- When cleaning plastic components, ensure that no electrostatic charges are generated by excessive friction.
- Prevent serious deposits of dust on the motor.
- Consider potential equalisation before you approach any pump equipment that could be at a different electrical potential (such as pipes or tools).
- Replace wear parts, such as bearings, when there is an identifiable incidence of unacceptable wear.
- Appropriate diagnostic equipment for bearing damage is recommended for the premature detection of bearing damage.
- Check whether the potential equalisation lines are all sitting correctly with clean contacts. Use the equipotential bonding drawings as an aid – see Appendix.
- Check whether the earth lines are all sitting correctly with clean contacts. Use the equipotential bonding drawings as an aid – see Appendix.
- Only use genuine spare parts as replacements.

Potential equalisation line (required in the area at risk from explosion)

The entire installation supplied is provided ex works with the necessary potential equalisation lines.

Electrically connect an additional potential equalisation cable from the potential equalisation cables from this system cleanly and permanently to an electrically clean potential equalisation point, e.g., to a potential equalisation bar on site.

Check the temperature of the spur gears

Measure the surface temperature at maximum load. Additional information – refer to the operating instructions for the spur gears.

Inspection, daily

Check the pump installation for:

- Leaks
- Abnormal noises or squeaks
- Abnormal temperatures
- Abnormal odours
- Abnormal vibrations
- Other anomalies

**WARNING!**

Stop the pump immediately in the event of any anomalies when inspecting the pump and rectify them immediately. ProMinent Service may be needed if required.

Maintenance

Interval	Maintenance work	Personnel
Quarterly*	<ul style="list-style-type: none"> ■ ATEX pump only: Special maintenance work - refer to the "Safety information for ATEX pumps". ■ ATEX pumps with an add-on power end only: Check the gear ring/DZ element of the ROTEX® coupling as per their manual. If the coupling is OK, the maintenance interval can be increased to 4000 hours. If the coupling is not clearly OK: Call ProMinent Service. 	Technical personnel
After 20,000 operating hours or 26,000 operating hours (API)	Adhere to the motor manufacturer's recommendations - see operating instructions for the motor.	

➔ Screw in the oil drainage plug (2) with a new seal.

**WARNING!**

Check after 1 day whether the oil drainage plug (2) is still tight.

Power end and motor – ATEX

Data	Value	Unit
Ambient temperature with function "Application" - "1 - Standard":	-10 ... +40	°C
Ambient temperature with function "Application" - "3 - Low temperature":	-20 ... +40	°C

SST - ATEX liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	90	°C
Minimum temperature.	-10	°C

Installation height

Data	Value	Unit
Maximum installation height*:	1000	m a.s.l.

* We urgently advise you to contact a specialist for ATEX motors with higher intended installation heights!

Namur sensor (Specified for EX zones)

5–25 V DC, in accordance with Namur or DIN 19234, potential-free design.

Data	Value	Unit
Rated voltage *	8	VDC

Data	Value	Unit
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	+

Safety equipment

Other safety equipment - ATEX labels

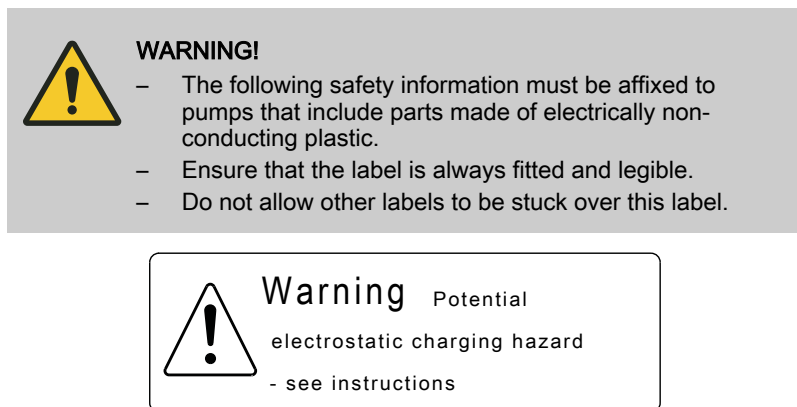


Fig. 3

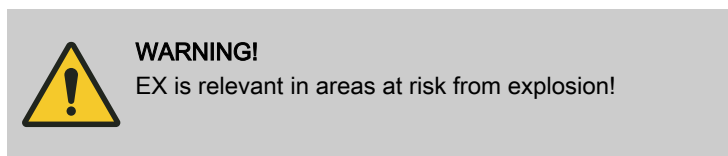
Requirements if the motor is being installed independently

The operator must be able to:

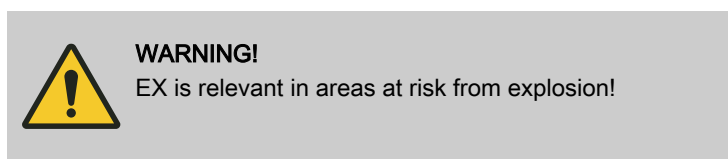
- with ATEX motors: perform an ignition hazard assessment

Install the motor - with designs without motor

1. Select a suitable motor - it must correspond to the data for one of the motors from the "Motor data" table - see Chapter "Technical data".



2. Fit the motor correctly on the flange (qualified personnel).
Observe the coupling operating instructions!



With a claw coupling: The claw on the motor shaft must be fixed at the correct height, see corresponding figure and table.

3. ➔ As you have converted an "incomplete machine" into a complete machine, you must perform a conformity assessment, risk assessment, issue an EC Declaration of Conformity, fit your own company nameplate,
4. ➔ With ATEX pumps: additionally perform an ignition hazard assessment.
5. ➔ Complete the pump documentation / operating instructions.

In areas at risk from explosion only the following combinations of identity code variants are permitted:

Identity code specification	Values
Elec. power supply / Motor design / Application	4A__0, 7A__0, 8A__0, 9A__0, 0A__0

Declarations of Conformity for the pump

The Declarations of Conformity can be found at the end of the operating instructions.

Special conditions X

If there is an "X" at the end of the ATEX specification of a unit in a "Declaration of Conformity for ATEX Machines" or a "Declaration of Incorporation for ATEX Machines", then special conditions apply for the safe operation of the equipment in areas at risk from explosion.

Please refer in this respect to the operating instructions, design test certificates and other documentation for the bought-in parts!

2.2 Explanation of the ATEX label

in accordance with Directive 2014/34/EU and standards EN ISO 80079-36, -37

Explanation of the pump's ATEX labelling Makro TZMb

Unit group			
II	No mines or associated underground systems, which can be endangered by firedamp - Unit for use in other areas at risk from explosion		
	Other parameters		
	3G Ex h	(Example)	
		Explosion group	
		IIC	for explosion group IIC gas - refer to your explosion protection document
		IIB	for explosion group IIB gas - refer to your explosion protection document
		Temperature class	
		T3	for Temperature class T3 gas - refer to your explosion protection document
		T4	for Temperature class T4 gas - refer to your explosion protection document

Explanation of the pump's ATEX labelling Makro TZMb

					Equipment protection level (EPL)	
					Gb	high EPL use possible in zones 1 and 2 - refer to your explosion protection document
					Gc	normal EPL use possible in zone 2 - refer to your explosion protection document
					Suffix X	
					X	Special conditions - refer to the Declarations of Conformity and EC-type examination certificates



WARNING!

Example of EX-designation: Where may I use the ATEX version of the Makro TZMb?


The pump designation is:

" ... II 3G Ex h IIB T4 Gc".

The pump label corresponds to "Unit group" II: the pump may only be used in overground production systems, which are not at risk from firedamp.

The inserted pump label "3G Ex h" does not need to be discussed here.

The additional pump label in the example states "Explosion group" IIB and "Temperature class" T4:

The  *Tab. 1 'Example of the division of gases into explosion groups and temperature classes' on page 23* is shown as an example: the pump can be used for ethyl ether or a comparable gas - refer to the material safety data sheet for the gas or your explosion protection document.

The pump in the example could also be suitable for gases that require only "Explosion group" IIA and "Temperature class" T3, T2 or T1 - but not for T5 and T6.

"EPL" Gc is shown in the next example: Use only in zone 2 – but not in zone 1 or zone 0.

Tab. 1: Example of the division of gases into explosion groups and temperature classes

	T6 85 °C	T5 100 °C	T4 135 °C	T3 200 °C	T2 300 °C	T1 450 °C
IIC	Carbon disulphide	-	Trichlorosilane	-	Ethyne	Hydrogen
IIB	-	-	Ethyl ether	-	Ethene	Mains gas (coal gas)
IIA	-	-	Acetaldehyde	Benzine, Diesel fuel, Aircraft fuel, Heating oils, n-hexane	Ethanol, n-butane, n-butyl alcohol	Acetone, Ammonia, Benzene (pure), Acetic acid, Ethane, Ethyl acetate, Carbon oxide, Methanol, Propane, Toluene

**WARNING!**


Example 2 - EX-designation: Where may I use the ATEX version of the Makro TZMb?

The pump designation is " ... II 2G Ex h IIC T4 Gb X".

The pump label corresponds to "Unit group" II: the pump may only be used in overground production systems, which are not at risk from firedamp.

The inserted pump label "2G Ex h" does not need to be discussed here.

The pump label is shown in the example "Explosion group" IIC and "Temperature class" T4:

The  Tab. 1 'Example of the division of gases into explosion groups and temperature classes' on page 23 shows the following: the pump can be used for all gases of "Explosion group" IIC and "Temperature class" T4 - refer to your explosion protection document.

The pump in the example could also be suitable for gases that require only "Explosion group" IIB or IIA and "Temperature class" T3, T2 or T1 – but not for T5 and T6.

"EPL" Gb is shown in the next example: use is possible in zone 1 and zone 2 – but not in zone 0.

"X" indicates "Special conditions" - see EU Declaration of Conformity or type test certification for the pump or additional assemblies. This might involve another lower limit for the ambient temperature, e.g. -10 °C .

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 "Decommissioning!"

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

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



CAUTION!

Danger of environmental and material damage

The unit can be damaged or oil may escape due to 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 with the locking screw - not the bleed plug - fitted to the oil filling opening.
- 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.

Storage

Personnel: ☐ Technical personnel

1. ➤ Plug the caps on the valves.
2. ➤ Check whether the seal screw is screwed into oil filler opening instead of the vent screw.
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, sealed place in line with the prescribed ambient conditions - refer to the chapter entitled "Technical Data".

4 Overview of equipment, control elements

Power end, single head

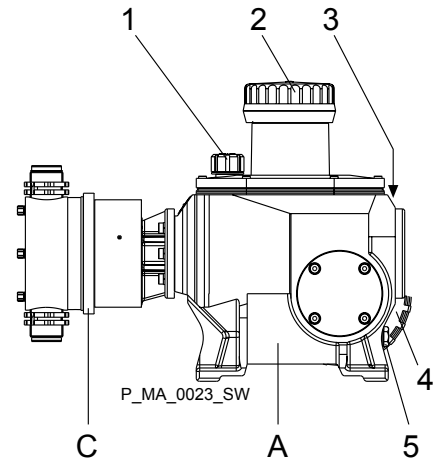


Fig. 4: Side view (here TZMb H)

- A Drive
- C Liquid end
- 1 Vent screw
- 2 Stroke length adjustment wheel
- 3 Oil inspection window
- 4 Motor
- 5 Oil drainage screw

Power end, double head

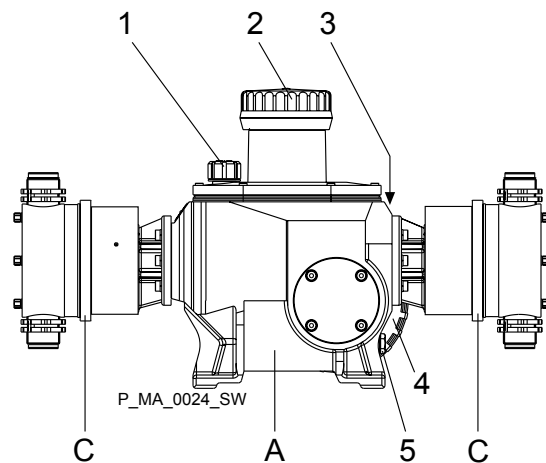


Fig. 5: Side view (here TZMb D)

- A Drive
- C Liquid end
- 1 Vent screw
- 2 Stroke length adjustment wheel
- 3 Oil inspection window
- 4 Motor
- 5 Oil drainage screw

Liquid end

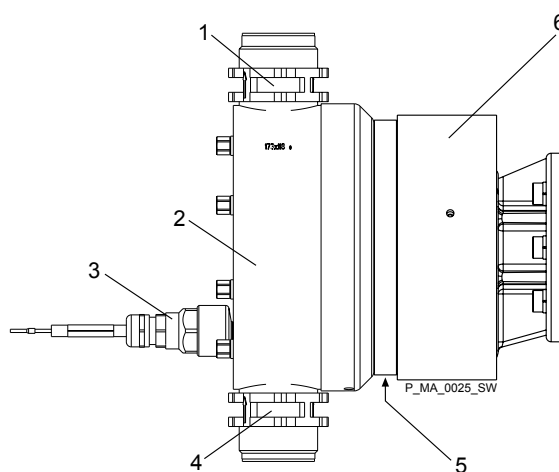


Fig. 6: View of the liquid end

- 1 Discharge valve
- 2 Dosing head
- 3 Diaphragm rupture sensor
- 4 Suction valve
- 5 Tube nozzle for leakage
- 6 Protective cover

5 Functional description

Pump

The metering pump is an oscillating diaphragm pump, the stroke length of which can be adjusted. An electric motor drives it.

6 Assembly



- Refer to the correct dimensional drawings on our website www.prominent.com for assistance.
- Compare the dimensions on the dimensional drawing with those of the pump.

Install the motor - with designs without motor

1. ➔ Select a suitable motor - it must correspond to the data for one of the motors from the "Motor data" table - see Chapter "Technical data".



WARNING!

EX is relevant in areas at risk from explosion!

2. ➔ Fit the motor correctly on the flange (qualified personnel).
Observe the coupling operating instructions!



WARNING!

EX is relevant in areas at risk from explosion!

With a claw coupling: The claw on the motor shaft must be fixed at the correct height, see corresponding figure and table.

3. ➔ As you have converted an "incomplete machine" into a complete machine, you must perform a conformity assessment, risk assessment, issue an EC Declaration of Conformity, fit your own company nameplate, ...
4. ➔ With ATEX pumps: additionally perform an ignition hazard assessment.
5. ➔ Complete the pump documentation / operating instructions.

Base

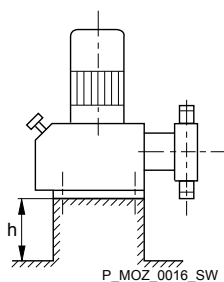


Fig. 7



WARNING!

The pump can break through the base or slide off it

- Ensure that the base is horizontal, flat and permanently load-bearing.



Capacity too low

Vibrations can disturb the liquid end valves.

- Do not allow the base to vibrate.

Space requirement

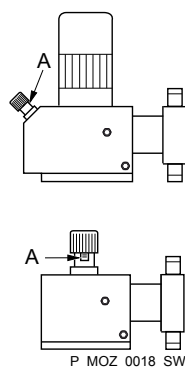


Fig. 8



WARNING!

Motor may overheat

If the necessary cooling air supply is not guaranteed, the motor may overheat. In an area at risk from explosion, it could trigger an explosion.

- Maintain sufficient clearance between the air intake opening and the walls. The distance should be greater than 1/4 of the diameter of the air intake opening.
- The fan must not suck in the exhaust air from other devices.



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.



WARNING!

Risk of burns with hot feed chemicals

If hot feed chemicals can heat the liquid ends above the permissible surface temperatures, persons can suffer burns from them.

- Consider attaching a "Hot surface" label to the liquid end or ...
- fitting a guard plate.

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.

Make sure that there is enough space to carry out an oil change (vent screws, oil drainage plugs, oil trough ...).

- 1 Discharge valve
- 2 Dosing head
- 3 Suction valve

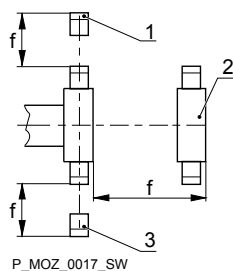


Fig. 9

Liquid end alignment



Capacity too low

The liquid end valves cannot close correctly if they are not upright.

- Ensure that the discharge valve is upright.

Fastening

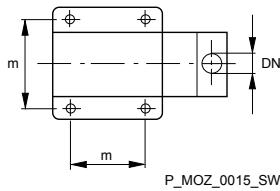


Fig. 10

Instructions

- ➔ Using 4 sufficiently strong screws, screw the pump to the support surface through the 4 holes in the frame.

Nothing more needs to be fitted to the pump itself: the pump is filled with gear oil and completely assembled on a frame.



Capacity too low

Vibrations can disturb the liquid end valves.

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

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

Use appropriate screws to fix the pump base to the supporting floor.

7 Installation



CAUTION!

Danger of injury to personnel and material damage

Disregarding the technical data during installation can lead to personal injuries or damage to property.

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

7.1 Installation, hydraulic



WARNING!

ATEX pumps in areas at risk from explosion

- Metering pumps must have an appropriate safety relief valve on the discharge side (to protect against excessive heating due to overloading or impact sparks caused by the breakage of power end parts).
- Only use the design with Ex"i" design of diaphragm rupture indicator. Make sure that the diaphragm rupture indicator stops the pump as soon as a diaphragm has ruptured.



WARNING!

Danger of fire with flammable feed chemicals

- Flammable media may only be pumped using metering heads made of stainless steel, Hastelloy C, PRFE with carbon or PP with carbon.
- Metering pumps can be used for metering flammable media, but fundamentally only those designed with an ATEX diaphragm rupture sensor and a discharge-side flow control, which both stop the pump as soon as a diaphragm rupture or no flow is detected.
- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.
- If necessary, the operator must implement further measures.



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 of backflow

A back pressure valve or a spring-loaded injection valve do not represent absolutely leak-tight closing elements.

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



CAUTION!

Suction problems are possible

The valves may no longer close properly with feed chemicals with a particle size of greater than 0.3 mm.

- Install a suitable filter in the suction line.



CAUTION!

Warning of the discharge line rupturing

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

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



CAUTION!

Uncontrolled flow of feed chemical

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

- Use an injection valve or a vacuum breaker.



CAUTION!

Uncontrolled flow of feed chemical

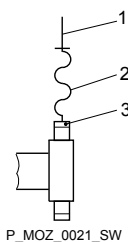
Feed chemical can press through the metering pump in an uncontrolled manner in the event of excessive priming pressure on the suction side of the metering pump.

- Do not exceed the maximum permissible priming pressure for the metering pump or
- Set up the installation properly.

**CAUTION!****Warning about lines coming loose**

Suction, discharge and relief lines installed incorrectly can come loose from the pump connection.

- Only use original hoses with the specified hose diameter and wall thickness.
- Only use clamp rings and hose nozzles that fit the respective hose diameter.
- Always connect the lines without mechanical tension.
- Only connect steel piping via a flexible piping section to a plastic valve body - see the following figure.



P_MOZ_0021_SW

Fig. 11: Connect the steel piping to the plastic pump body as shown

- 1 Steel piping
- 2 Flexible pipe section
- 3 Plastic valve body

**CAUTION!****Warning of feed chemical spraying around**

PTFE seals, which have already been used / compressed, can no longer reliably seal a hydraulic connection.

- New, unused PTFE seals must always be used.

**CAUTION!****Warning of backflow**

Liquid ends, foot valves, back pressure valves, relief valves or spring-loaded injection valves do not constitute absolutely leak-tight sealing elements.

- Use a shut-off valve, a solenoid valve or a vacuum breaker for this purpose.

**CAUTION!****Danger due to incorrect use of the safety relief valve**

The safety relief valve can only protect the motor and the gear, only against illegal positive pressure that is monitored 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.



- *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.*

Diaphragm rupture indicator



CAUTION!



Warning of unnoticed diaphragm rupture

Only above approximately 2 bar system back pressure is a signal generated in the event of the rupture of a diaphragm.

- Only rely on the diaphragm rupture indicator with back pressures of greater than 2 bar.
Or install a back pressure valve and set it to a minimum of 2 bar – if the installation permits this.

Route the leakage liquid drainage line

Drain off the leakage liquid via the flushing collar and a hose nozzle, without other parts of the liquid end coming into contact with the medium.

1.  Connect a hose to the lower hose nozzle.
2.  Route the hose into a collection vessel for the leakage liquid.

7.2 Basic installation notes

Safety notes



CAUTION!

Danger resulting from rupturing hydraulic components

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

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




CAUTION!

Hazardous feed chemicals can escape

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

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

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

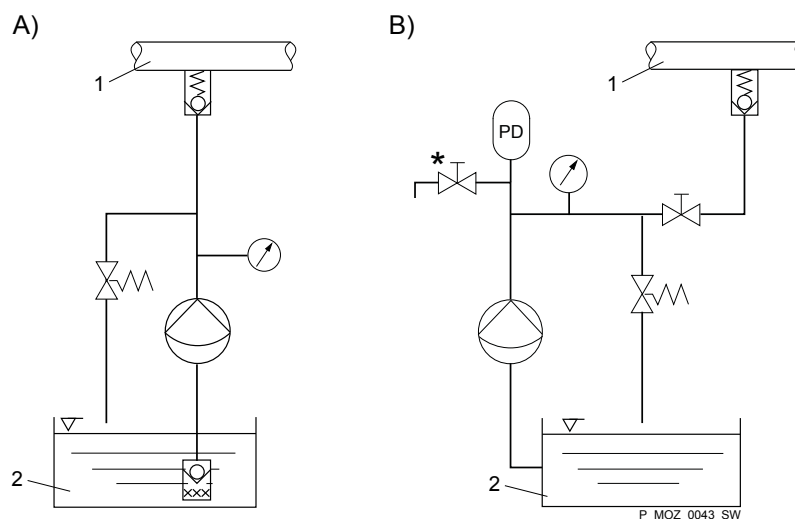


Fig. 12: (A) standard installation, (B) with pulsation damper

- 1 Main line
2 Storage tank

Legend for hydraulic diagram

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

7.3 Installation, electrical



WARNING!

ATEX pumps in areas at risk from explosion

- Electrically connect the electrical units listed on the earthing diagram, cleanly and permanently, to an electrically clean earthing point, - e.g. with an earthing bar on your system.
- Electrically connect the electrical units fitted with a potential equalisation cable to each other, cleanly and permanently, to an electrically clean potential equalisation point - e.g. with a potential equalisation bar on your system.
- Note the enclosed documentation for the individual electrical components.



WARNING!

Danger of fire with flammable feed chemicals

- The ATEX diaphragm rupture sensor and a discharge-side flow control must both stop the pump as soon as a diaphragm rupture or no flow is detected.

**WARNING!****Danger of electric shock**

In the event of an electrical accident, it must be possible to quickly disconnect the pump, and any electrical ancillaries which may possibly be present, from the mains.

- Install an emergency cut-off switch in the mains supply line to the pump and any electrical ancillaries which may be present or
- Integrate the pump and electrical ancillaries which may be present in the emergency cut-off management of the system and inform personnel of the isolating option.

**WARNING!****Danger of electric shock**

This pump is equipped with a protective earth conductor, to reduce the risk arising from an electric shock.

- Connect the PE conductor to "earth" with a clean and permanent electrical connection.

**WARNING!****Danger of electric shock**

A mains voltage may exist inside the motor or electrical ancillaries.

- If the housing of the motor or electrical ancillaries has been damaged, you must disconnect it from the mains immediately. The pump must only be returned to service after an authorised repair.

**WARNING!****Danger of electric shock**

There can still be dangerous voltage present for 3 minutes in the interior of motor designs with integral frequency converter.

- Only open the drain screw 3 minutes after the mains voltage has been switched off.

**WARNING!**

Never change the "Motor voltage" and "Cycle frequency" parameters with motor designs with integral frequency converter.

The parameters on delivery from ProMinent do not correspond to the motor manufacturer's factory settings.

If other parameters are to be changed, then we recommend speaking to ProMinent head office in Heidelberg.

What requires electrical installation?:

- Motor
- External fan (identity code option)
- Stroke control drive (identity code option)
- Stroke actuator (identity code option)
- Diaphragm rupture indicator
- Stroke sensor (identity code option)
- Frequency converter (identity code option)

- Earthing wires (to be provided on site)
- Potential equalisation line (to be provided on site, prescribed in the area at risk from explosion)

Motor

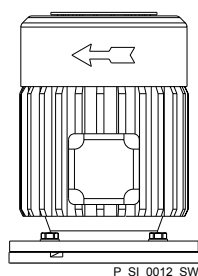


Fig. 13: Direction of rotation of motor



WARNING!

ATEX pumps in areas at risk from explosion

- Use a suitable motor protection switch to protect power end motors. Use motor protection approved for this application with Ex"e" motors. (Protection against warming caused by overloading)
- Provide a time-delay residual current device.
- Observe the enclosed operating instructions for the Ex motor, especially the maintenance plan.



WARNING!

Only motors with a frequency converter: Danger of electric shock

There remains a risk of an electric shock for 3 minutes after the mains voltage has been switched off on conducting parts of the motor with an integrated frequency converter and on the lines themselves.

- After switching off, allow the device to stand for 3 minutes before opening the terminal box.



CAUTION!

The motor can be damaged

Provide appropriate motor protection devices (e.g. motor protection switch with thermal overcurrent trip) to protect the motor from overloading.

Fuses do not provide motor protection.



CAUTION!

Only motors with a frequency converter: The motor can be damaged

The input current limiter could be damaged if a motor with an integrated frequency converter is restarted within 3 minutes of the mains voltage being switched off.

- After switching off, allow the device to stand for at least 3 minutes before restarting.
- If the motor is controlled via a control, take this into consideration at the control.



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. 13.



Use an electrical isolating device in the mains supply cable, such as a mains switch, to switch off the pump independently of the entire installation (e.g. for repairs).

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 system's emergency cut-off management scheme.
3. ➤ Only connect the motor to the power supply using a suitable cable.



- Key motor data can be found on the nameplate and in the "Technical data" chapter.
- The terminal wiring diagram is located in the terminal box.



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

- For further information on the motor with identity code specification "S", refer to our website www.prominent.com. Motor data sheets can be requested for all other motors.
- With motors other than those with identity code specifications "S", "M" or "N": Pay special attention to the operating instructions for the motors.
- Special motors or special motor flanges are available on request.

External fan



CAUTION!

Provide a separate power supply for the external fan for motors with external fans (identity code specification "R" or "Z").

Variable speed motors with frequency converter

Connect the motor as per the wiring diagram for the controller, if it is controlled by an electronic control unit (such as direct current motors by a frequency converter).

Stroke length actuators / control power ends

Connect the motors in accordance with the enclosed wiring diagram or as per the wiring diagram fixed to the inside of the housing.



CAUTION!

Only operate stroke length actuators / control drives when the pump is running.

Otherwise they will become damaged.

Diaphragm rupture sensor (optional)



WARNING!

Danger of electric shock

In the event of a defect, there is a risk of electric shock if conductive feed chemicals are present.

- For safety reasons, we recommend connecting to 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.

- Electrically wire the enclosed diaphragm rupture sensor to a suitable monitoring device.

**CAUTION!****Additional damage with a ruptured diaphragm**

Never allow the diaphragm to rupture fully if damage can be caused by hydraulic oil mixing with the feed chemical.

- The diaphragm rupture sensor must switch off the pump immediately.
Only restart the pump once the diaphragm has been replaced.

a) Diaphragm rupture sensor with switch contact

- *The cable can be connected as required.*

b) Namur sensor, inherently safe

Make sure that the monitoring/feed equipment installed by the customer is capable of evaluating the current variations of the Namur sensor to indicate a diaphragm rupture!

**WARNING!****The following applies in areas at risk from explosion:**

- Note the details of the type examination certificate PTB 00 ATEX 2048 X for the Namur sensor NJ1.5-8GM-N as well.

**CAUTION!****Warning of unnoticed diaphragm rupture**

Only above approximately 2 bar system back pressure is a signal generated in the event of the rupture of a diaphragm.

- Only rely on the diaphragm rupture sensor with back pressures of greater than 2 bar.
Or install a back pressure valve and set it to a minimum of 2 bar – if the installation permits this.

When using flammable media:**WARNING!****Danger of fire with flammable feed chemicals**

Make sure that the electric diaphragm rupture sensor switches off the pump immediately after a diaphragm rupture.

- Connect the pump and the diaphragm rupture sensor to a control so that the pump stops immediately in the event of a diaphragm rupture.

Stroke sensor (optional)

- ▶ Connect the stroke sensor to a suitable monitoring device in line with the details in the "Technical data" chapter - also refer to their technical data!

Make sure that the monitoring/feed equipment installed by the customer is capable of evaluating the current variations of the Namur sensor to indicate a stroke.



WARNING!

The following applies in areas at risk from explosion:

- Note the details of the type examination certificate PTB 00 ATEX 2048 X for the Namur sensor NJ1.5-8GM-N as well.

Earthing lines

Connect the electrical components of the entire installation supplied cleanly and permanently to an electrically clean earthing point, e.g. with an earthing bar on site - see potential equalisation diagrams in the appendix.

Potential equalisation line (prescribed in the area at risk from explosion)

The entire installation supplied is provided ex works with the necessary potential equalisation lines. Electrically connect an additional potential equalisation cable from the potential equalisation cables from this system cleanly and permanently to an electrically clean potential equalisation point, e.g. to a potential equalisation bar on site.

Other units

- ▶ Install the other units in line with their documentation.

8 Start up and operation

Safety information



WARNING!

ATEX pumps in areas at risk from explosion

- Make sure that a suitably competent person checks whether the appropriate installation information from the "Installation " chapter has been implemented correctly.
- Make sure that a "recognised competent person" checks the electrical installation and in particular the intrinsically safe power circuits.
- Set the opening pressure of the relief valve to a maximum of no more than 1.5 times the nominal pressure of the pump.



WARNING!

ATEX pumps in areas at risk from explosion

The ignition temperature is reduced significantly below the ignition temperature at atmospheric pressure due to compression with the discharge stroke of the possibly ignitable vapour-air mixture.

- Do not allow it to run dry.



WARNING!

Fire hazard with flammable media

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

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



WARNING!

Only motors with a frequency converter: Danger of electric shock

There remains a risk of an electric shock for 3 minutes after the mains voltage has been switched off on conducting parts of the motor with an integrated frequency converter and on the lines themselves.

- After switching off, allow the device to stand for 3 minutes before opening the terminal box.



CAUTION!

Only motors with a frequency converter: The motor can be damaged

The input current limiter could be damaged if a motor with an integrated frequency converter is restarted within 3 minutes of the mains voltage being switched off.

- After switching off, allow the device to stand for at least 3 minutes before restarting.



CAUTION!

Possible environmental and material damage

The screw plug in the oil filler neck is factory-fitted and, during operation, prevents any pressure equalisation between the power end housing and the surroundings. This ensure that oil can be pushed from the power end housing.

- Replace the screw plug on the oil filler neck by the air vent plug supplied.
- Retain the sealing plug for subsequent transport of the unit.



CAUTION!

Liquid end may be damaged

- Always fit a filter in the suction line with feed chemicals with a particle size greater than 0.3 mm



CAUTION!

Warning of unnoticed diaphragm rupture

Only above approximately 2 bar system back pressure is a signal generated in the event of the rupture of a diaphragm.

- Only rely on the diaphragm rupture sensor with back pressures of greater than 2 bar.
- Check that a back pressure valve is installed in the discharge line.



CAUTION!

Feed chemical could escape

- Check suction and discharge lines, and liquid end with valves for leak-tightness and tighten if necessary.
- Check whether the necessary flushing pipes or bleed lines have been connected.



CAUTION!

Prior to commissioning, check that the power end motor and corresponding ancillary equipment is connected in compliance with the regulations!



CAUTION!

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

Observe the technical data



CAUTION!

Danger of material damage

Observe the details in the chapter "Technical data" (pressure, viscosity, resistance, ...).

Test the diaphragm rupture sensor



CAUTION!

Feed chemical can escape unnoticed

If the diaphragm rupture sensor does not stop the pump or no alarm is triggered, feed chemical can escape unnoticed.

- Trigger the diaphragm rupture indicator - see chapter "Repairs" and in so doing check the reaction of the analysis unit.



CAUTION!

Only restart the pump once the diaphragm has been replaced after a diaphragm rupture if damage can be caused by hydraulic oil mixing with the feed chemical.

Installing a vent screw

Replace the sealing screw at the oil filler neck with the supplied vent screw - see chapter "Overview of equipment and control elements".

Checking the oil level

When the pump is idle, check whether the pump oil level almost covers the oil inspection window.

This indicates that the pump has not lost oil and consequently been damaged.

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."



WARNING!

Risk of injury from the fan impeller

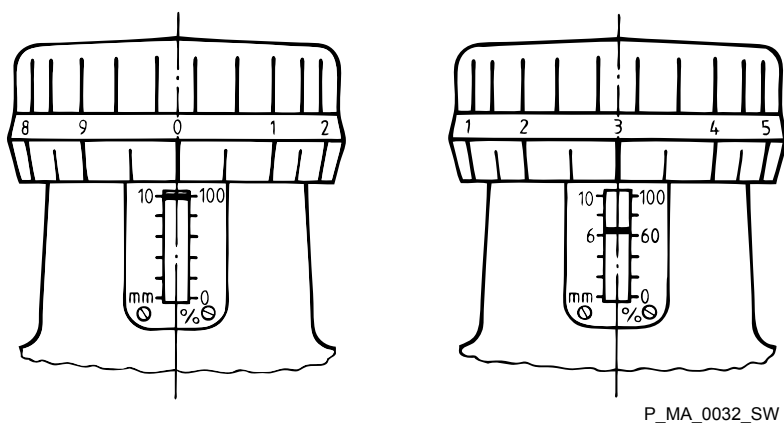
The fan impeller beneath motor's fan cowling can cause severe injuries while it is turning.

- The pump must only be connected to the mains voltage with the fan cowling closed.

Adjusting the stroke length



The stroke length can only be adjusted when the machine is stationary, provided the liquid ends are depressurised.



P_MA_0032_SW

Fig. 14: Stroke length adjustment wheel with scale

10 mm =	100% stroke length (10 revolutions)	6.3 mm =	63% stroke length (6 revolutions and 3 long scale markings)
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Stroke length adjustment wheel markings:

1 revolution =	10%
1 long scale marking =	1%
1 short scale marking =	0.5%

Earthing lines

Check whether the earthing lines in the pump's electrical units are correctly connected and connected to a clean earth wire - see earthing diagrams in the appendix.

Potential equalisation lines (mandatory with ATEX)

Check whether the potential equalisation lines are sitting correctly on the pump and connected to a clean potential equalisation point.

8.1 Bleeding the liquid end

When bleeding the liquid end or priming against pressure:

Requirements:

Depressurise the suction and discharge lines!

With dangerous feed chemicals, take suitable protective measures as per the material safety data sheet!

Read the safety information in this chapter with flammable feed chemicals!

1. ➤ Loosen the discharge line.
2. ➤ Install a piece of translucent hose.
3. ➤ Run the pump slowly until the feed chemical appears in the section of hose.
4. ➤ Remove the piece of hose.
5. ➤ Assemble the discharge line.

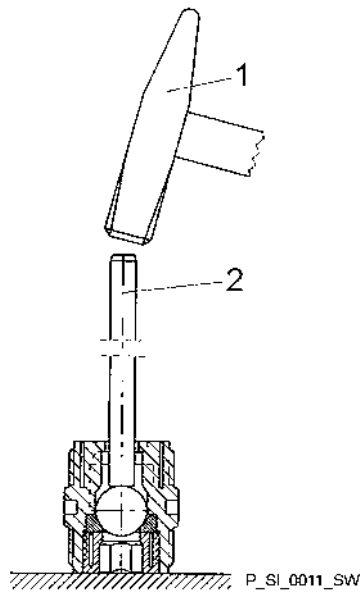


Fig. 15: Tapping the valve set disc



Eliminating suction problems (only for single ball valves with PTFE ball seat)

For suction problems occurring during start up:

- Exclude the possibility that there are foreign bodies in the valve.
- Place the valve on a stable surface.
- Using a hammer (1) and a brass bar (2), gently tap the PTFE ball seat above the valve ball - see figure below.
- Then with the valve in a damp condition allow it to prime.

8.2 Calibrate the stroke control drive (optional)

The stroke control drive is calibrated to the capacity ordered ex-factory. Please contact ProMinent in the event that you want the stroke control drive to be calibrated to another capacity.

9 Maintenance

Safety information



WARNING!

ATEX pumps in areas at risk from explosion

- Generally check that the system is working properly, particularly the power end and bearings, by regularly monitoring it (for leaks, noises, temperatures, smell....).
- Do not allow the pump to run hot due to a lack of oil. With lubricated metering pumps, regularly check for the presence of lubricant, for example by checking the liquid level, visual leak control etc. If oil is leaking, examine the leakage point immediately and eliminate the cause.
- Check the correct operation of the relief valve downstream of the pump. In premises at risk from explosion, the relief valve should prevent the gear from becoming overloaded and becoming hot.
- Observe the enclosed operating instructions for the Ex motor.
- Check / replace worn gear ring etc. of the clutch.
- When cleaning plastic components, ensure that no electrostatic charges are generated by excessive friction.
- Prevent serious deposits of dust on the motor.
- Consider potential equalisation before you approach any pump equipment that could be at a different electrical potential (such as pipes or tools).
- Only with stroke control motor: Wait 3 minutes after switching off before opening the housing.
- Have wear parts, such as bearings, replaced by ProMinent Service when there is an identifiable incidence of unacceptable wear.
- Appropriate diagnostic equipment for bearing damage is recommended for the premature detection of bearing damage.
- Check whether the potential equalisation lines are all sitting correctly with clean contacts. Use the equipotential bonding drawings as an aid – see Appendix.
- Check whether the earth lines are all sitting correctly with clean contacts. Use the equipotential bonding drawings as an aid – see Appendix.
- Only use genuine spare parts as replacements.



WARNING!

Fire hazard with flammable media

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

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



WARNING!

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

**WARNING!****Risk of injury from the fan impeller**

The fan impeller beneath motor's fan cowling can cause severe injuries while it is turning.

- The pump must only be connected to the mains voltage with the fan cowling closed.

**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.

Inspection, daily

Check the pump installation for:

- Leaks
- Abnormal noises or squeaks
- Abnormal temperatures
- Abnormal odours
- Abnormal vibrations
- Other peculiarities

**WARNING!**

In the area at risk from explosion: stop the pump immediately and rectify these peculiarities. ProMinent Service may be needed if required.

Maintenance work performed

Under heavy loading (e.g. continuous operation) shorter maintenance intervals are recommended than those given.



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

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

Interval	Maintenance work	Personnel
Quarterly*	<ul style="list-style-type: none"> ■ ATEX pump only: Special maintenance work - refer to the "Safety information for ATEX pumps". ■ ATEX pumps with an add-on power end only: Check the gear ring/DZ element of the ROTEX® coupling as per their manual. If the coupling is OK, the maintenance interval can be increased to 4000 hours. If the coupling is not clearly OK: Call ProMinent Service. 	Technical personnel
	Check the tightening torques for the dosing head screws (1) (30 Nm) and the drive flange screws (2) (25 Nm).	Technical personnel
	Check the correct seating and state of the metering lines at both discharge and suction ends.	Technical personnel
	Check that the discharge valve and suction valve are correctly seated.	Technical personnel
	Check whether the diaphragm rupture sensor stops the pump or generates an alarm after it is triggered, see the chapter "Repairs".	Technical personnel
	Check that the diaphragm rupture sensor is firmly seated.	Technical personnel
	Check that the flow is correct: Allow the pump to prime briefly.	Technical personnel
	Check the leak-tightness of the entire liquid end - particularly around the leakage hole!	Technical personnel
	With critical applications, check or replace the diaphragm at regular intervals.	
	Check that the electrical connectors are intact.	Electrician Electrical technician with additional explosion protection qualification
	Check the tight, clean electrical connection of the earthing wires.	Electrician Electrical technician with additional explosion protection qualification
	Check the tight, clean electrical connection of the potential equalisation wires.	Electrician Electrical technician with additional explosion protection qualification
	Check the oil level.	Technical personnel
	Check whether the pump is transporting media correctly - run briefly at high power. Observe the maximum permissible operating pressure!	Technical personnel
	Check, whether moisture can be detected at the hose nozzle (3); if so a diaphragm rupture has probably occurred. As a preventative maintenance measure, you can also replace the other parts of the spare parts kits together with the diaphragm.	Technical personnel
After approx. 4,000 operating hours	Check the gear ring/DZ element of the coupling as per their operating instructions.	Technical personnel
After approx. 5,000 operating hours *	Change the gear oil.	
After approx. 10,000 operating hours **	Replace the diaphragm - refer to the "Repair" chapter - "Changing the diaphragm".	Technical personnel
After 23,500 hours of operation	Adhere to the motor manufacturer's recommendations - see operating instructions for the motor.	Technical personnel

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

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

** under normal loading.

With very unfavourable metering parameters: Shorter intervals.

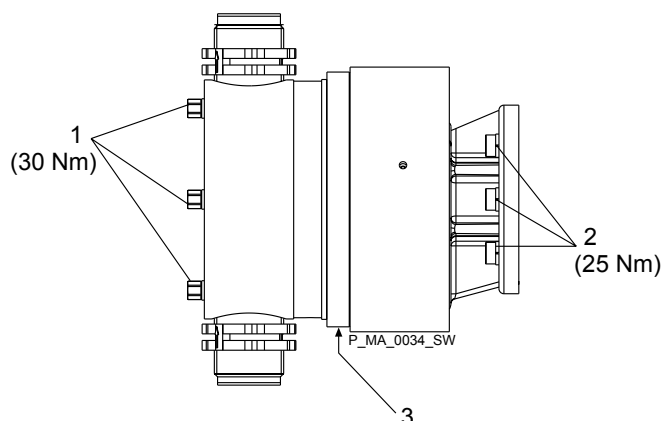


Fig. 16: Liquid end tightening torques

- 1 Dosing head screws
- 2 Drive flange screws
- 3 Hose nozzle

Changing the gear oil



WARNING!

Risk of burns due to hot gear oil

The gear oil may become very hot when the pump is heavily loaded

- When draining oil, avoid contact with the oil running out.

Tab. 2: Gear oil

Gear oil	Supplied quantity	Order no.
Mobilgear 600 XP 460	1 l	1004542

Tab. 3: Gear oil filling volumes

Types	Volume, approx.
All	3.2 l

Draining the gear oil:

1. ➡ Remove the vent screw (1).
2. ➡ Place an oil trough under the oil drainage plug (2). Expected oil quantity - see filling volumes, above.
3. ➡ Unscrew the oil drainage plug (2) from the power end housing.
4. ➡ Allow the gear oil to run out of the power end.
5. ➡ Screw in the oil drainage plug (2) with a new seal.

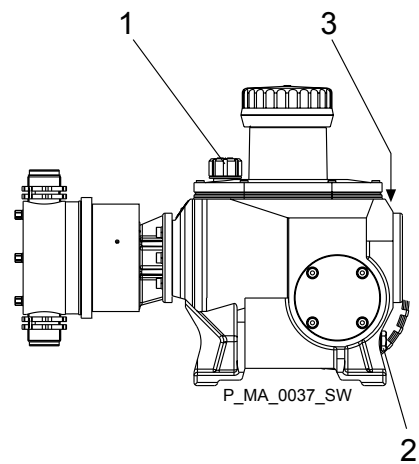


Fig. 17: Oil change

- 1 Vent screw
- 2 Oil drainage plug
- 3 Oil inspection window

Filling with gear oil:

1. ➤ Start the pump.
2. ➤ Slowly pour gear oil through the vent screw (1) opening until the oil inspection window (3) is nearly covered.
3. ➤ Allow the pump to run slowly for a further 1... 2 minutes.
4. ➤ Replace the vent screw (1).
5. ➤ Check whether all openings are tightly sealed again – especially in the area at risk from explosion!



WARNING!

Only in areas at risk from explosion: Check after 1 day whether the oil drainage plug (2) is still tight.

10 Repairs

Safety information



WARNING!

ATEX pumps in areas at risk from explosion

- Generally check the proper functioning of the system, particularly of the power end and bearings, by regular monitoring (for leaks, noises, temperatures, smell).



WARNING!

ATEX pumps in areas at risk from explosion

Static electricity can cause ignition sparks.

- Consider potential equalisation before you approach any pump equipment that could be at a different electrical potential (such as pipes or tools)



WARNING!

Fire hazard with flammable media

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

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



WARNING!

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



WARNING!

Risk of injury from the fan impeller

The fan impeller beneath motor's fan cowling can cause severe injuries while it is turning.

- The pump must only be connected to the mains voltage with the fan cowling closed.



WARNING!

Risk of fingers being crushed

Under unfavourable conditions, the stroke axle or displacement body can cause crushing of the fingers.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.



WARNING!

Warning of hazardous feed chemical

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

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



CAUTION!

Warning of feed chemical spraying around

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

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

10.1 Replacing the diaphragm

Important note



CAUTION!

A diaphragm rupture may remain unnoticed

Should the multi-layer diaphragm be handled incorrectly, the diaphragm rupture warning system may fail.

- Take the multi-layer diaphragm from the packaging immediately before installing it.
- Do not allow dirt to come into contact with the multi-layer diaphragm.
- Do not "inspect" the insert discs.

1. ➤ Flush the suction line, discharge line and liquid end (activate flushing assembly or immerse suction lance in a suitable medium and pump for a while (consider the effect of the medium on your system first!)) or proceed as described below.

2. ➤ Set the stroke length to 0% stroke with the pump running.

3. ➤ Switch off the pump.

4. ➤ Secure the pump to prevent it from being switched back on.

5. ➤ Protect yourself against the feed chemical if the liquid end has not been flushed in accordance with the above processes - protective clothing, safety goggles,

After dismantling, immediately place parts that have been wetted by the medium in a trough with a suitable medium for flushing – be sure to rinse hazardous media thoroughly.

6. ➤ Unscrew the hydraulic connectors on the discharge and suction side.

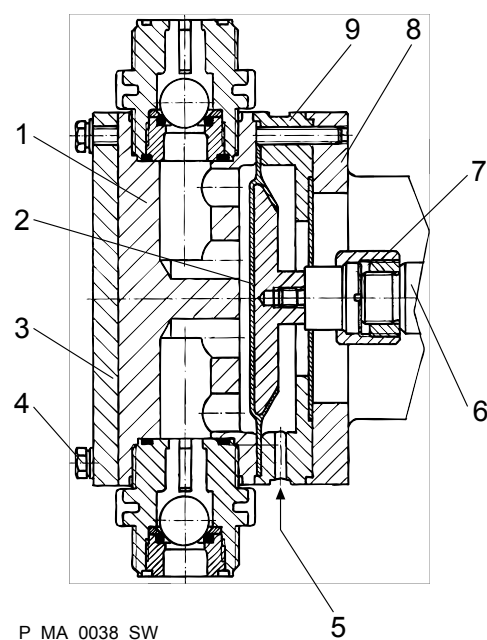


Fig. 18: Cross-section through liquid end

- 1 Dosing head
- 2 Diaphragm
- 3 Reinforce plate
- 4 Screw
- 5 Leakage hole
- 6 Slide rod
- 7 Threaded connection
- 8 Turret
- 9 Backplate

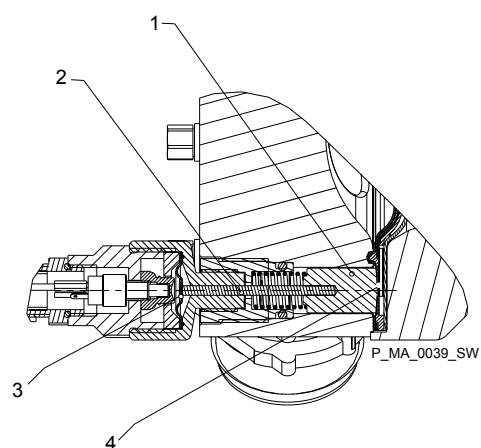


Fig. 19: Cross-section through diaphragm rupture warning system

- 1 Safety piston
 - 2 Spring
 - 3 Socket
 - 4 O-ring
 - 5 Expandable point on multi-layer diaphragm
8. Loosen the safety screw and remove the protective cover (5) from the backplate (6).
 9. Unscrew the diaphragm rupture indicator from the dosing head.
 10. Unscrew the socket (3) from the dosing head.
 11. Take the safety piston (1) with the spring (2) out of the dosing head.
 12. Undo the screws (4) on the reinforce plate.
 13. Remove the dosing head (1) with the screws from the turret (8).

14. ➤ Unscrew the diaphragm (2) from the slide rod (6) and remove.
15. ➤ Clean the sealing surfaces.
16. ➤ Smear a little screw locking paste onto the thread of the threaded connection of the diaphragm slide rod.
17. ➤ Screw the new diaphragm (2) up to the stop on the slide rod (8).
 - ⇒ This must be done correctly to ensure the pump meters accurately.
18. ➤ Place the dosing head (1), the reinforce plate (3) and the backplate (9) onto the turret (8).
19. ➤ Position the screws.
20. ➤ Push the safety plunger (1) with the spring (2) into the channel of the dosing head.
21. ➤ Screw the socket into the dosing head (O-ring (4)!) and tighten by hand.
22. ➤ Screw the diaphragm rupture indicator into the dosing head.



CAUTION!

The diaphragm rupture warning system can fail.

- Make sure that the safety plunger (1) and its pin can move freely.

23. ➤ Start the pump and tighten the screws crosswise at a 100% stroke.

Tightening torque

30 Nm

24. ➤ Position the protective cover (5) on the turret (8) and screw in the safety screw.



- Check the tightening torque of the screws after 24-hour operation.
- With PP dosing heads, check the tightening torque again after three months.

10.2 Repairing the diaphragm rupture sensor



WARNING!

Feed chemical warning

After a diaphragm rupture, additional feed chemical will be present in the diaphragm rupture sensor and the feed channel in the dosing head.

- Protect yourself from the feed chemical if using hazardous or unknown feed chemicals. Observe the material safety data sheet.

30 V version

Check diaphragm rupture sensor

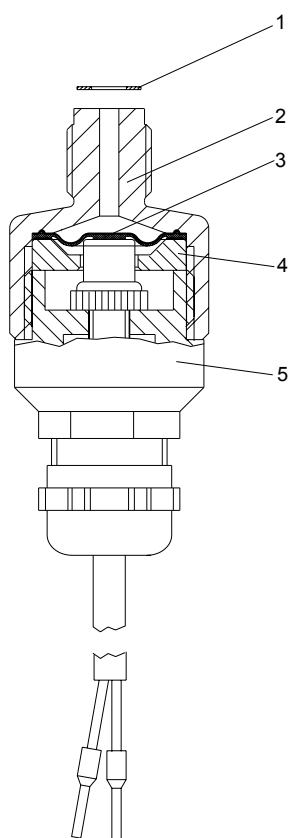


Fig. 20

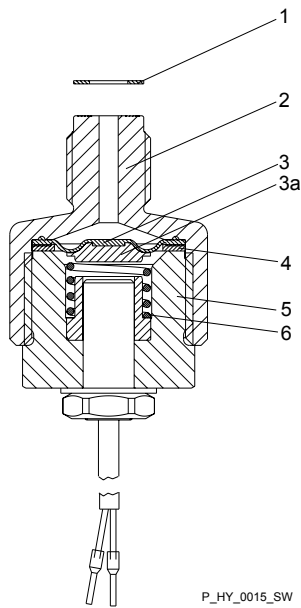
1. ➤ When changing the diaphragm, unscrew the diaphragm rupture sensor from the dosing head.
2. ➤ Check for electrical continuity:
3. ➤ Using a blunt insulating probe (Ø 2 ... 3 mm, no sharp edges), press into the channel of the diaphragm rupture sensor.
⇒ Check that there is no electrical continuity
4. ➤ Release the pin again.
⇒ Electrical continuity must be re-established.
5. ➤ Repeat the test several times.
6. ➤ If everything is working correctly, screw the diaphragm rupture sensor into the dosing head with a new seal (1).
7. ➤ If not, go to the next section.

Replace separating diaphragm of the diaphragm rupture sensor

1. ➤ Disconnect the diaphragm rupture sensor from the power supply.
2. ➤ When changing the diaphragm, unscrew the diaphragm rupture sensor from the dosing head.
3. ➤ Grasp the upper section (2) of the diaphragm rupture sensor.
4. ➤ Hold the body (5) in place with an open-ended spanner.
5. ➤ Unscrew the top of the diaphragm rupture sensor.
6. ➤ Clean the soiled parts.
7. ➤ Lay the new separating diaphragm (3) with the light side (PTFE) down into the upper section (2).
8. ➤ Lay the plate (4) with the uneven side down into the upper section (2).
9. ➤ Screw the body (5) into the upper section and screw tighten.
10. ➤ Check the diaphragm rupture sensor as described in "Check diaphragm rupture sensor".
11. ➤ If the diaphragm rupture sensor does not operate clearly and reliably, then a new diaphragm rupture sensor must be used without fail.

ATEX version

Checking the diaphragm rupture sensor



P_HY_0015_SW

Fig. 21

1. ➤ When changing the diaphragm, unscrew the diaphragm rupture sensor from the dosing head.
2. ➤ Check that the monitor does not indicate a diaphragm rupture:
3. ➤ Using a blunt insulating probe (Ø 2 ... 3 mm, no sharp edges), press into the channel of the diaphragm rupture sensor.
 - ⇒ The monitor device should indicate a diaphragm rupture.
4. ➤ Release the pin again.
 - ⇒ The monitor device should no longer indicate a diaphragm rupture.
5. ➤ Repeat the test several times.
6. ➤ If everything is working correctly, screw the diaphragm rupture sensor into the dosing head with a new seal (1).
7. ➤ If not, go to the next section.

Replace the separating diaphragm of the diaphragm rupture sensor

1. ➤ Disconnect the diaphragm rupture sensor from the monitor.
2. ➤ When changing the diaphragm, unscrew the diaphragm rupture sensor from the dosing head.
3. ➤ Grasp the top part (2) of the diaphragm rupture sensor.



Do not tamper with the lacquer-protected nut.

4. ➤ Hold the body (5) in place with an open-ended spanner.
5. ➤ Unscrew the top of the diaphragm rupture sensor.
6. ➤ Clean any dirty parts.
7. ➤ Lay the new separating diaphragm (3) with the light side (PTFE) down into the top part (2).
8. ➤ Place the disc (4) in the top part (2).
9. ➤ Place the spring into the body (5).
10. ➤ Move the body (5) close to the top part (2).
 - ⇒ The spring (6) should sit correctly on the spring seat (3a).
11. ➤ Screw the body (5) into the top part and tighten.
12. ➤ Connect the diaphragm rupture sensor back to the monitor.
13. ➤ Check the diaphragm rupture sensor as described under "Checking diaphragm rupture sensor".
14. ➤ If the diaphragm rupture sensor does not operate clearly and reliably, then definitively use a new diaphragm rupture sensor.

10.3 Valve repair



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 parts kits. In the event of doubt, refer to the exploded views and ordering information in the appendix.*



Clean the discharge and suction valves only one after another as they cannot be differentiated using the arrow markings.

10.3.1 Double ball valves

Cleaning a discharge valve

Taking the discharge valve apart

1. ➡ Unscrew the discharge valve from the dosing head and rinse out.
2. ➡ Dismantle the discharge valve.
3. ➡ Rinse and clean all parts.
4. ➡ Replace the worn parts and seals.

Assembling the discharge valve



When assembling, take note of the orientation of the valve seats (3). The valve seats (3) are used as a ball seat on the fine machined side and as a ball cage and spring guide on the other side. The fine machined side must point in the flow direction with all valve seats.

When assembling the valves, take note of the sequence:

Teflon – metal – Teflon – metal - ...

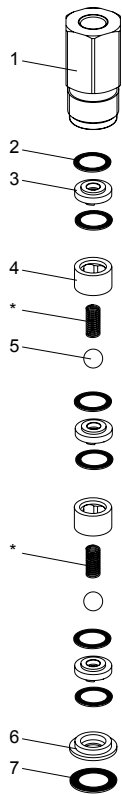


Fig. 22: Discharge valve (double ball valve)

Cleaning a suction valve

1. ➔ Slide into the valve body (1) one after another:
 - one seal (2) and one valve seat (3) - direction!
 - one seal (2) and one valve bushing (4)
 - (If fitted: one spring (*) into the spring guide of the valve seat (3))
 - one ball (5) into the valve body (1)
 - one seal (2) and the second valve seat (3) - direction!
 - one seal (2) and the second valve bushing (4)
 - (If fitted: the second spring (*) into the spring guide of the valve seat (3))
 - the second ball (5) into the valve body (1)
 - one seal (2), the third valve seat (3) - (direction!) and a further seal (2)

2. ➔ Position the insert disc (6) with the flare on the packing.



The distance between the edge of the valve body and the insert disk (6) is due to the construction.

3. ➔ Place the larger seal (7) between the insert disc (6) and the dosing head.

4. ➔ Screw in the valve until the stop.

A suction valve is dismantled, cleaned and assembled in the same way as a discharge valve.



Please note, however, that when assembling, the valve seat (3) must be aligned in the other direction. The fine machined side must point in the direction of flow with all valve seats (3).

10.3.2 Plate valves



Do not scratch the finely machined sealing surfaces on the valve plates (5) and valve inserts (6).

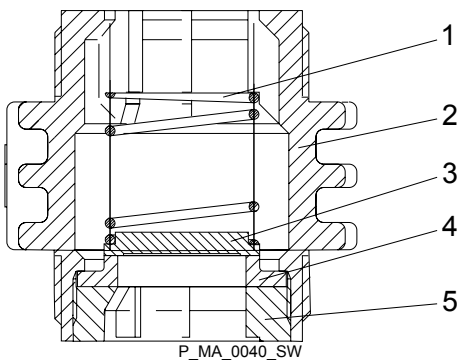


Fig. 23: Cross-section through the plate valve

- 1 Compression spring
- 2 Valve body
- 3 Valve plate
- 4 Valve insert
- 5 Valve body bushing

1. ➤ Screw the valve cap (7) on to the suction side - see Fig. 23.
2. ➤ Carefully remove the parts from the valve body (4).
3. ➤ Replace the worn parts.
4. ➤ Clean the remaining parts.
5. ➤ Check all parts.
6. ➤ Place the compression spring (3) inside the valve body (4).



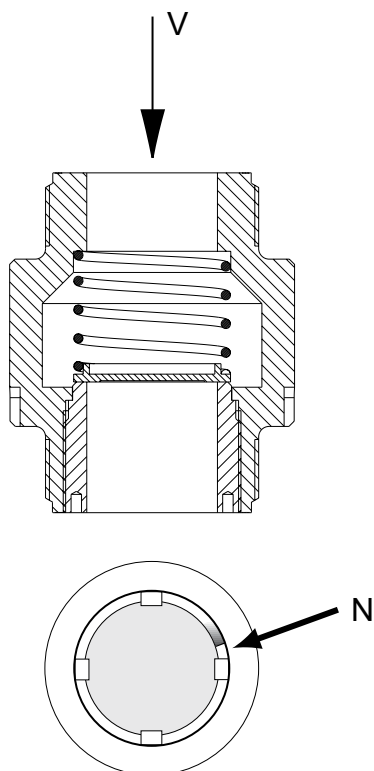
Place the compression spring with the end (see figure: arrow N, at the bottom) on one of the lugs in the valve body, as shown on the diagram.

Otherwise the valve plate may knock when in operation.

7. ➤ Insert the valve plate (5) and the valve insert (6).
8. ➤ Screw on the valve cap (7).



Note the flow direction of the discharge and suction connectors when fitting the valve.



P_MAK_0056_SW

Fig. 24: Inserting the compression spring

V Viewing direction

N Spring end position on the nose

10.4 Replacing power end bearings

The power end bearings should only be replaced by ProMinent Service!

11 Troubleshooting

Safety information



WARNING!

ATEX pumps in areas at risk from explosion

- Generally ensure proper functioning (no leaks, unusual noises, high temperatures, unusual smell, vibrations, etc.) especially of the power end/drive and the bearings.
- Do not allow the pump to heat up because of lack of oil!
With lubricated metering pumps, regularly check for the presence of lubricant, for example by checking the liquid level, visual leak control etc. If oil is leaking, examine the leakage point immediately and eliminate the cause.
- Only use a moist cloth when cleaning plastic parts to avoid electrostatic charge.
- Replace wear parts, such as bearings, when there is an identifiable incidence of unacceptable wear. (The nominal service life cannot be calculated with lubricated bearings.)
- Only use genuine spare parts as replacements.



WARNING!

ATEX pumps in areas at risk from explosion

Static electricity can cause ignition sparks.

- Consider potential equalisation before you approach any pump equipment that could be at a different electrical potential (such as pipes or tools)



WARNING!

Fire hazard with flammable media

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

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



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 feed chemical

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

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



WARNING!

Only motors with a frequency converter: Danger of electric shock

The risk of electric shock remains for 3 minutes after the mains voltage has been switched off on conducting parts of the motor with an integrated frequency converter and on the lines themselves.

- After switching off, allow the device to stand for 3 minutes before opening the terminal box.



CAUTION!

Only motors with a frequency converter: The motor can be damaged

The input current limiter could be damaged if a motor with an integrated frequency converter is restarted within 3 minutes of the mains voltage being switched off.

- After switching off, allow the device to stand for at least 3 minutes before restarting.



CAUTION!

Danger of personnel injury and material damage

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

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



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 fails to pressurise or does not prime in despite full stroke motion and bleeding.	The valves are dirty or worn.	Repair the valves - see chapter entitled "Repair".	Technical personnel

Fault description	Cause	Remedy	Personnel
Pump fails to pressurise or does not prime in despite full stroke motion and bleeding.	The feed chemical has particles larger than 0.3 mm.	Install a suitable filter in the suction line.	Technical personnel
Pump does not reach high pressure rates.	The motor is wired incorrectly.	1. Check the mains voltage and mains frequency. 2. Wire the motor correctly.	Electrician Electrical technician with additional explosion protection qualification
	The mains voltage has failed.	Eliminate the cause.	Electrician Electrical technician with additional explosion protection qualification
	Operating diaphragm ruptured and alarm has not sounded. **	■ Replace the operating diaphragm immediately - refer to the "Repair" chapter - "Changing the diaphragm".	Technical personnel
The power end 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® Service.	

12 Decommissioning and disposal

12.1 Decommissioning

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

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

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

**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 residue**

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

- It is mandatory that the safety information in the "Storage, transport and unpacking" chapter is read before shipping or transporting the unit.
- Thoroughly clean the liquid end and the housing of chemicals and dirt. Adhere to the material safety data sheet for the feed chemical.

**WARNING!****Warning of hazardous feed chemical**

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

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

**CAUTION!****Warning of feed chemical spraying around**

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

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



CAUTION!

Danger of damage to the device

The device may be damaged by incorrect and improper storage and transport.

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

Final decommissioning

1. ➤ Disconnect the pump from the mains/power supply,
2. ➤ Depressurise and bleed the hydraulic system around the pump.
3. ➤ Flush the liquid end with a suitable medium - observe the material safety data sheet! Flush the dosing head thoroughly when using hazardous feed chemicals!
4. ➤ Drain the gear oil - refer to the chapter entitled "Maintenance".
5. ➤ Thoroughly clean the liquid end and the housing of chemicals and dirt.
6. ➤ Possible additional work - refer to the "Storage, transport and unpacking" chapter.

Temporary decommissioning

In addition:

1. ➤ Plug the caps on the valves.
2. ➤ Push the caps onto the hose nozzles.
3. ➤ Preferably place the pump on a pallet.
4. ➤ Cover the pump with a tarpaulin cover - allowing rear ventilation!
5. ➤ Store the pump in a dry, sealed place in line with the storage conditions outlined in the chapter entitled "Storage, Transport and Unpacking".

12.2 Disposal



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.



CAUTION!

Generally note the local guidelines currently applicable in your country.

Sign indicating EU collection system

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

13 Technical data

Only with "M - modified" design:



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

Main pumps with 1500 rpm motor at 50 Hz operation

Type	Minimum pump capacity at maximum back pressure			Maximum stroke rate	Suction lift	Connector size	Shipping weight**
	bar	l/h	ml/stroke	Strokes/min	m WS	G-DN	kg
120260	12*	260	60	72	4	1 1/2 - 25	46/54
120340	12*	340	60	96	4	1 1/2 - 25	46/54
120430	12*	430	60	120	4	1 1/2 - 25	46/54
120510	12*	510	60	144	4	1 1/2 - 25	46/54
120650	12*	640	60	180	4	1 1/2 - 25	46/54
70430	7	430	99	72	3.5	2 - 32	50/64
70570	7	570	99	96	3.5	2 - 32	50/64
70720	7	720	99	120	3.5	2 - 32	50/64
70860	7	860	99	144	3.5	2 - 32	50/64
71070	7	1070	99	180	3.5	2 - 32	50/64
40840	4	840	194	72	3	2 1/4 - 40	56/80
41100	4	1100	194	96	3	2 1/4 - 40	56/80
41400	4	1400	194	120	3	2 1/4 - 40	56/80
41670	4	1670	194	144	3	2 1/4 - 40	56/80
42100	4	2100	194	180	3	2 1/4 - 40	56/80

* Material versions PP, PC, TT max. 10 bar

** Material versions PPT, PCT, TTT / SST

The shipping weight applies to single head pumps without an add-on power end.

The permissible priming pressure on the suction side is approximately 50% of the max. permitted back pressure.

With double head pumps, the maximum permissible back pressure reduces from 7 to 5.5 bar or from 4 to 3 bar.

All figures refer to water at 20 °C.

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

The priming lift of 2 m applies to clean and moistened valves and a clear outlet.

Main pumps with 1800 rpm motor at 60 Hz operation

Type	Minimum pump capacity at maximum back pressure			Maximum stroke rate	Suction lift	Connector size	Shipping weight**
	psi	l/h	gph	Strokes/min	m WS	G-DN	kg
120260	174*	309	81.8	86	4	1 1/2 - 25	46/54
120340	174*	414	109.5	115	4	1 1/2 - 25	46/54
120430	174*	518	137	144	4	1 1/2 - 25	46/54
120510	174*	622	164.5	173	4	1 1/2 - 25	46/54
120650	174*	–	–	–	4	1 1/2 - 25	46/54
70430	100	511	135	86	3.5	2 - 32	50/64
70570	100	683	180	115	3.5	2 - 32	50/64
70720	100	855	226	144	3.5	2 - 32	50/64
70860	100	1028	272	173	3.5	2 - 32	50/64
71070	100	–	–	–	3.5	2 - 32	50/64
40840	58	1001	264	86	3	2 1/4 - 40	56/80
41100	58	1339	354	115	3	2 1/4 - 40	56/80
41400	58	1676	443	144	3	2 1/4 - 40	56/80
41670	58	2014	532	173	3	2 1/4 - 40	56/80
42100	58	–	–	–	3	2 1/4 - 40	56/80

* Material version PP, PC, TT max. 145 psi

** Material versions PPT, PCT, TTT / SST

The permissible priming pressure on the suction side is approximately 50% of the max. permitted back pressure.

With double head pumps, the maximum permissible back pressure reduces from 101.5 to 80 psi or from 58 to 43.5 psi.

All figures refer to water at 20 °C.

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

The priming lift of 2 m applies to clean and moistened valves and a clear outlet.

13.2 Precision

13.2.1 Reproducibility

Data	Value	Unit
Reproducibility	±2	% *

* for measurements taken under constant conditions, minimum 30% stroke rate and water at 20 °C - when installed correctly, p< 1 bar

13.2.2 Dosing precision

Data	Value	Unit
Dosing precision	±1	% *

* at maximum stroke length and maximum back pressure

13.3 Viscosity

The liquid ends are generally suitable for the following viscosity ranges:

Design	Area	Unit
no valve springs	0 ... 200	mPas
with valve springs	200 ... 500	mPas
with appropriately laid out installation	500 ... 1000	mPas
with appropriately laid out installation and advice from ProMinent	over 1000	mPas

* Only when the installation is correctly adjusted.

13.4 Wetted materials

Tab. 4: with DN 25 ball valve

Material version	Liquid end	Suction/pressure connector	Seals	Valve balls	Valve seat
PPT	Polypropylene	PVDF	PTFE	Borosilicate glass	PTFE
PCT	PVC	PVDF	PTFE	Borosilicate glass	PTFE
TTT	PTFE with carbon	PTFE with carbon	PTFE	Ceramic	PTFE
SST	Stainless steel 1.4571/1.4404	Stainless steel 1.4571/1.4404	PTFE	Stainless steel 1.4401	PTFE
HCT	Hastelloy C4	Hastelloy C4	PTFE	Ceramic	PTFE

Tab. 5: with DN 32 / DN 40 plate valves**

Material version	Liquid end	Suction/pressure connector	Seals	Valve plates/valve springs	Valve seat
PPT	Polypropylene	Polypropylene	PTFE	Ceramic / Hast. C + CTFE**	PTFE
PCT	PVC	PVC	PTFE	Ceramic / Hast. C + CTFE**	PTFE
TTT	PTFE with carbon	PTFE with carbon	PTFE	Ceramic / Hast. C + CTFE**	PTFE
SST	Stainless steel 1.4571/1.4404	Stainless steel 1.4571/1.4404	PTFE	Ceramic / Hast. C + CTFE**	PTFE
HCT	Hastelloy C4	Hastelloy C4	PTFE	Hast. C	PTFE

** The valve spring is coated with CTFE (similar to PTFE)

13.5 Ambient conditions

13.5.1 Temperatures

Pump, fully assembled

Data	Value	Unit
Storage and transport temperature:	-10 ... +50	°C

Power end and motor

Data	Value	Unit
ATEX ambient temperature during operation:	-10 ... +40	°C
Ambient temperature during operation:	-10 ... +45	°C

PC liquid end

Data	Value	Unit
Max. temperature long-term at max. operating pressure	45	°C
Max. temperature for 15 min at max. 2 bar	60	°C
Minimum temperature	-10	°C

PP liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	50	°C
Max. temperature, for 15 min at max. 2 bar	100	°C
Minimum temperature	-10	°C

TT - ATEX liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	50	°C
Max. temperature, for 15 min at max. 2 bar	90	°C
Minimum temperature	-10	°C

TT liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	50	°C
Max. temperature, for 15 min at max. 2 bar	120	°C
Minimum temperature	-10	°C

SST - ATEX liquid end

Data	Value	Unit
Max. temp.	90	°C
Minimum temperature "Standard"	-10	°C

HCT - ATEX liquid end

Data	Value	Unit
Max. temp.	90	°C

Data	Value	Unit
Minimum temperature	-10	°C

HCT 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

13.5.2 Air humidity

Data	Value	Unit
Maximum air humidity*:	95	% relative humidity

*non-condensing (according to DIN IEC 60068-2-30)

13.6 Housing degree of protection

Data	Value
Protection against contact and humidity*	IP 55

*according to DIN VDE 470 (EN IEC 60529)

13.7 Installation height

Data	Value	Unit
Maximum installation height*:	1000	m above standard zero

* with standard pumps: Fit at higher installation heights at your own risk.

with ATEX pumps: We urgently advise that you contact a specialist for ATEX motors at higher installation heights!

13.8 Motor data

Electrical data

Identity code specification	Phases, protection	Rated voltage	Mains frequency	Rated output	Remarks
S	3-phase, IP 55	220-240 V / 380-420 V	50 Hz	0.75 kW	
		250-280 V / 440-480 V	60 Hz	0.75 kW	
R	3-phase, IP 55	230 V / 400 V	50/60 Hz	1.5 kW	with PTC, speed adjustment range 1:20 with external fan 1-phase 230 V; 50/60Hz

Identity code specification	Phases, protection	Rated voltage	Mains frequency	Rated output	Remarks
V0	1-phase, IP 55	230 V ±	50/60 Hz	1.1 kW	Variable speed motor with integrated frequency converter
L1	3-phase, II2GEx-eIIIT3	220-240 V / 380-420 V	50 Hz	0.75 kW	
L2	3-phase, II2GEx-deIICT4	220-240 V / 380-420 V	50 Hz	0.75 kW	with PTC, speed control range 1:5
P1	3-phase, II2GEx-eIIIT3	250-280 V / 440-480 V	60 Hz	1.0 kW	
P2	3-phase, II2GEx-deIICT4	250-280 V / 440-480 V	60 Hz	0.75 kW	with PTC, speed control range 1:5
V2	3-phase, II2GEx-deIICT4	400 V ±10%	50/60 Hz	1.5 kW	EX-variable speed motor with integrated frequency converter



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

- For further information on the motor with identity code specification "S", refer to our website www.prominent.com. Motor data sheets can be requested for all other motors.
- With motors other than those with identity code specifications "S", "M" or "N": Pay special attention to the operating instructions for the motors.
- Special motors or special motor flanges are available on request.

13.9 Stroke sensor (optional), intrinsically safe

Stroke sensor (optional), intrinsically safe



Install the sensor according to the chapter "Installation, electrical". Refer to its documentation.

Sensor name: NJ1.5-8GM-N.

Namur sensor (Specified for EX zones)

5–25 V DC, in accordance with Namur or DIN 19234, potential-free design.

Data	Value	Unit
Rated 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 Diaphragm rupture sensor



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

Contact (standard)

Tab. 6: Contact loading, max.

at voltage	Maximum current
30 V DC	1 A

The contact is an opener.

The contact is an potential-free.



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



Install the sensor according to the chapter "Installation, electrical". Refer to its documentation.

Sensor name: NJ1.5-8GM-N.

:

Namur sensor (Specified for EX zones)

5–25 V DC, in accordance with Namur or DIN 19234, potential-free design.

Data	Value	Unit
Rated 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	+



The monitor / power supply must be able to evaluate the current variations to indicate a diaphragm rupture.

13.11 Filling volumes

13.11.1 Gear oil

Tab. 7: Gear oil

Gear oil	Supplied quantity	Order no.
Mobilgear 600 XP 460	1 l	1004542

Tab. 8: Gear oil filling volumes

Types	Volume, approx.
All	3.2 l

13.12 Sound pressure level

Sound pressure level

Sound pressure level $L_{pA} < 75$ dB in accordance with EN ISO 20361:2010-10

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

13.13 Supplement for modified versions

(With Identcode 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.

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 Dimensional drawings



- Compare the dimensions on the dimension sheet and pump.
- All dimensions are in mm.

Dimensional drawing of Makro TZ, TZMbH Main power end

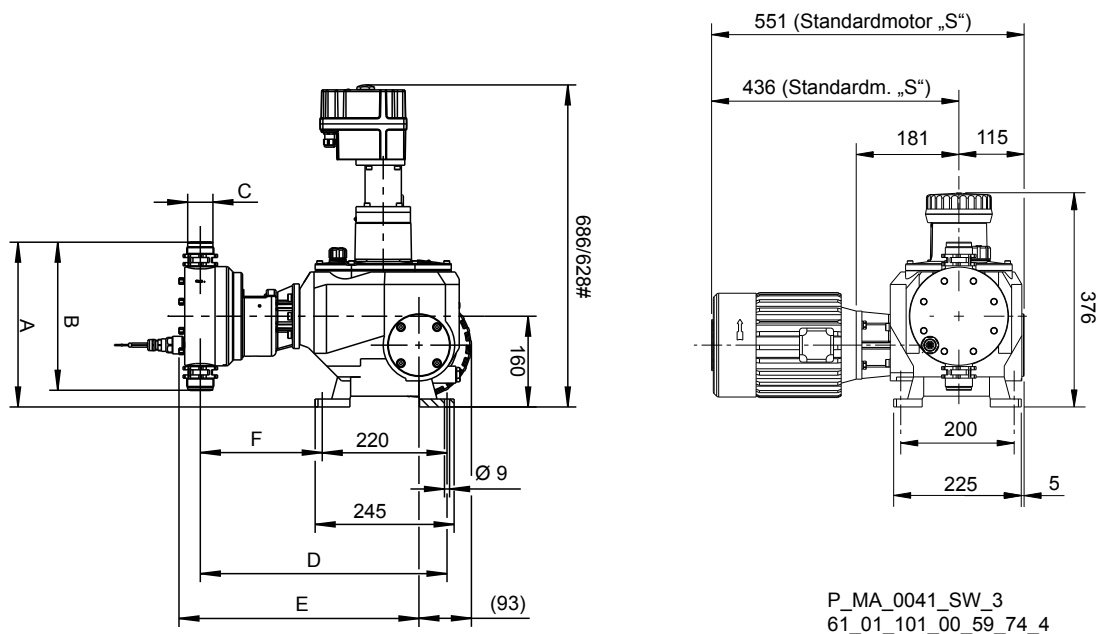


Fig. 25: Dimensions # with manual adjustment wheel. Diagram is not strictly binding.

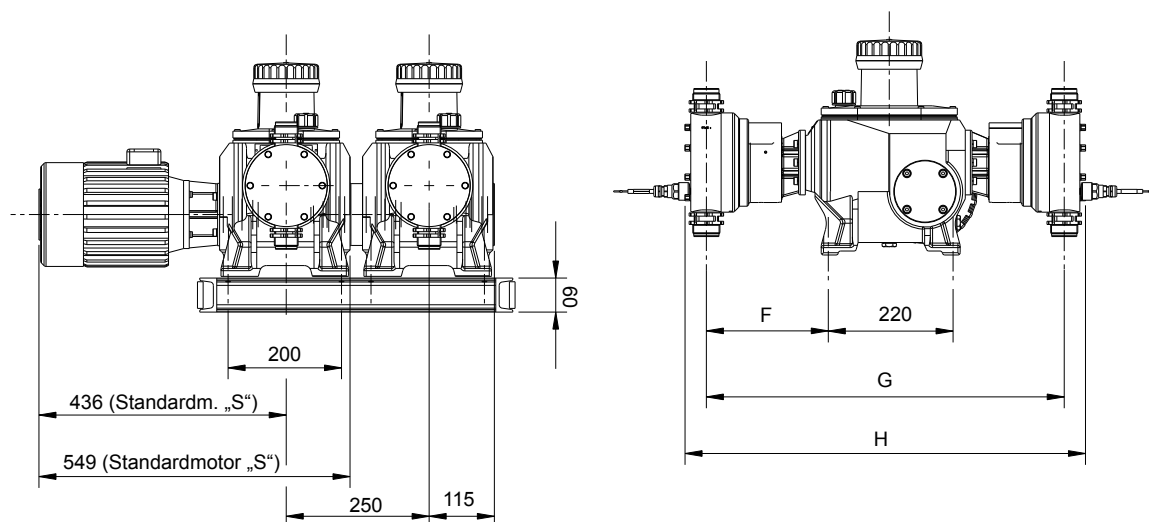
Tab. 9: Dimensions of Makro TZ (in mm)

Type	120260, 120340, 120430, 120510, 120650	120260, 120340, 120430, 120510, 120650	070430, 070570, 070720, 070860, 071070	070430, 070570, 070720, 070860, 071070	040840, 041100, 041400, 041670, 42100	040840, 041100, 041400, 041670, 42100
	S	PP, P, T	S	PP, P, T	S	PP, P, T
A	290	290	308	308	347	347
B	261	261	295	295	374	374
C	DN25*	DN25*	DN32*	DN32*	DN40*	DN40*
	G 1 1/2 A	G 1 1/2 A	G 2 A	G 2 A	G 2 1/4 A	G 2 1/4 A
D	435	435	442	442	447	447
E	423	423	438	438	458	458
F	215	215	222	222	227	227

* External thread

Dimensional drawing for Makro TZ,
TZMbA with TZMbB or TZMbD

Main power end with add-on power end or double head version



P_MA_0020_SW
61_01_101_00_59_74_2x01

Fig. 26: Diagram is not strictly binding.

Tab. 10: Dimensions of Makro TZ (in mm)

Type	120260, 120340, 120430, 120510, 120650	120260, 120340, 120430, 120510, 120650	070430, 070570, 070720, 070860, 071070	070430, 070570, 070720, 070860, 071070	040840, 041100, 041400, 041670, 42100	040840, 041100, 041400, 041670, 42100
	S	PP, P, T	S	PP, P, T	S	PP, P, T
F	215	215	222	222	227	227
G	631	631	645	645	655	655
H	707	723	736	752	756	776

Dimensional drawing for Makro TZ, motor flanges

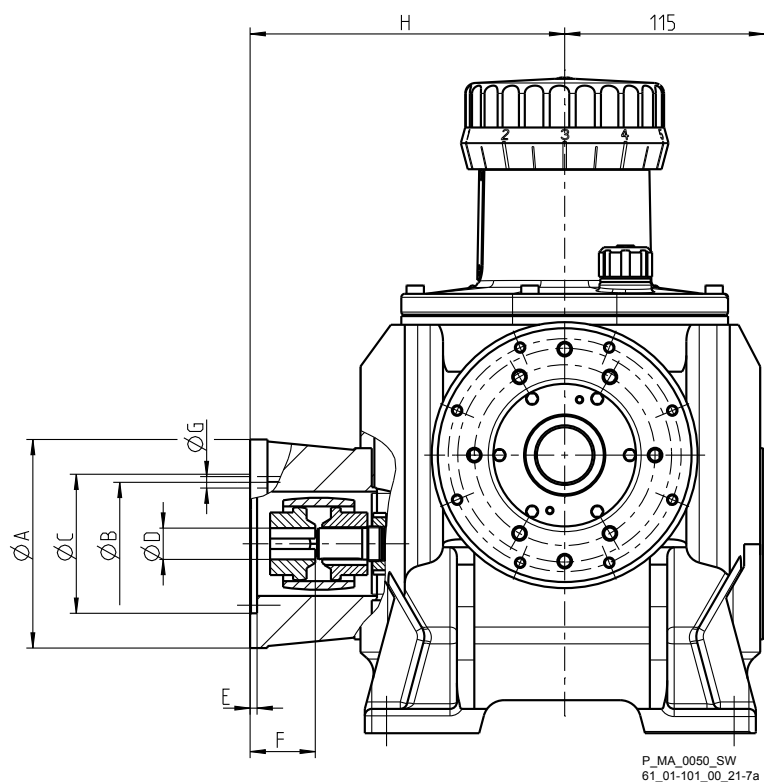


Fig. 27: Diagram is not binding.

Tab. 11: Dimensions of Makro TZ motor flanges (in mm)

	4	7	8	9
	56C	120/80	160/90	200/90
ØA	167	120	160	200
ØB	149.3	100	130	165
ØC	114.3	80	110	130
ØD	15.87	19	24	24
ØE	4	4	4	4
F	48.76	37	46.5	46.5
ØG	11	6.6	9	M10
H	193	181	191	191
Coupling type	M24 Bowex	M24 Bowex	M24 Bowex	M24 Bowex
Mounting	56C (Nema)	B14	B14	B5 1.1/1.5 kW B14 ,2/3 kW

15 Motor data sheet

Motor Datenblatt / Motor data sheet / Fiche technique pour moteur				
Bestell Nr. order no. / no. de commande		1039212	Hersteller producer / producteur	
			ATB Mat.Nr. 570330	
Motor- Typ motor type type du moteur	NF80/4H-13+E2	Leistungsfaktor power factor facteur de puissance	0,77 0,78	
Maschinenart type of machine désignation	3-Ph. Motor	Wirkungsgrad efficiency rendement	73% 76%	
Schutzart degree of protection degré de protection	IP55	Bemessungsfrequenz rated frequency fréquence nominale	50 Hz 60 Hz	
Bauform mounting construction	IMB14	Bemessungsdrehzahl rated speed vitesse nominale	1440 1750	U/min rpm t/mn
Bemessungsleistung rated output puissance nominale	0,75 kW	Wärmeklasse temperature class class d'isolement	F	
Bemessungsspannung rated voltage tension nominale	▲ / Δ 400/230 +/-10% V 440/254 +10 -15% V	Anzugsstrom starting current courant de démarrage	7,4	fach fold fois
Bemessungsstrom rated current courant nominale	1,71 / 2,96 A 1,54 / 2,67 A	Anzugsmoment starting torque couple de démarrage	3,1	fach fold fois
Geprüft nach tested in acc. with contrôlé selon	EN 60034	Kippmoment pull-out torque couple de décrochage	3,6	fach fold fois
ATEX Nr.		Umgebungstemperatur ambient temperature température ambiante	40°C	
Ex-Schutzklasse ex-protective system		Schaltung connection branchement	▲ / Δ	
		Drehzahlregelbereich speed ajustment range		
Anmerkung comments observation	* auf Anfrage beim Hersteller * upon request at manufacturer * sur demande auprès du producteur			
ProMinent Pumpentyp TZMaH _____ S _____ TZMbH _____ S _____				
Die Daten entsprechen den Angaben der Motorenhersteller. Kenndaten funktionsgleicher Motoren anderer Hersteller ändern sich nur unwesentlich. Angaben ohne Gewähr. The data correspond to the details given by the motor manufacturers. Ratings of motors with the same functions made by other producers show insignificant changes only. This information is supplied without liability. Les données techniques correspondent au descriptif du fabricant des moteurs. Les données techniques des moteurs similaires chez d' autres fabricants varient très peu. Données sont d' ordre général.				

ProMinent Dosiertechnik GmbH . 69123 Heidelberg . Germany Nr./No. MD-1039212

Datum/Date Jul 2011

ProMinent®

16 Earthing/equipotential bonding drawings for TZMb

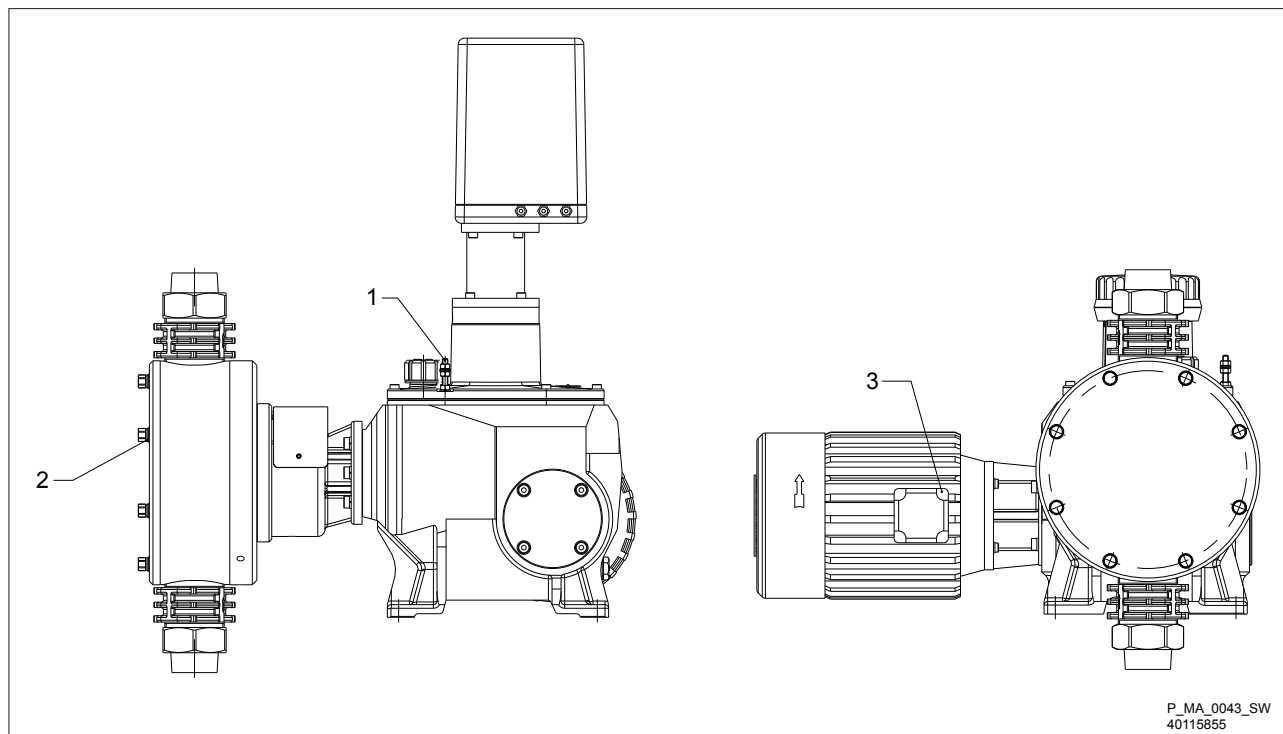


Fig. 28: Earthing/equipotential bonding drawing - Makro TZ TZMb

- 1 Potential equalisation of pump
- 2 Potential equalisation of liquid end
- 3 Potential equalisation of motor

Potential equalisation line of Pos. no. 1 at 3

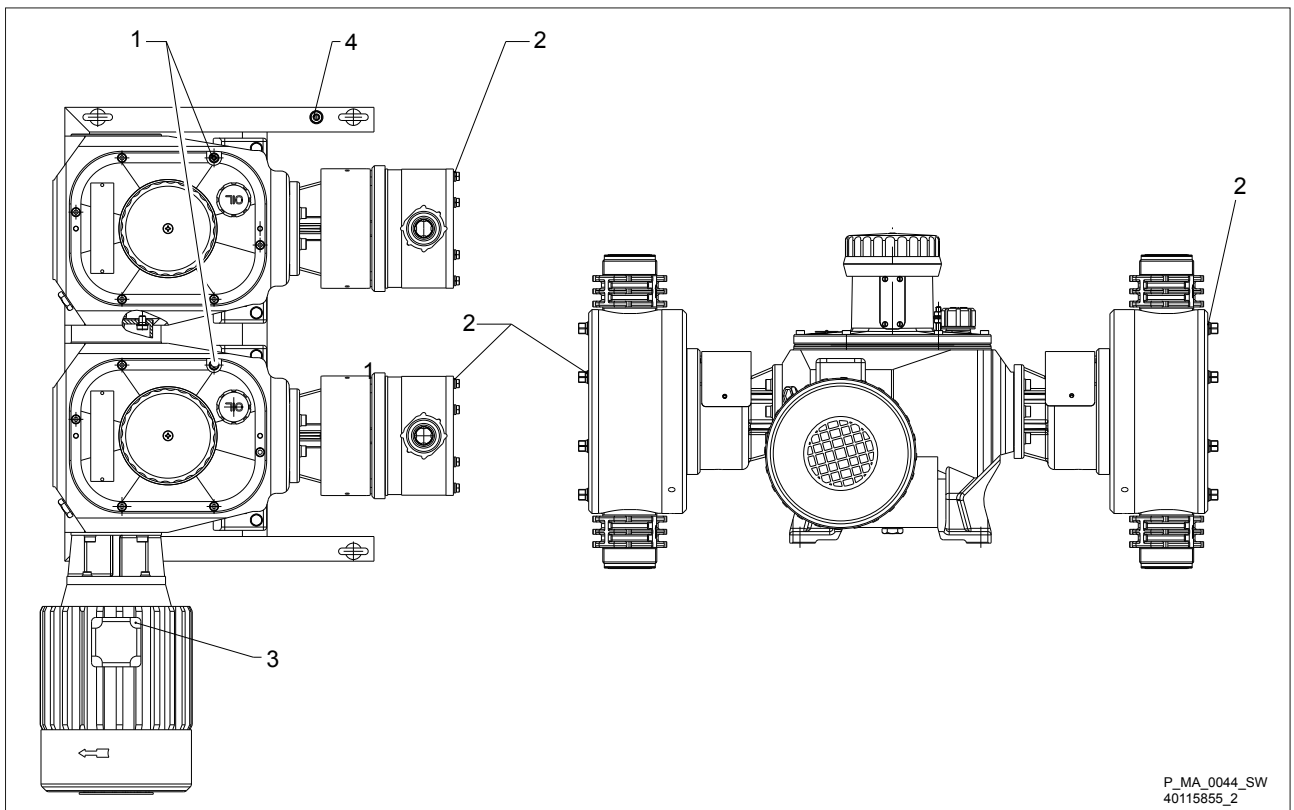


Fig. 29: Earthing/equipotential bonding drawing 2 - Makro TZ TZMb

- 1 Potential equalisation of pump
- 2 Potential equalisation of liquid end
- 3 Potential equalisation of motor
- 4 Potential equalisation of frame

Potential equalisation of Pos. no. 1 and 4 at 3

17 Diagrams for adjusting the capacity

MakroTZ, TZMb H/A at 50 Hz

MakroTZ, TZMb D/B - per liquid end at 50 Hz

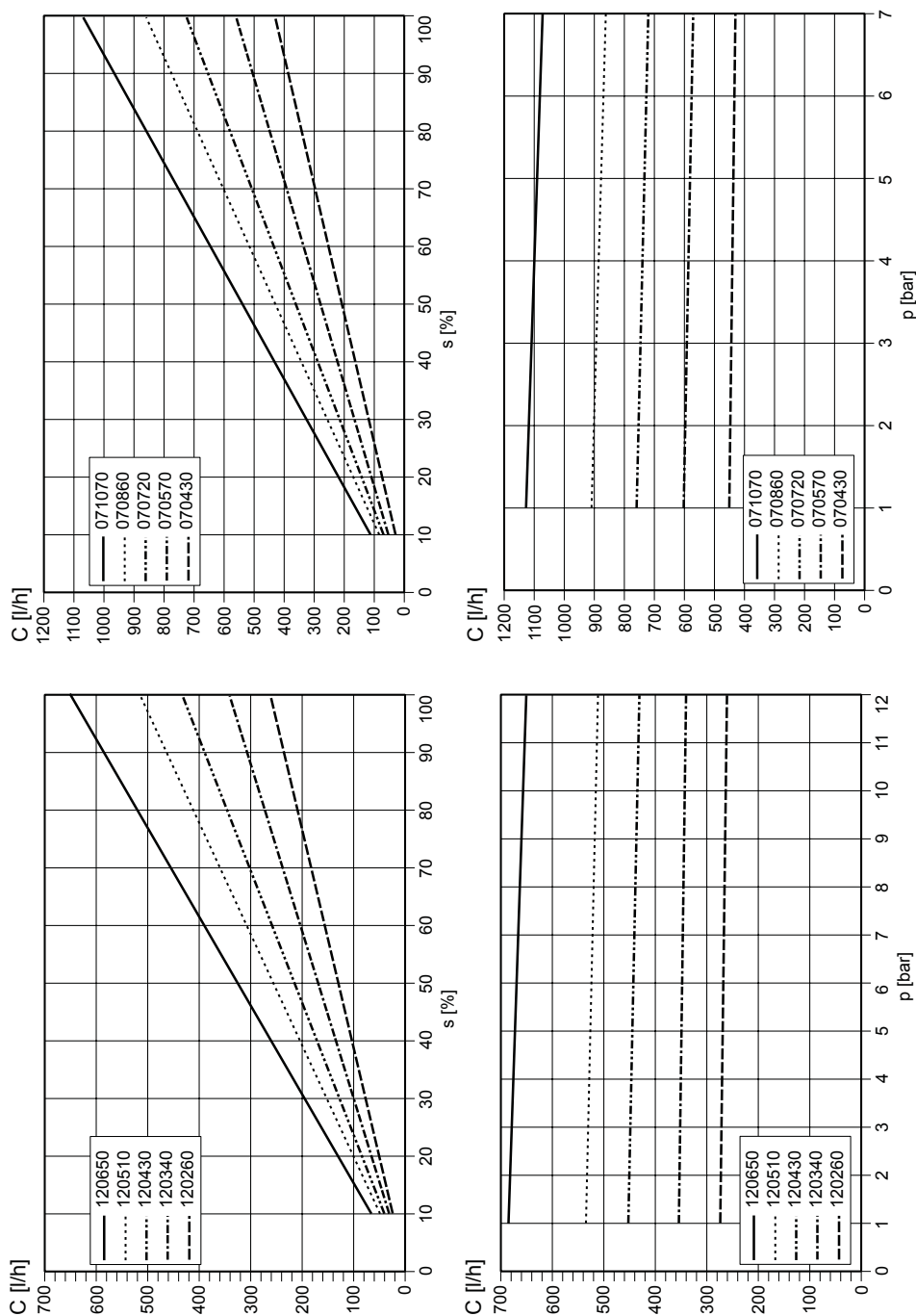


Fig. 30: Metering capacity C at medium back pressure according to the stroke length s or metering capacity C on the basis of back pressure p for the different types of a series.

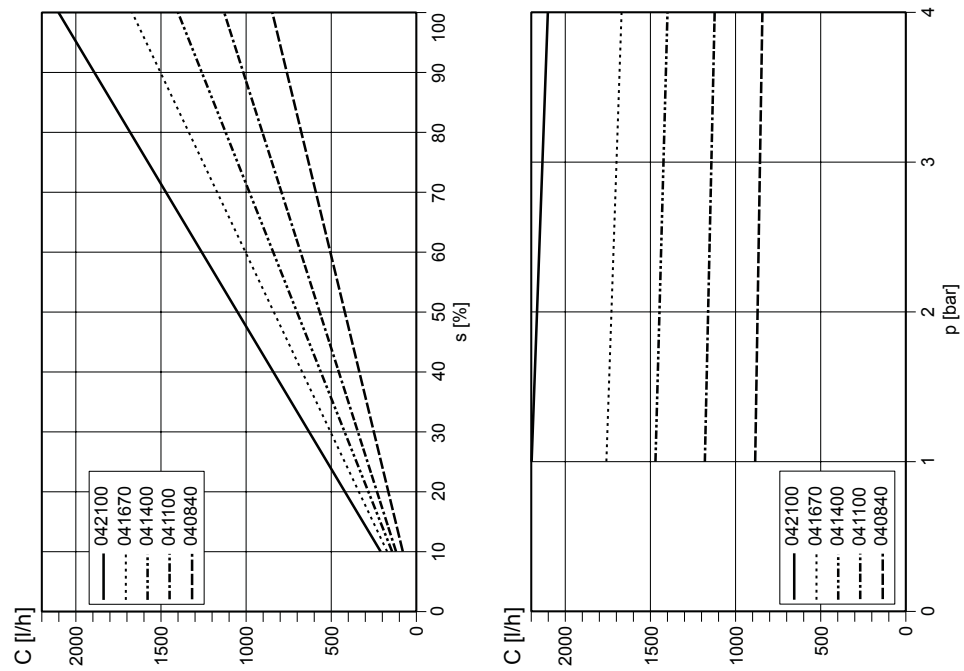


Fig. 31: Metering capacity C at medium back pressure according to the stroke length s or metering capacity C on the basis of back pressure p for the different types of a series.

MakroTZ, TZMb H/A at 60 Hz

MakroTZ, TZMb D/B - per liquid end at 60 Hz

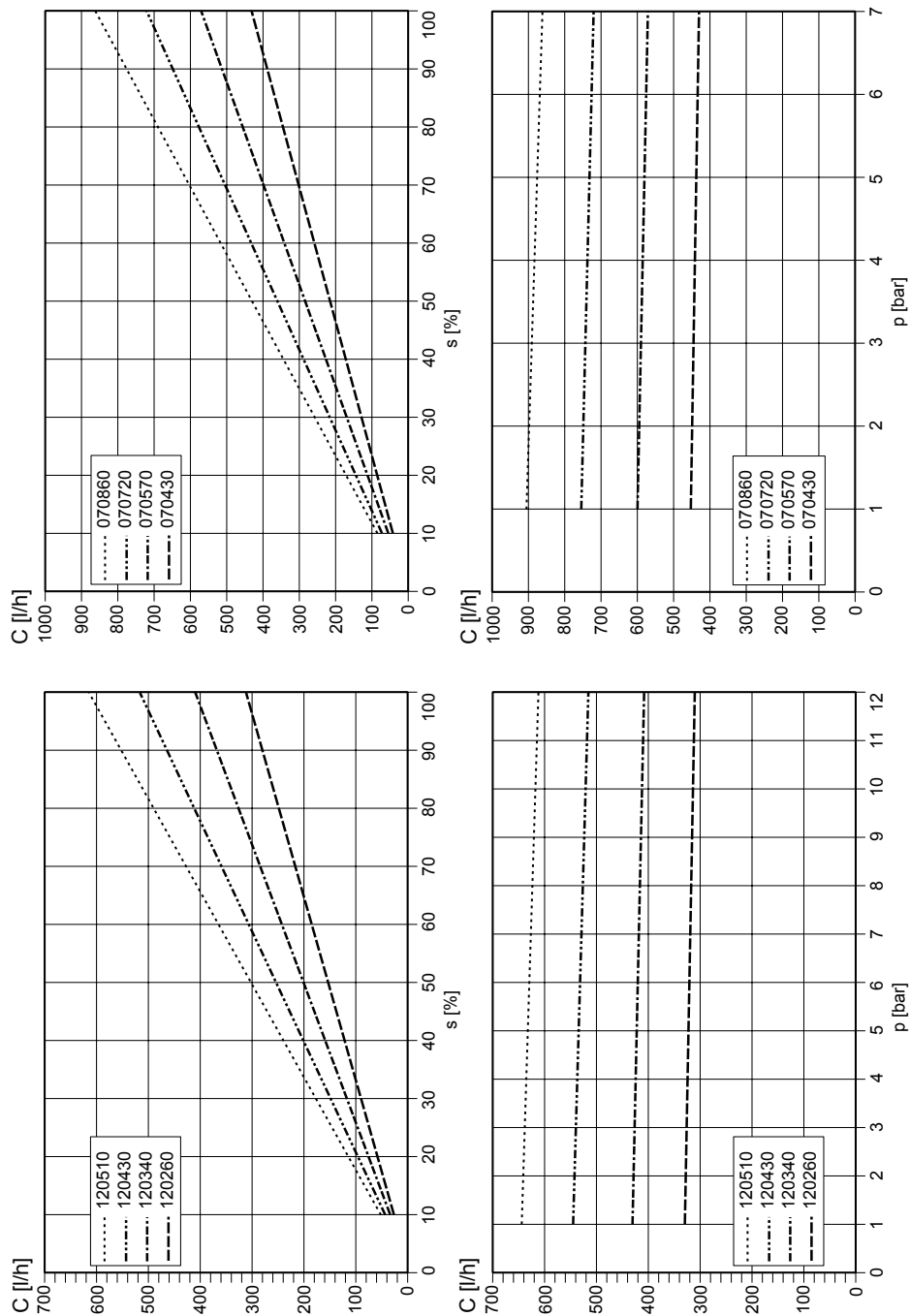


Fig. 32: Metering capacity C at medium back pressure according to the stroke length s or metering capacity C on the basis of back pressure p for the different types of a series.

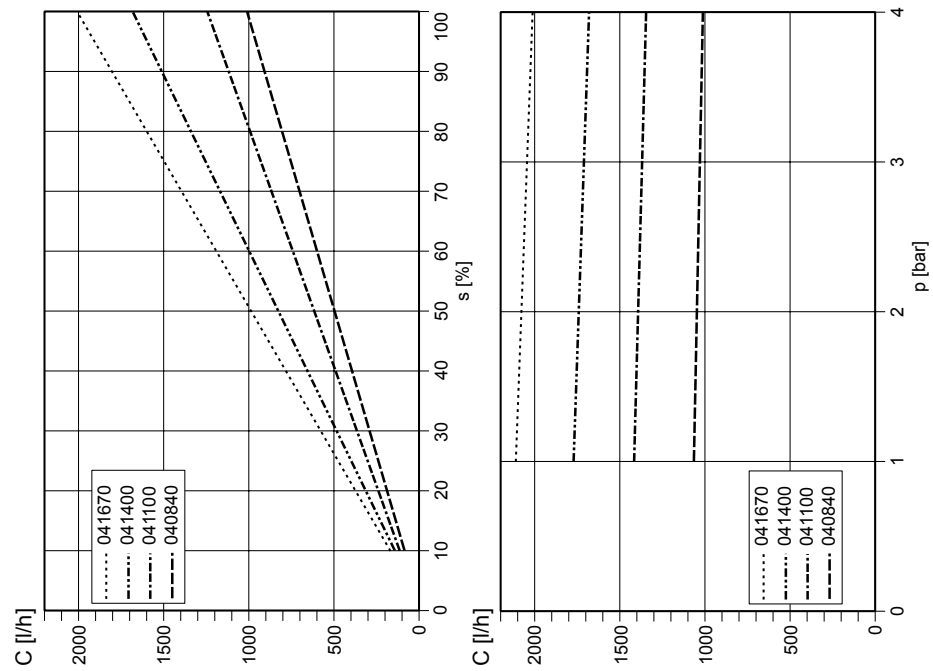


Fig. 33: Metering capacity C at medium back pressure according to the stroke length s or metering capacity C on the basis of back pressure p for the different types of a series.

18 Spare parts

Further sources of information

Further information on spare parts, accessories and options can be found in:

- the identity code
- the ProMinent® product catalogue

18.1 Spare parts

Spare parts kit for Makro TZ, TZMb

Spare parts kit contents:

- 1 - Diaphragm
- 1 - Suction valve, complete
- 1 - Discharge valve, complete
- 2 - Valve plate (DN40 with plate and spring)
- 1 - Complete sealing set (O-rings or flat seal, valve seat, valve seat bushing)

Tab. 12: For 12(10) bar types: 120260, 120340, 120430, 120510, 120650

FM 650 - DN 25	Order no.
PP	1025166
P	1025164
T	1025172
S	1022896
S (without valve assemblies)	1022895

Tab. 13: For 7 bar types: 070430, 070570, 070720, 070860, 071070

FM 1070 - DN 32	Order no.
PP	1025168
P	1025167
T	1025173
S	1022917
S (without valve assemblies)	1022916

Tab. 14: For 4 bar types: 040840, 041100, 041400, 041670, 042100

FM 2100 - DN 40	Order no.
PP	1025170
P	1025169
T	1025174
S	1022930
S (without valve assemblies)	1022929

Metering diaphragm PTFE

ProMinent® DEVELOPAN® metering diaphragms made of EPDM with woven inner layer, large area, vulcanised aluminium core and PTFE Teflon layer on the wetted side.

Tab. 15: For 12(10) bar types: 120260, 120340, 120430, 120510, 120650

Liquid end type	Order no.
FM 650	1022887

Tab. 16: For 7 bar types: 070430, 070570, 070720, 070860, 071070

Liquid end type	Order no.
FM 1070	1022900

Tab. 17: For 4 bar types: 040840, 041100, 041400, 041670, 042100

Liquid end type	Order no.
FM 1500 / FM 2100	1022921

18.2 Other material

18.2.1 Gear oil

Tab. 18: Gear oil

Gear oil	Supplied quantity	Order no.
Mobilgear 600 XP 460	1 l	1004542

Tab. 19: Gear oil filling volumes

Types	Volume, approx.
All	3.2 l

19 Declaration of Conformity for Machinery

For pumps without explosion protection:

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

We,

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

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

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

Tab. 20: Extract from the Declaration of Conformity

Designation of the product:	Metering pump, Makro TZ product range
Product type:	TZMb _____ § 0 ____ TZHa _____ § 0 ____ TZKa _____ § 0 ____ with characteristics § = "R" or "S" or "V" or "Z" or "N"
Serial number:	see nameplate on the device
Relevant directives:	Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive 2014/35/EU according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC EMC Directive (2014/30/EU)
Harmonised standards applied, in particular:	EN ISO 12100:2010 EN 809:1998 + A1:2009 + AC:2010 EN 61000-6-2:2005 + AC:2005 EN 61000-6-4:2007 + AC:2011
Date:	20.04.2016

You can download the Declaration of Conformity at www.prominent.com.

20 Declaration of Incorporation

For pumps without explosion protection:

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

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- DE - 69123 Heidelberg,

hereby declare that the product specified in the following, complies with the relevant basic health and safety requirements of the Directive, on the basis of its functional concept and design and in the version distributed by us. Technical documents were produced in line with Appendix VII Part B.

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

Tab. 21: Extract from the Declaration of Incorporation

Designation of the product:	Metering pump without motor, product range Makro TZ
Product type:	TZMb_____ § 0____ TZHa_____ § 0____ TZKa_____ § 0____ with characteristics § = "4" or "7" or "8" or "9" or "0"
Serial number:	see nameplate on the device
Relevant directives:	Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive 2014/35/EU according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	EN ISO 12100:2010 EN 809:1998 + A1:2009 + AC:2010
Only start up the pump when it has been established that the machine into which the pump has been installed corresponds to the provisions of the Machine Directive.	
Date:	20.04.2016

You can download the Declaration of Incorporation at www.prominent.com.

21 ATEX Declaration of Conformity

For pumps with explosion protection:

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

We,

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

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

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

Tab. 22: Excerpt from the Declaration of Conformity

Designation of the product:	Metering pump, Makro TZ product range, Design for use in areas at risk of explosion in accordance with the ATEX Directive (2014/34/EC)
Product type:	TZMb_____ § \$ __ 0 TZHa_____ § \$ __ & TZKa_____ § \$ __ 0 with characteristics § = "L" or "P" or "V" and \$ = "1" or "2" & = "0" or "3"
Serial number:	see nameplate on the device
Relevant directives:	ATEX Directive (2014/34/EC) Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive 2014/35/EU according to Appendix I, No. 1.5.1 of the Machinery Directive EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN ISO 80079-36:2016, EN ISO 80079-37:2016, EN ISO 12100:2010, EN 809:1998 + A1:2009 + AC:2010 EN 61000-6-2:2005/AC:2005, EN 61000-6-4:2007/AC:2011 EN 50581:2012
Ex-designations:	II 2G Ex h IIC T3 Gb X for \$ = "1" II 2G Ex h IIC T4 Gb X for \$ = "2" X: max. media temperature 90 °C Ambient temperature -10 °C ... +40 °C for & = "3" X: max. media temperature 80 °C Ambient temperature -10 °C ... +40 °C
Date:	22/07/2019

With regard to "Special conditions" - refer also to the chapter entitled "Safety information for ATEX designs".

You can download the Declaration of Conformity from www.prominent.com.

22 ATEX Declaration of Incorporation

For pumps with explosion protection:

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

We,

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

hereby declare that the product specified below complies with the relevant basic health and safety requirements of the Directive, on the basis of its functional concept and design and in the version distributed by us. Technical documents were produced in line with Appendix VII Part B.

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

Tab. 23: Extract from the Declaration of Incorporation

Designation of the product:	Metering pump without motor, product range Makro TZ, Design for use in areas at risk of explosion in accordance with the ATEX Directive (2014/34/EU)
Product type:	TZMb_____ § A__ 0 TZHa_____ § A__ & TZKa_____ § A__ 0 with characteristics § = "4" or "7" or "8" or "9" or "0" & = "0" or "3"
Serial number:	see nameplate on the device
Relevant directives:	ATEX Directive (2014/34/EC) Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive 2014/35/EU according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN ISO 80079-36:2016, EN ISO 80079-37:2016, EN ISO 12100:2010, EN 809:1998 + A1:2009/AC:2010 EN 50581:2012
Only start up the pump when it has been established that the machine into which the pump has been installed complies with the provisions of the Machine Directive.	
Ex-designation:	II 2G Ex h IIC T4 Gb X X: max. media temperature 90 °C Ambient temperature -10 °C ... +40 °C for & = "3" X: max. media temperature 80 °C Ambient temperature -10 °C ... +40 °C
Assess the ignition risk when combining the pump and motor.	
Date:	22/07/2019

You can download the Declaration of Incorporation at www.prominent.com.



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