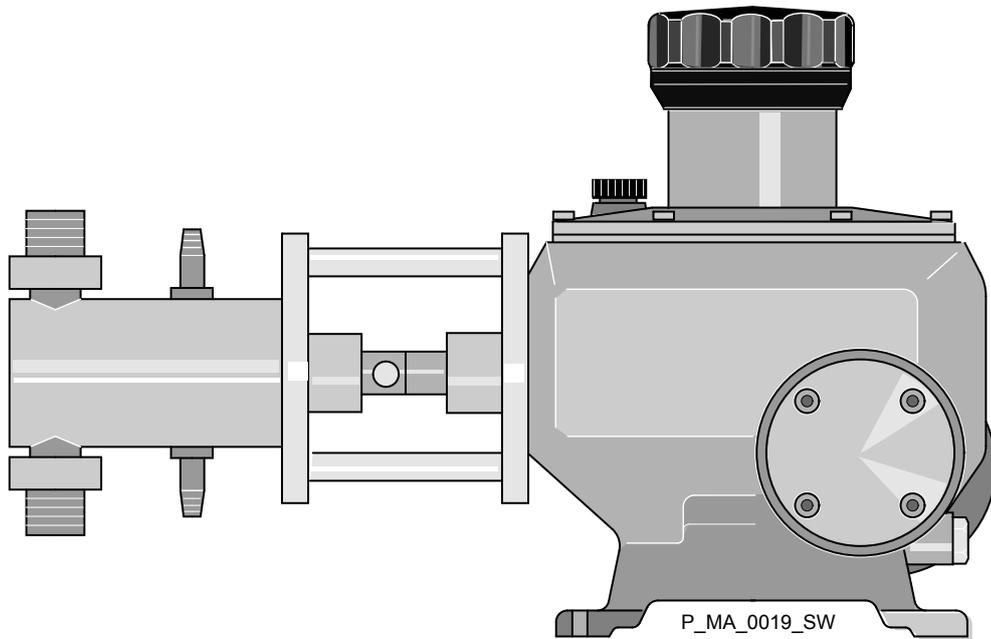


# Operating instructions

## Plunger metering pump

### Makro TZ, TZKa

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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# 1 Identity code

TZKa	Makro TZ 20 plunger metering pump	
	<b>Power end type</b>	
H	Main power end	
D	Main power end, doubled	
A	Add-on power end	
B	Add-on power end, doubled	
	<b>Type</b>	
-----	Performance data at maximum back pressure and type: refer to nameplate on the pump housing	
	<b>Dosing head material</b>	
SS	Stainless steel	
	<b>Seal material</b>	
T	PTFE	
	<b>Displacement body material</b>	
S	Stainless steel plunger, chromium dioxide coated	
	<b>Dosing head design</b>	
0	No valve spring	
1	with valve spring	
	<b>Hydraulic connector</b>	
0	Standard connection	
4	Union nut and SS insert	
	<b>Design</b>	
0	With ProMinent® logo, no frame	
2	Without ProMinent® logo, no frame	
A	With ProMinent® logo, with single frame	
B	With ProMinent® logo, with double frame	
C	With ProMinent® logo, with triple frame	
M	modified*	* order-related design, refer to order paperwork for pump features
	<b>Electric power supply</b>	
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	
P	3-phase, 230 V/400 V, 60 Hz, (Exe, Exd)	
L	3-phase, 230 V/400 V 50 Hz (Exe, Exd)	
V(2)	Variable speed stroke control motor with integrated frequency converter (Exd)	
4	No motor, with flange 56 C	
7	without motor, with flange 120/80	

TZKa	Makro TZ 20 plunger metering pump									
									8	without motor, with flange 160/90
									0	No motor, add-on power end
										<b>Degree of protection</b>
									0	IP 55 (standard) ISO class F
									1	Exe design ATEX-T3 *
									2	Exd design ATEX-T4 *
									A	ATEX design of power end *
										<b>Stroke sensor</b>
									0	No stroke sensor
									1	Stroke sensor (Namur), intrinsically safe
										<b>Stroke length adjustment</b>
									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
										<b>Applications</b>
									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 20

## 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
<b>WARNING</b>	Denotes a possibly dangerous situation. If this is disregarded, you are in a life-threatening situation and this can result in serious injuries.
<b>CAUTION</b>	Denotes a possibly dangerous situation. If this is disregarded, it could result in slight or minor injuries or material damage.

### Warning signs denoting different types of danger

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

Warning signs	Type of danger
	Warning – 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](http://www.prominent.com))!
- All other uses or modifications are prohibited.
- The pump is not intended for the metering of gaseous media and solids.
- The pump is not intended for the metering of 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!**

**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

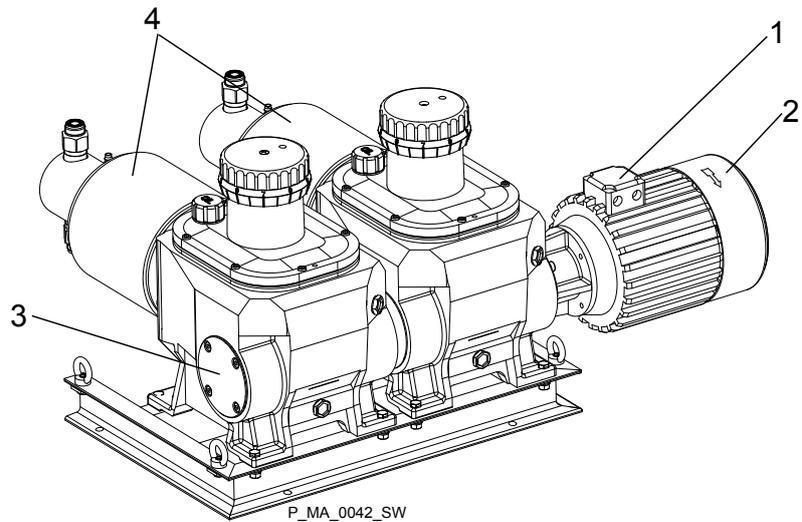


Fig. 2: Isolating protective equipment for Makro TZ with add-on power end (shown here for plunger design)

- 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 LpA < 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>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	Do not allow the pump to meter flammable feed chemicals.
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, if necessary, ...).
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**

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"> <li>■ ATEX pump only: Special maintenance work - refer to the "Safety information for ATEX pumps".</li> <li>■ 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.</li> </ul>	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
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**



**WARNING!**

- The following safety information must be affixed to pumps that include parts made of electrically non-conducting plastic.
- Ensure that the label is always fitted and legible.
- Do not allow other labels to be stuck over this label.



**Warning** Potential electrostatic charging hazard  
- see instructions

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".



**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.

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 TZKa**

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)
	<b>Explosion group</b>

Explanation of the pump's ATEX labelling Makro TZKa

			IIC	for explosion group IIC gas - refer to your explosion protection document
			IIB	for explosion group IIB gas - refer to your explosion protection document
			<b>Temperature class</b>	
			T3	for Temperature class T3 gas - refer to your explosion protection document
			T4	for Temperature class T4 gas - refer to your explosion protection document
			<b>Equipment protection level (EPL)</b>	
			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
			<b>Suffix X</b>	
			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 TZKa?**

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 22* 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	-	-	<b>Ethyl ether</b>	-	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 TZKa?**

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 22 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

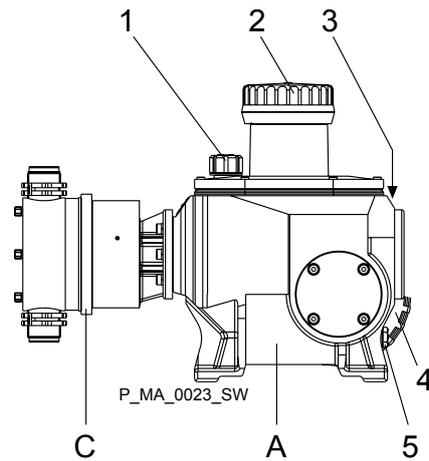


Fig. 4: Side view (here TZMb H)

- 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

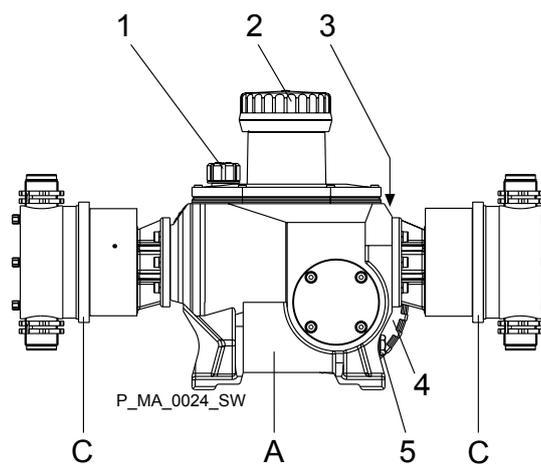
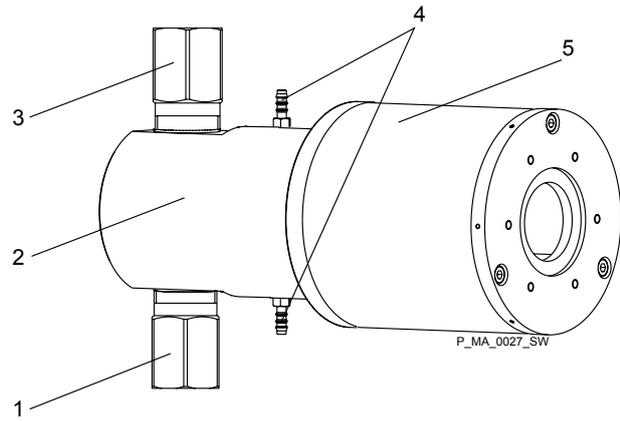


Fig. 5: Side view (here TZMb D)

- 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 Suction valve
- 2 Dosing head
- 3 Discharge valve
- 4 Protective cover
- 5 Tube nozzles for leakage/flushing connector

## 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](http://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

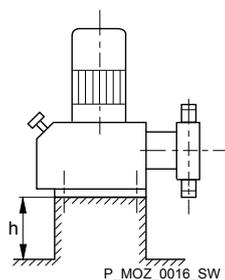


Fig. 7



**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

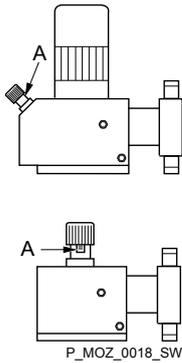


Fig. 8



### 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

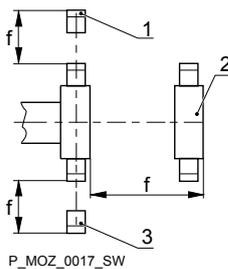


Fig. 9

## 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**

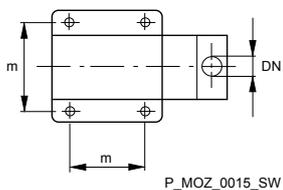


Fig. 10

**Instructions**

**i** *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.

➔ 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.

## 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).
- Do not allow it to run dry. Take appropriate protective measures.
- Provide a flow control with plunger metering pumps to ensure that the maximum media temperature is not exceeded.
- Use a suitable medium (lubricating) to rinse the plunger packing through the flushing collar with feed chemicals that have poor lubricating properties with regard to the plunger packing.



### 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 pass 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 pass 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.

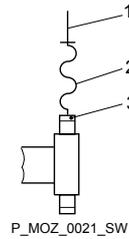


Fig. 11: Connect the steel piping to the plastic pump body as shown

- 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.*

## 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.

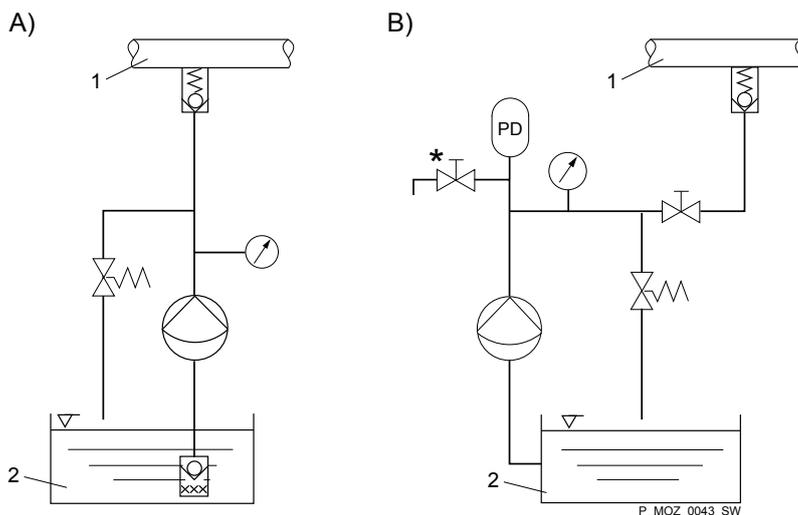


Fig. 12: (A) standard installation, (B) with pulsation damper

- 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 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)
- 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)

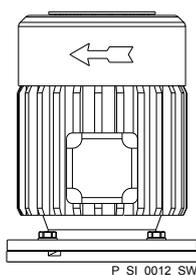
**Motor**

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](http://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.

**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!**

**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, ...).

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**

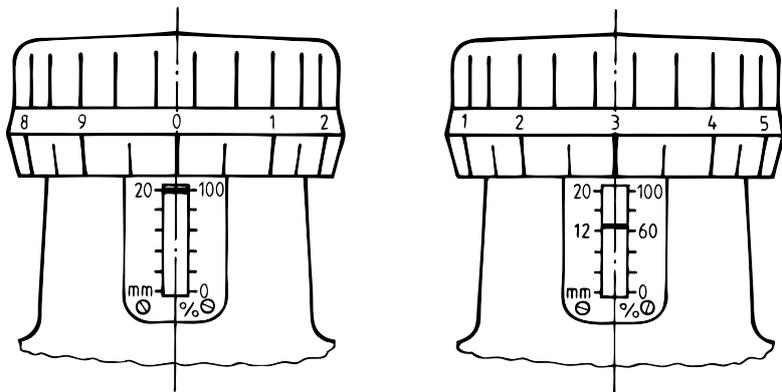
The fan impeller beneath motor's fan cowling can cause severe injuries while it is turning.

- 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.*



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Fig. 14: Stroke length adjustment wheel with scale

20 mm =	100% stroke length (10 revolutions)	12.3 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%

**Checking the leakage**

Check whether the leakage for the feed chemical used is between 10 and 120 drops /min.

**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.

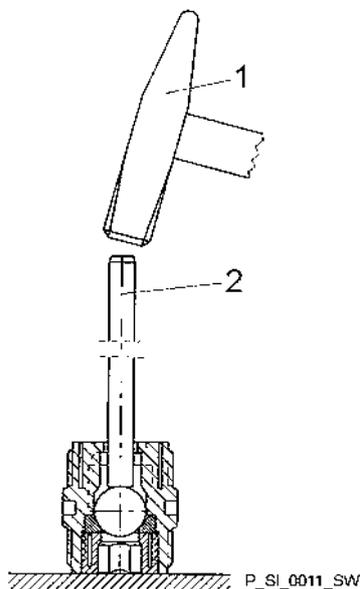


Fig. 15: Tapping the valve set disc



### **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!**

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"> <li>■ ATEX pump only: Special maintenance work - refer to the "Safety information for ATEX pumps".</li> <li>■ 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.</li> </ul>	Technical personnel
	Check the starting torque torques for the dosing head flange screws (1) (15 Nm) and the turret 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 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! With critical applications, check or replace the diaphragm at regular intervals.	Technical personnel
	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 the leakage level is OK: 10 ... 120 drops / min.	Technical personnel
	After approx. 4,000 operating hours	Check the gear ring/DZ element of the coupling as per their operating instructions.
After approx. 5,000 operating hours *	Change the gear oil.	
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.

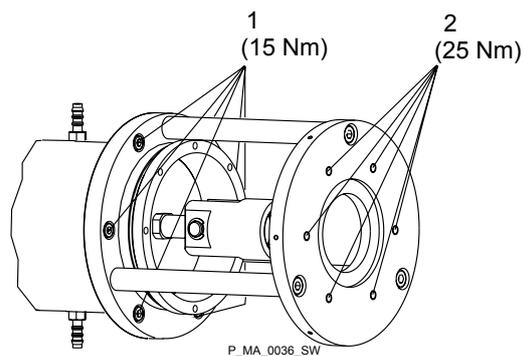


Fig. 16: Liquid end tightening torques

- 1 Dosing head screws
- 2 Turret flange screws

### 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.

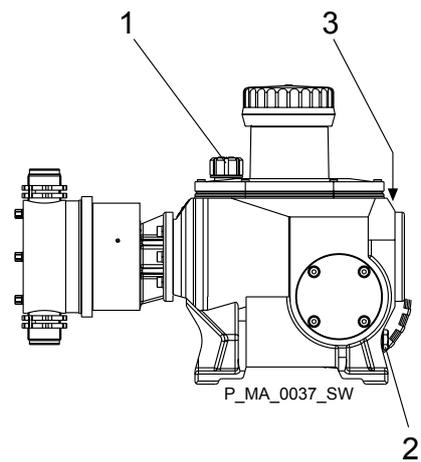


Fig. 17: Oil change

- 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!****EX pump in the area 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!****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!****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!

### 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.

## 10.1 Changing the plunger

### Removing the liquid end

1. Flush the suction line, discharge lines 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 being switched back on.
5. If the liquid end has not been flushed as per the above processes, then protect yourself against the feed chemical - protective clothing, safety glasses, ...

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

6. Unscrew the hydraulic connectors on the discharge and suction side.
7. Remove the protective cover (4) from the turret - see Fig. 18.
8. Remove a safety collar (2) from the bolt at the swivel head and pull out the bolt (1)
9. Place a sling around the liquid end and suspend from a crane.



## WARNING!

### Heavy parts may fall

- A helper must steady the liquid end by hand.
- Secure the plunger to prevent it from dropping out.

10. If this occurs: Remove the leakage or flushing tubes from the hose nozzles (6).
11. If this occurs: Unscrew the support bracket (5) from the liquid end.
12. Remove the securing screws (3) from the turret flange
13. Remove the liquid end and place onto a solid, even surface.

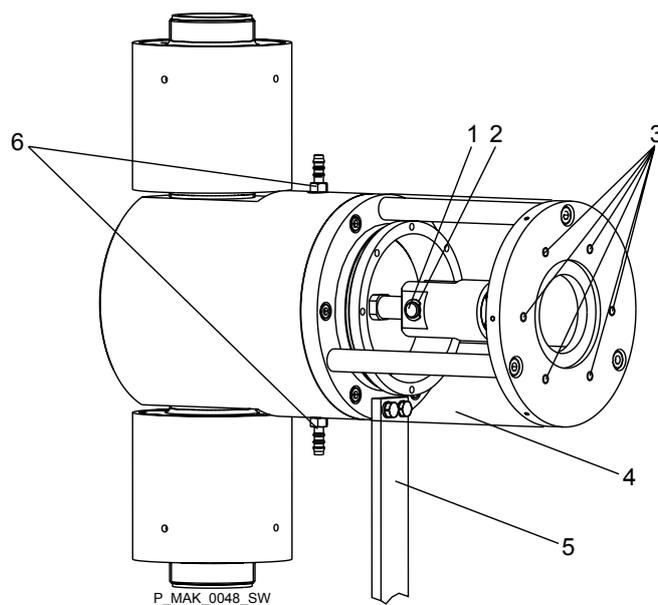


Fig. 18: View of the liquid end

- 1 Bolt
- 2 Safety collar
- 3 Securing screws
- 4 Protective cover
- 5 Support bracket (option)
- 6 Hose nozzles for leakage/flushing connector

### Repairing the liquid end

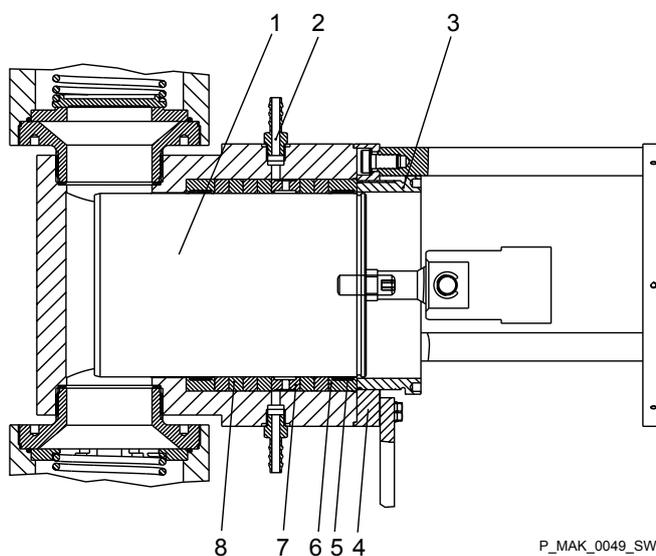


Fig. 19: Cross-section through the liquid end

- 1 Plunger
- 2 Hose nozzle
- 3 Tensioning screw
- 4 Dosing head flange
- 5 Guide bands
- 6 Guide sleeves
- 7 Flushing collar
- 8 Packing collars

1. ➤ Loosen the tensioning screw (3) using the face spanner and remove - see Fig. 19.
2. ➤ Loosen the dosing head flange (4) screws and remove the dosing head flange.

3. ➤ Remove the plunger (1)



*Now record the sequence of parts as you remove them ready for the reassembly.*

5. ➤ Remove the guide sleeves (6) and guide bands (5), the packing collars (8) and flushing collar (7).
6. ➤ Thoroughly clean the sealing area
7. ➤ Clean the plunger (1), the guide sleeves (6) and the flushing collar (7)
8. ➤ Dispose of the packing collars and guide bands
9. ➤ Insert the plunger (1).

Now reassemble the parts using a reverse sequence of steps:

1. ➤ Have new packing collars ready.



**CAUTION!**

**The plunger may be damaged**

- Never push the packing collars on with a sharp object.

2. ➤ Evenly push in the guide sleeve (6) with a new guide band and a packing collar.
3. ➤ Insert the other packing collars with the cut ends alternately rotated through 180°.
4. ➤ Insert the flushing collar (7), two further packing collars and the guide sleeve (6) with a new guide band in turn into the sealing area
5. ➤ Place the dosing head flange (4) on the liquid end and tighten.

Tightening torque

15 Nm



**CAUTION!**

**The plunger may be damaged**

- Only lightly tighten the tensioning screw.

6. ➤ Position the tensioning screw and only hand-tighten.

## Fitting the liquid end

1. ➤ Place a sling around the liquid end and suspend from a crane.



**WARNING!**

**Heavy parts may fall**

- A helper must steady the liquid end by hand.
- Secure the plunger to prevent it from dropping out.

2. ➤ Place the liquid end on the drive flange and secure using the retaining screws.

Tightening torque

25 Nm

## Positioning the liquid end

1. ➤ Align the holes of the swivel head and fork head - see Fig. 19.
2. ➤ Push the bolt through the holes and insert the safety collar in the bolt.
3. ➤ Clamp the protective cover over the turret.
4. ➤ If this occurs: Screw the support bracket onto the liquid end.
5. ➤ If this occurs: Fit the leakage or flushing tubes on to the hose nozzles.

## Commissioning packing collars

**Correct pressure of the tensioning screw**

*Packing collars should limit, not prevent, the escape of feed chemical. Leakage is necessary to reduce friction and dissipate the resulting friction heat.*

*In Fig. 20, the feed chemical B presses from the left between plunger b or the dosing head and the packing collar a (drop on the right!). The tensioning screw A (not shown) presses on the packing collar from the right.*

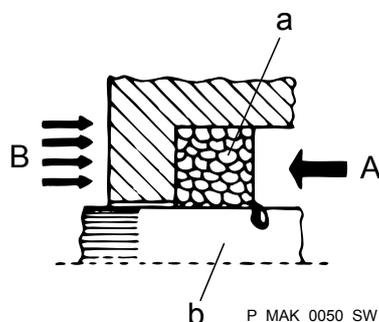


Fig. 20: Correct pressure of the tensioning screw

- A Tensioning screw pressure
- B Feed chemical pressure
- a Packing collar
- b Plunger

Allow the pump to run with this leak for the first 10 ... 15 minutes:

Leakage in the first 10 ... 15 min	50 ... 200 drops / min
------------------------------------	------------------------

Then:

1. ➤ Stop the pump.
2. ➤ Remove the protective cover.
3. ➤ Carefully tighten the tensioning screw.
4. ➤ Clamp the protective cover over the turret.
5. ➤ Start the pump.
6. ➤ Check the leakage.

Repeat steps 1 – 6 until minimum leakage is achieved:

Minimum leakage	10 ... 120 drops / min
-----------------	------------------------



*The minimum leakage is dependent on the feed chemical, the feed chemical pressure, the temperature and the plunger speed.*



### CAUTION!

#### The plunger may be damaged

If the tensioning screw pressure is too high, it can run dry and then damage the plunger and the packing collars.

- Do not over-tighten the tensioning screw.



#### The result of too high tensioning screw pressure

*The feed chemical can no longer press through the packing collars - liquid lubrication is prevented. The plunger runs dry. As a result the packing collars are scorched/burnt and the plunger damaged. Leakage increases greatly.*

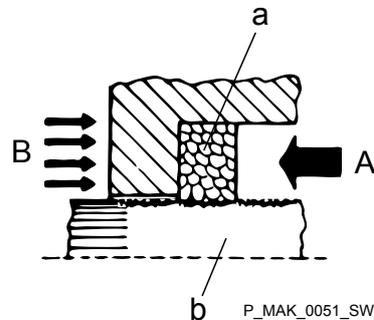


Fig. 21: The result of too high tensioning screw pressure

- A Tensioning screw pressure
- B Feed chemical pressure
- a Packing collar
- b Plunger

## 10.2 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.*

## 10.2.1 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.

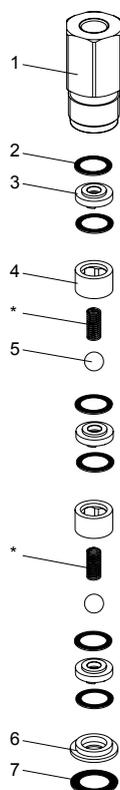
### Assembling the discharge valve



*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 - ...*



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.

Fig. 22: Discharge valve (double ball valve)

### Cleaning a suction valve

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

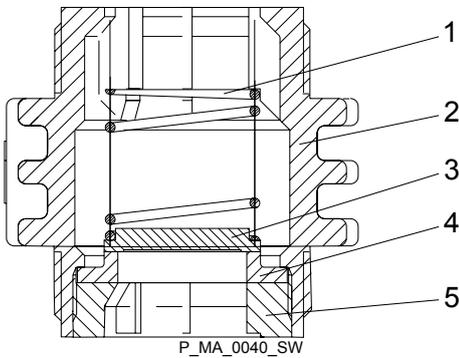


*Please note, however, that when assembling, the valve seat (3) must be aligned in the other direction. The fine machined side must point in the direction of flow with all valve seats (3).*

## 10.2.2 Plate valves



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



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

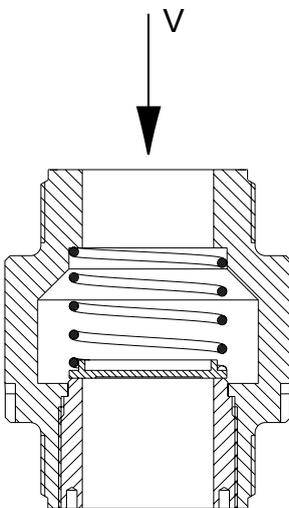
Fig. 23: Cross-section through the plate valve

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.*

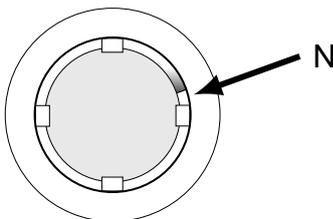
*Otherwise the valve plate may knock when in operation.*



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.*



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Fig. 24: Inserting the compression spring

- V Viewing direction
- N Spring end position on the nose

### 10.3 Replace power end bearings

The bearings of the power end 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

## Troubleshooting

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
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*	Plunger Ø
	bar	l/h	ml/stroke					
320009	320	8.7	2	72	4	Rp 1/4**- 8	50	12
320012	320	11.6	2	96	4	Rp 1/4**- 8	50	12
320014	320	14.5	2	120	4	Rp 1/4**- 8	50	12
320017	320	17.4	2	144	4	Rp 1/4**- 8	50	12
320018	320	17.7	4.1	72	4	Rp 1/4**- 8	50	17
320022	320	22.0	4.1	72	4	Rp 1/4**- 8	50	17
320024	320	23.6	4.1	96	4	Rp 1/4**- 8	54	17
320030	320	29.5	4.1	120	4	Rp 1/4**- 8	54	17
313035	313	35.4	4.1	144	4	Rp 1/4**- 8	54	17
313044	313	44.0	4.1	144	4	Rp 1/4**- 8	54	17
192033	192	32.9	7.6	72	4	Rp 3/8**- 10	55	23
192044	192	43.9	7.6	96	4	Rp 3/8**- 10	55	23
192055	192	54.8	7.6	120	4	Rp 3/8**- 10	55	23
168066	168	65.8	7.6	144	4	Rp 3/8**- 10	55	23
168082	168	82.0	7.6	144	4	Rp 3/8**- 10	55	23
113057	113	57.5	13.3	72	4	Rp 3/8**- 10	56	30
113077	113	76.6	13.3	96	4	Rp 3/8**- 10	56	30
113096	113	95.8	13.3	120	4	Rp 3/8**- 10	56	30
096115	96	114.9	13.3	144	4	Rp 3/8**- 10	56	30
096144	96	144.0	13.3	144	4	Rp 3/8**- 10	56	30
063104	63	104.3	24.2	72	4	1 1/4- 20	58	40
063139	63	139	24.2	96	4	1 1/4- 20	58	40
063174	63	173.8	24.2	120	4	1 1/4- 20	58	40
052208	52	208.5	24.2	144	4	1 1/4- 20	58	40
052261	52	261.0	24.2	144	4	1 1/4- 20	58	40
040163	40	162.9	37.7	72	4	1 1/4- 20	58	50
040217	40	217.2	37.7	96	4	1 1/4- 20	58	50
040271	40	271.5	37.7	120	4	1 1/4- 20	58	50
033326	33	325.8	37.7	144	4	1 1/4- 20	58	50
033407	33	407.0	37.7	144	4	1 1/4- 20	58	50
028237	28	237	54.9	72	4	1 1/2- 25	62	60
028316	28	315.9	54.9	96	4	1 1/2- 25	62	60
027395	27	394.9	54.9	120	4	1 1/2- 25	62	60
022474	22	473.9	54.9	144	4	1 1/2- 25	62	60
022592	22	592.0	54.9	144	4	1 1/2- 25	62	60
020322	20	322.5	74.7	72	4	1 1/2- 25	62	70

## Technical data

Type	Minimum pump capacity at maximum back pressure			Maximum stroke rate	Suction lift	Connector size	Shipping weight*	Plunger Ø
	bar	l/h	ml/stroke	Strokes/min	m WS	G-DN	kg	mm
020430	20	430	74.7	96	4	1 1/2- 25	62	70
020538	20	537.6	74.7	120	4	1 1/2- 25	62	70
016645	16	645.1	74.7	144	4	1 1/2- 25	62	70
016806	16	806.0	74.7	144	4	1 1/2- 25	62	70
014475	14	475.1	110	72	4	2 1/4- 40	68	85
014634	14	634.1	110	96	4	2 1/4- 40	68	85
013793	13	792.6	110	120	4	2 1/4- 40	68	85
011951	11	951.1	110	144	4	2 1/4- 40	68	85

**\*\* The suction and discharge side Rp 1/4 and Rp 3/8 connectors have an internal thread connection and configured as double ball valves.**

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

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*	Plunger Ø
	psi	gph	ml/stroke					
320009	4627	10	2.6	86	4	Rp 1/4**- 8	50	12
320012	4627	14	3.7	115	4	Rp 1/4**- 8	50	12
320014	4627	17	4.5	144	4	Rp 1/4**- 8	50	12
320017	4627	21	5.5	173	4	Rp 1/4**- 8	50	12
320018	4627	21	5.5	86	4	Rp 1/4**- 8	50	17
320022	4627		5.5	86	4	Rp 1/4**- 8	50	17
320024	4627	28	7.4	115	4	Rp 1/4**- 8	54	17
320030	4627	35	9.2	144	4	Rp 1/4**- 8	54	17
313035	4526	42	11	173	4	Rp 1/4**- 8	54	17
313044	4526		11	173	4	Rp 1/4**- 8	54	17
192033	2776	39	10	86	4	Rp 3/8**- 10	55	23
192044	2776	59	14	115	4	Rp 3/8**- 10	55	23
192055	2776	66	17.00	144	4	Rp 3/8**- 10	55	23
168066	2437	79	20.00	173	4	Rp 3/8**- 10	55	23
168082	2437		20.00	173	4	Rp 3/8**- 10	55	23
113057	1634	69	18.00	86	4	Rp 3/8**- 10	56	30
113077	1634	92.00	24.00	115	4	Rp 3/8**- 10	56	30
113096	1634	115.00	30.00	144	4	Rp 3/8**- 10	56	30
096115	1392	138.00	36.00	173	4	Rp 3/8**- 10	56	30
096144	1392		36.00	173	4	Rp 3/8**- 10	56	30
063104	911	125.00	33.00	86	4	1 1/4- 20	58	40
063139	911	167.00	44.00	115	4	1 1/4- 20	58	40
063174	914	209.00	55.00	144	4	1 1/4- 20	58	40
052208	754	250.00	66.00	173	4	1 1/4- 20	58	40
052261	754		66.00	173	4	1 1/4- 20	58	40
040163	578	195.00	51.00	86	4	1 1/4- 20	58	50
040217	578	261.00	68.00	115	4	1 1/4- 20	58	50
040271	580	326.00	86.00	144	4	1 1/4- 20	58	50
033326	479	391	103	173	4	1 1/4- 20	58	50
033407	479		103	173	4	1 1/4- 20	58	50
028237	405	284	75.00	86	4	1 1/2- 25	62	60
028316	405	379	100	115	4	1 1/2- 25	62	60
027395	392	474	125	144	4	1 1/2- 25	62	60
022474	319	569	150	173	4	1 1/2- 25	62	60
022592	319		150	173	4	1 1/2- 25	62	60
020322	289	387	102	86	4	1 1/2- 25	62	70
020430	289	516	136	115	4	1 1/2- 25	62	70

## Technical data

Type	Minimum pump capacity at maximum back pressure			Maximum stroke rate	Suction lift	Connector size	Shipping weight*	Plunger Ø
	psi	gph	ml/stroke	Strokes/min	m WS	G-DN	kg	mm
020538	290	645	170	144	4	1 1/2- 25	62	70
016645	232	774	204	173	4	1 1/2- 25	62	70
016806	232		204	173	4	1 1/2- 25	62	70
014475	202	571	150	86	4	2 1/4- 40	68	85
014634	202	761	201	115	4	2 1/4- 40	68	85
013793	189	951	251	144	4	2 1/4- 40	68	85
011951	160	1141	301	173	4	2 1/4- 40	68	85

\*\* The suction and discharge side Rp 1/4 and Rp 3/8 connectors have an internal thread connection and configured as double ball valves.

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

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	±0.5	% *

\* for measurements taken under constant conditions, minimum 10% 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

Design	Area	Unit
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

Plunger Ø	Liquid end	Suction/pressure connector	Ball seat/seals	Fastening body	Plunger
...12 S to 30 S	Stainless steel 1.4571/1.4404	Stainless steel 1.4571/1.4404	SS/PTFE	Oxide ceramic	Stainless steel/ ceramic
...40 S to 70 S	Stainless steel 1.4571/1.4404	Stainless steel 1.4581	PTFE/PTFE	Stainless steel 1.4401	Stainless steel/ ceramic
...85 S	Stainless steel 1.4571/1.4404	Stainless steel 1.4581	PTFE/PTFE	Hast. C	Stainless steel/ ceramic

## 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

SST - ATEX liquid end

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

SST liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	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	1.5 kW	
		250-280 V / 440-480 V	60 Hz	1.5 kW	
R	3-phase, IP 55	230 V / 400 V	50/60 Hz	2.2 kW	with PTC, speed adjustment range 1:20 with external fan 1-phase 230 V; 50/60Hz
V0	1-phase, IP 55	400 V ±	50/60 Hz	2.2 kW	Variable speed motor with integrated frequency converter
L1	3-phase, II2GEx-elIT3	220-240 V / 380-420 V	50 Hz	1.5 kW	
L2	3-phase, II2GEx-dellCT4	220-240 V / 380-420 V	50 Hz	1.5 kW	with PTC, speed control range 1:5
P1	3-phase, II2GEx-elIT3	250-280 V / 440-480 V	60 Hz	2.0 kW	

Identity code specification	Phases, protection	Rated voltage	Mains frequency	Rated output	Remarks
P2	3-phase, II2GEx-dIICT4	250-280 V / 440-480 V	60 Hz	1.5 kW	with PTC, speed control range 1:5
V2	3-phase, II2GEx-dIICT4	400 V ±10%	50/60 Hz	2.2 kW	EX-variable speed motor with integrated frequency converter

**i** **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](http://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

**i** 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 Filling volumes

### 13.10.1 Gear oil

*Tab. 4: Gear oil*

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

*Tab. 5: Gear oil filling volumes*

Types	Volume, approx.
All	3.2 l

## 13.11 Sound pressure level

### Sound pressure level

Sound pressure level L<sub>pA</sub> < 75 dB in accordance with EN ISO 20361:2010-10

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

## 13.12 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

**i** – Compare the dimensions on the dimension sheet and pump.  
 – All dimensions are in mm.

Dimension sheet Makro TZ, TZKaH

Main power end

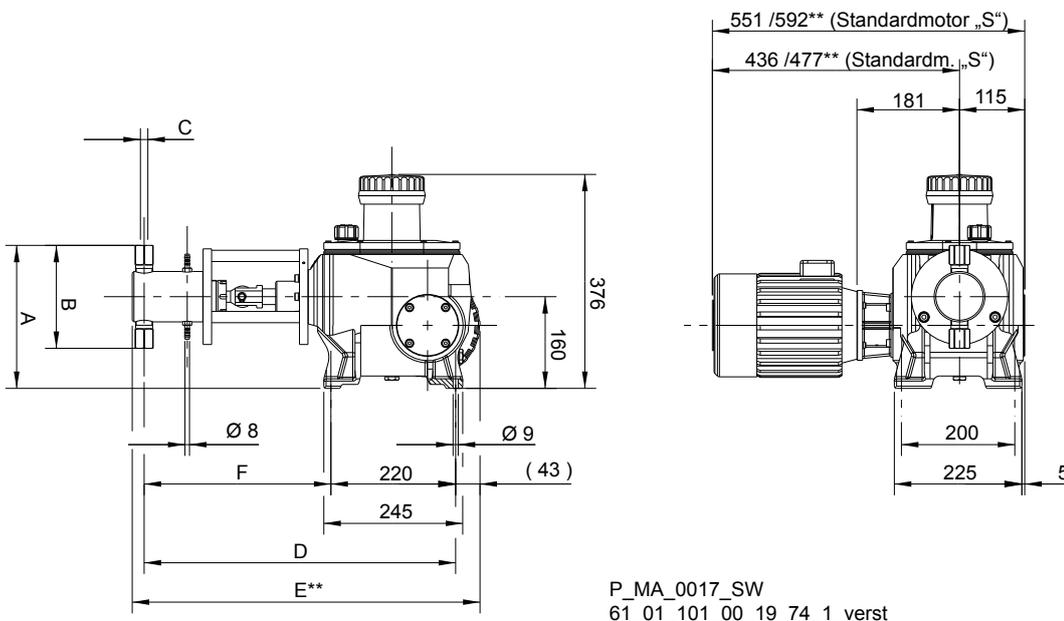


Fig. 25: Diagram is not binding.

Tab. 6: Dimensions Makro TZ (in mm)

Type	HK ..-12	HK ..-17	HK ..-23	HK ..-30	HK ..-40	HK ..-50	HK ..-60	HK ..-70	HK ..-85
	S	S	S	S	S	S	S	S	S
A	257	257	257	257	247	247	266	271	293
B	183	183	193	193	173	187	206	216	265
C	DN8*	DN8*	DN10*	DN10*	DN20*	DN20*	DN25*	DN25*	DN40*
	Rp 1/4	Rp 1/4	Rp 3/8	Rp 3/8	G1 1/4 A	G1 1/4 A	G1 1/2 A	G1 1/2 A	G2 1/4 A
D	551	551	551	556	548	548	546	553	563
E**	615	615 / 630	615 / 630	620 / 635	619 / 634	619 / 634	620 / 635	624 / 639	624 / 657
F	331	331	331	336	328	328	326	333	343

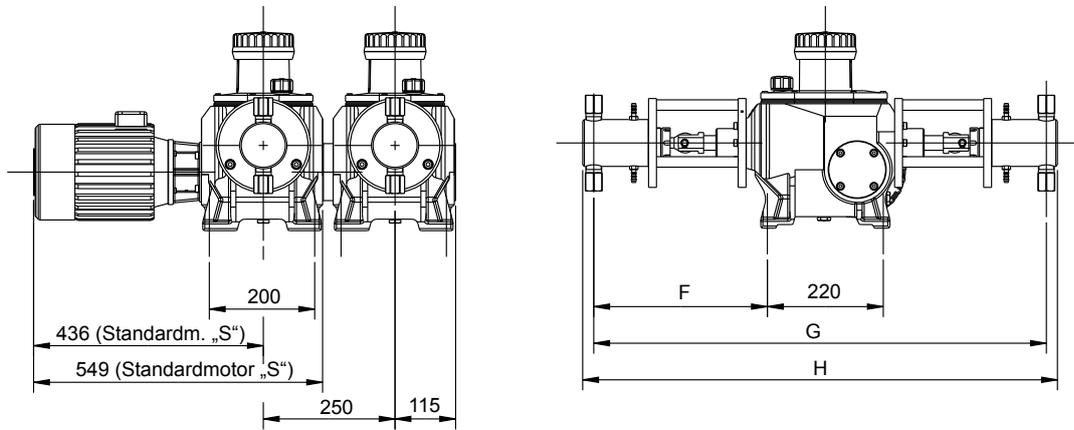
\* Rp internal thread

External thread

\*\* 0.75 kW motor / 1.5 kW motor

Dimension sheet for Makro TZ, TZKaA with TZKaB or TZKaD

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



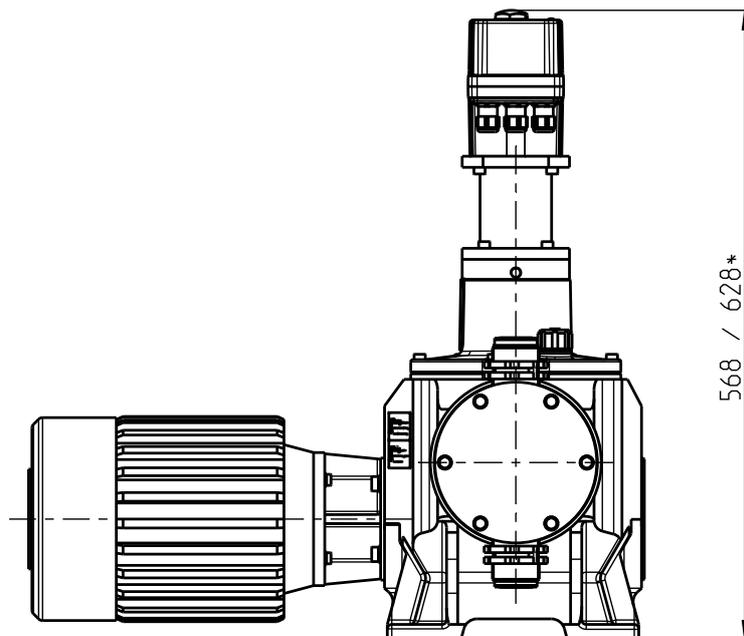
P\_MA\_0018\_SW  
61\_01\_101\_00\_19\_74\_2\_verst

Fig. 26: Diagram is not binding.

Tab. 7: Dimensions Makro TZ (in mm)

Type	HK ..-12	HK ..-17	HK ..-23	HK ..-30	HK ..-40	HK ..-50	HK ..-60	HK ..-70	HK ..-85
	S	S	S	S	S	S	S	S	S
F	330	330	330	335	328	328	326	330	340
G	860	860	860	870	856	856	853	861	880
H	902	902	902	912	910	910	912	920	956

Dimensional drawing for TZ, TZKaH with servomotor



P\_MA\_0049\_SW  
61\_01-101\_00\_21-7a

Fig. 27: \* Dimensions with manual adjustment wheel. Diagram is not binding.

Dimensional drawing for Makro TZ, motor flanges

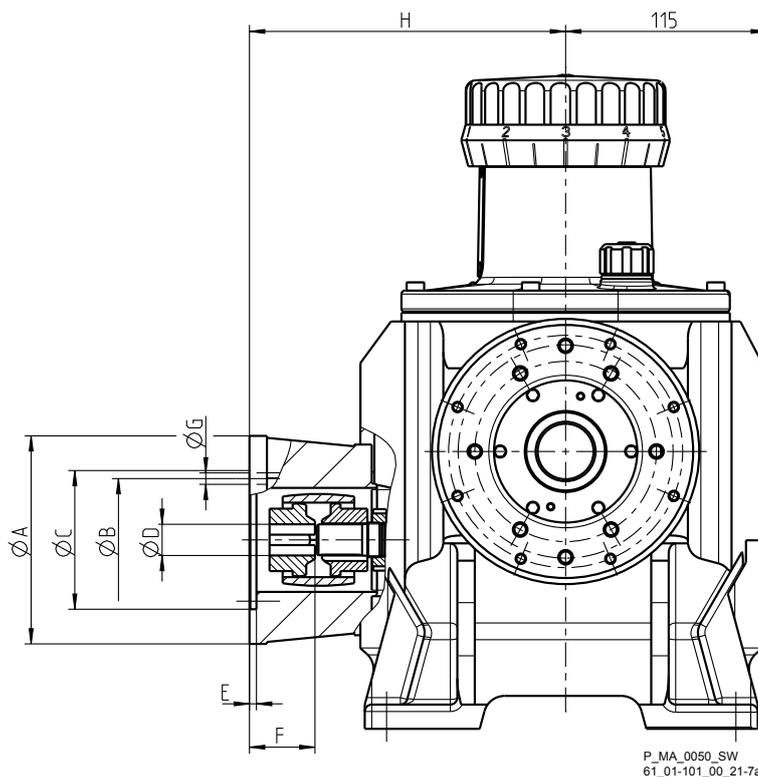


Fig. 28: Diagram is not binding.

Tab. 8: 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 Earthing/equipotential bonding drawings for TZKa

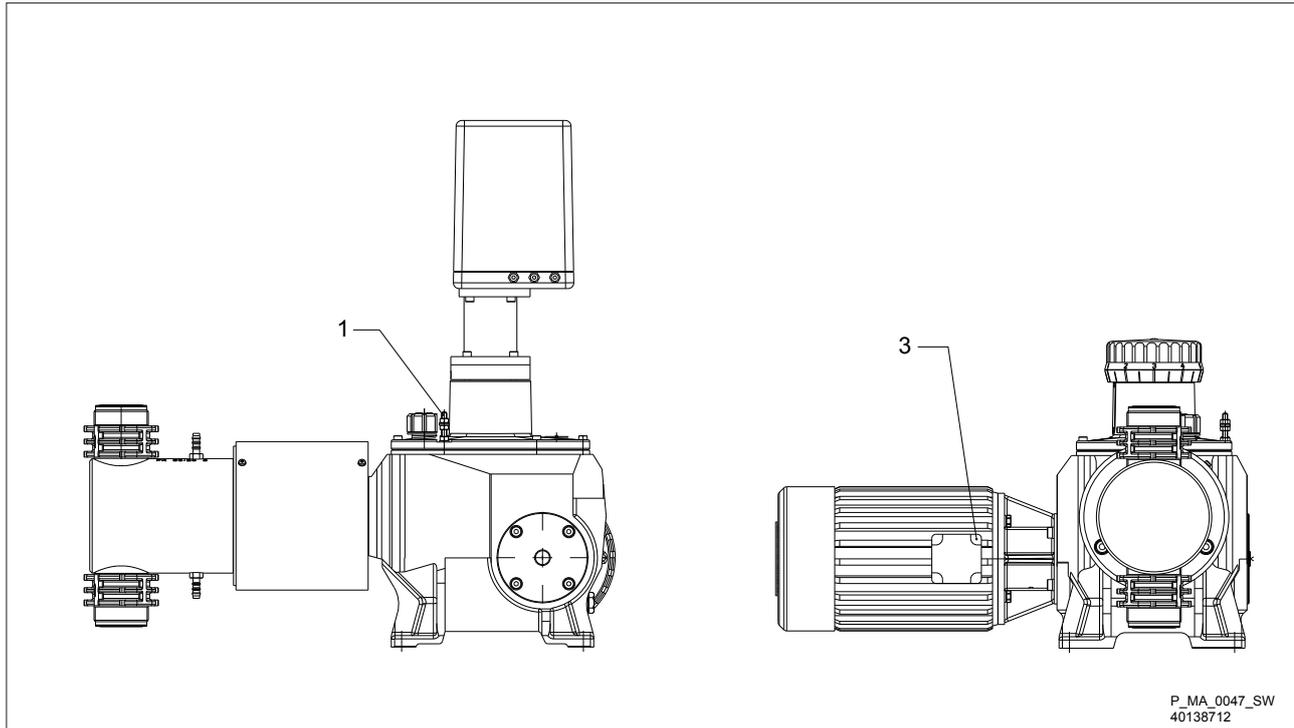


Fig. 29: Earthing/equipotential bonding drawings - Makro TZ TZKa

- 1 Potential equalisation of pump
- 3 Potential equalisation of motor

Potential equalisation of Pos. no. 1 at 3

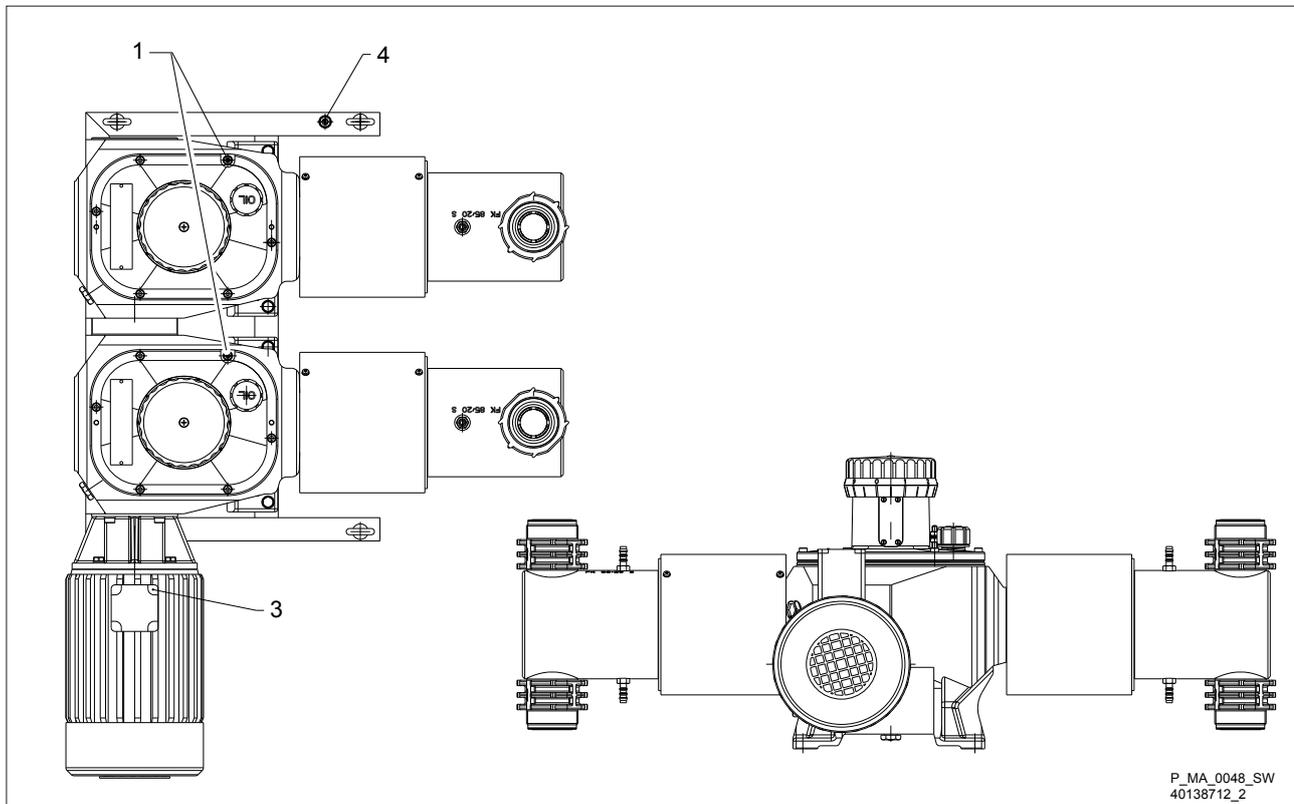


Fig. 30: Earthing/equipotential bonding drawing 2 - Makro TZ TZKa

- 1 Potential equalisation of pump
- 3 Potential equalisation of motor
- 4 Potential equalisation of frame

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

# 16 Motor data sheet

**ProMinent®**

<b>Motor Datenblatt / Motor data sheet / Fiche technique pour moteur</b>				
<b>Bestell Nr.</b> order no. / no. de commande		<b>1039210</b>	<b>Hersteller</b> producer / producteur	
			<b>ATB</b> Mat.Nr. 570315	
<b>Motor- Typ</b> motor type type du moteur	AF90L/4M-13L+E2	<b>Leistungsfaktor</b> power factor facteur de puissance	0,79 0,80	
<b>Maschinenart</b> type of machine désignation	3-Ph. Motor	<b>Wirkungsgrad (100 - 75 - 50 %)</b> efficiency (100 - 75 - 50 %) rendement (100 - 75 - 50 %)	IE2 82,8 - 81,3 - 78,7% 84,0 - 82,1 - 78,6 %	
<b>Schutzart</b> degree of protection degré de protection	IP55	<b>Bemessungsfrequenz</b> rated frequency fréquence nominale	50 Hz 60 Hz	
<b>Bauform</b> mounting construction	IMB14	<b>Bemessungsdrehzahl</b> rated speed vitesse nominale	1440 1740	U/min rpm t/mn
<b>Bemessungsleistung</b> rated output puissance nominale	1,5kW	<b>Wärmeklasse</b> temperature class class d'isolement	F	
<b>Bemessungsspannung</b> rated voltage tension nominale	▲ / Δ 400/230 +/-10% V 440/254+10% -15% V	<b>Anzugsstrom</b> starting current courant de démarrage	7,1	fach fold fois
<b>Bemessungsstrom</b> rated current courant nominale	3,30 / 5,70 A 2,90 / 5,00 A	<b>Anzugsmoment</b> starting torque couple de démarrage	2,9	fach fold fois
<b>Geprüft nach</b> tested in acc. with contrôlé selon	EN 60034	<b>Kippmoment</b> pull-out torque couple de décrochage	3,2	fach fold fois
<b>ATEX Nr.</b>		<b>Umgebungstemperatur</b> ambient temperature température ambiante	40°C	
<b>Ex-Schutzklasse</b> ex-protective system		<b>Schaltung</b> connection branchement	▲ / Δ	
		<b>Drehzahlregelbereich</b> speed ajustment range		
<b>Anmerkung</b> comments observation	* auf Anfrage beim Hersteller * upon request at manufacturer * sur demande auprès du producteur			
<b>ProMinent</b>				
Pumpentyp	TZHaH _____ S _____ TZKaH _____ S _____			
<p>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.</p>				

## 17 Diagrams for adjusting the capacity

on request

## 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, TZKa

#### Spare parts kit contents

- Valve balls
- Valve plate with spring
- Ball seat discs
- Plunger packings made from PTFE/graphite
- Plunger guide bands
- Flat seals / O-rings

Liquid end	Order no.
FK 12/20 S DN 8	1019106
FK 17/20 S DN 8	1019107
FK 23/20 S DN 10	1019108
FK 30/20 S DN 10	1019109
FK 40/20 S DN 20	1019110
FK 50/20 S DN 20	1019111
FK 60/20 S DN 25	1019112
FK 70/20 S DN 25	1019113
FK 85/20 S DN 40	1019124

### 18.2 Other material

#### 18.2.1 Gear oil

Tab. 9: Gear oil

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

Tab. 10: 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. 11: 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](http://www.prominent.com).

## 20 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. 12: 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](http://www.prominent.com).

## 21 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. 13: 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](http://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. 14: 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](http://www.prominent.com).

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