

# Operating instructions

## Metering pump

### Hydro/ 4, HP4a

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

HP4a	Hydro/ 4, version a	
	<b>Power end type</b>	
H	Main power end	
D	Main power end, double head version	
E	Main power end for add-on power end	
F	Main power end, double head version for add-on power end	
A	Duplex/triplex add-on power end	
B	Add-on power end, double head version	
T	Main power end, triplex	
V	Triplex add-on power end	
	<b>Type *</b>	Capacity
----	Performance data at maximum back pressure and type: see nameplate on pump housing	
--		
	<b>Dosing head material</b>	
SS	Stainless steel	
PV	PVDF	
HC	Hastelloy C	
PC	PVC	
PP	PP	
TT	PTFE + 25 % carbon	
	<b>Seal material</b>	
T	PTFE	
	<b>Displacement body</b>	
0	Standard multi-layer safety diaphragm with rupture signalling	
	<b>Dosing head design</b>	
0	no valve spring (standard)	
1	With valve spring	
	<b>Hydraulic connector</b>	
0	Standard threaded connector (in line with technical data)	
E	With DIN ISO flange	
F	With ANSI flange	
	<b>Design</b>	
0	With ProMinent® logo (standard)	
1	Without ProMinent® logo	
2	With ProMinent® logo, with mechanical overpressure display	
3	With ProMinent® logo, with electrical overpressure display	
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, 1.1 kW	

HP4a		Hydro/ 4, version a									
L		3-phase, 230 V/400 V, 50 Hz, (Exe, Exde), 1.1 kW									
P		3-phase, 265 V/440 V, 60 Hz, (Exe, Exde), 1.1 kW									
R		3-phase, variable speed control motor, 230/400 V, 1.5 kW									
V(0)		Variable speed control motor with integrated frequency converter 1-phase, 230 V, 50/60 Hz									
V(2)		Variable speed control motor with integrated frequency converter (Exd)									
Z		Speed control complete, 1-phase, 230 V, 50/60 Hz									
1		No motor, with flange 250/100									
3		No motor, with flange 200/90									
4		No motor, with NEMA flange									
0		Add-on power end									
<b>Degree of protection</b>											
0		IP 55 (Standard) ISO class F									
1		Exe design ATEX-T3									
2		Exde design ATEX-T4									
A		ATEX power end									
<b>Stroke sensor</b>											
0		No stroke sensor (standard)									
1		Stroke sensor (compatible with areas at risk from explosion)									
<b>Stroke length adjustment</b>											
0		Manual (standard)									
K		Manual (outdoor, SS)									
1		With servomotor, 230 V, 50/60 Hz									
2		With servomotor, 115 V, 60 Hz									
A		With stroke control motor 0...20 mA 230 V, 50/60 Hz									
B		With stroke control motor 4...20 mA 230 V, 50/60 Hz									
C		With stroke control motor 0...20 mA 115 V, 60 Hz									
D		With stroke control motor 4...20 mA 115 V, 60 Hz									
<b>Hydraulic oil</b>											
0		Standard									
1		Food approval for oil									

\* Type, power (at 50 Hz)

Type	Capacity		Type	Capacity		Type	Capacity		Type	Capacity	
	bar	l/h		bar	l/h		bar	l/h		bar	l/h
250130	25 <sup>1</sup>	130	160210	16 <sup>1</sup>	210	100330	10	330	070465	7	465
250190	25 <sup>1</sup>	190	160300	16 <sup>1</sup>	300	100480	10	480	070670	7	670
250250	25 <sup>1</sup>	250	160400	16 <sup>1</sup>	400	100635	10	635	070890	7	890

Type	Capacity		Type	Capacity		Type	Capacity		Type	Capacity	
	bar	l/h		bar	l/h		bar	l/h		bar	l/h
<b>250350</b>	25 <sup>1</sup>	350	<b>160400</b>	16 <sup>1</sup>	550	<b>100800</b>	10	880	<b>071230</b>	7	1230
<b>250400</b>	25 <sup>1</sup>	400	<b>160625</b>	16 <sup>1</sup>	625	<b>101000</b>	10	1000	<b>071400</b>	7	1400

<sup>1</sup> Maximum back pressure with TTT, PPT and PCT material versions: 10 bar!

## 2 Safety Chapter



### Explanation of the safety information

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

Signal word	Meaning
<b>WARNING</b>	Denotes a possibly hazardous 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 hazardous situation. If this is disregarded, it could result in slight or minor injuries or material damage.

### Warning signs denoting different types of danger

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

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

### Intended Use

- Only use the pump to meter liquid feed chemicals.
- In potentially explosive atmospheres only operate the pump with the appropriate nameplate for pumps designed for use in areas at risk of explosion in compliance with Directive 94/9/EC in accordance with the European guidelines.  
The explosion group, category and degree of protection specified on the label should correspond to or be better than the conditions given in the intended field of application.
- The pump is only approved for use with flammable feed chemicals if it has the identity code option "Multi-layer safety diaphragm with rupture display", is operated at back pressures over 2 bar with metal liquid ends and if the operator implements appropriate safety measures.
- Only use the pump after it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions. Consider the temperatures produced using a heating cartridge when working with one.
- Observe the general limitations with regard to viscosity limits, chemical resistance and density - refer also to the ProMinentResistance List (in the Product Catalogue or at [www.prominent.com](http://www.prominent.com))!
- All other uses or modifications are prohibited.

- Never operate pumps without the relevant nameplate (and the respective EC Declaration of Conformity) for pumps for use in premises at risk from explosion in premises at risk from explosion.
- 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 ATEX design is not intended for the metering of electrically non-conductive media (conductivity less than 50 pS/m).
- Do not expose the ATEX design to ionised radiation, electromagnetic high frequency in the range of  $10^4 \dots 3 \times 10^{15}$  Hz or ultrasound without taking measures in line with EN 1127-1.
- The pump is not intended for unprotected use outdoors.
- The pump is only intended for industrial use.
- Only allow the pump to be operated by trained and authorised personnel, see the following table.
- You are obliged to observe the information contained in the operating instructions at the different phases of the unit's service life.
- You are obliged to observe the information contained in the operating instructions for the accessory units at the different phases of their respective service lives.

Qualification of personnel

Task	Qualification
Storage, transport, unpacking	Instructed person
Assembly	Technical personnel, service
Planning hydraulic installation	Qualified personnel who have a thorough knowledge of the use of oscillating metering pumps.  In areas at risk from explosion: ATEX qualified person, ATEX electrical technician
Hydraulic installation	Technical personnel, service
Installation, electrical	Electrical technician,  In areas at risk from explosion: ATEX electrical technician
Start up	Qualified personnel  In areas at risk from explosion: Qualified personnel with ATEX training; checking of the electrical installation: recognised competent person
Operation	Instructed person
Maintenance, repair	Technical personnel, service  In areas at risk from explosion: ATEX qualified person, ATEX electrical technician
Decommissioning, disposal	Technical personnel, service
Troubleshooting	Qualified person, electrical technician, instructed person, service - depending on the requirement  In areas at risk from explosion: ATEX electrical technician; checking of the electrical installation: recognised competent person

### Explanation of the table:

#### Qualified personnel

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

Note:

A qualification of equal validity to a technical qualification can also be gained by several years of employment in the relevant field of work.

#### Electrical technician

An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on their technical training and experience, as well as knowledge of pertinent standards and regulations.

The electrical technician should be specifically trained for the working environment in which they are employed and know the relevant standards and regulations.

An electrical technician must comply with the provisions of the applicable statutory directives on accident prevention.

A qualification of equal validity to a technical qualification can also be gained by several years of employment in the relevant field of work.

#### ATEX explosion protection electrical technician

The electrical technician with an additional explosion protection qualification should be specifically trained for the work area in which they are employed and know the relevant standards and regulations. The electrical technician with an additional explosion protection qualification can work on electrical systems and independently recognise and avoid possible dangers based on their 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 however exclusively, with all parts of EN 60079 [electrical equipment for areas at risk of a gas explosion].

The 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 tests, the competent person must have:

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

The person must have knowledge of the relevant body of standards and regulations and have worked in the area for at least one year. The person is required to have participated in opportunities for exchanging experiences.

There are specific requirements relating to competent persons intending to carry out tests on repaired units/parts. They must be **recognised** by the responsible authorities (e.g. the district council) to undertake this work.

#### Instructed person

An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.

#### Service

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

## Safety information

**CAUTION!**

These operating instructions include notes and quotes from German guidelines relating to the system 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!****Only use ATEX pumps in areas at risk from explosion**

- Observe the European Operator Directive 99/92/EC (ATEX 137), implemented in Germany by the Industrial Health and Safety Regulation and the German Ordinance on Hazardous Substances, for the installation and operation of equipment in areas at risk from explosion.
- Observe the European standards EN 1127-1, EN 60079-10, EN 60079-14, EN 60079-17 and EN 60079-25 and EN 50039 for inherently safe electrical circuits. (In Germany these standards are partly implemented by VDE 0165 and VDE 0118).
- Adhere to the respective national regulations outside of the EU.
- Ensure that installations in areas at risk from explosion are checked by a "recognised competent" person. This applies specifically to intrinsically safe circuits.
- The following information relates essentially to the unique characteristics in areas at risk from explosion but does not replace the standard operating instructions.
- Only clean plastic parts carefully with a damp cloth to avoid electrostatic charges and sparks.

**WARNING!****Warning of dangerous or unknown feed chemical**

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

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

**WARNING!****Danger from hazardous substances!**

Possible consequence: Fatal or very serious injuries.

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

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



### CAUTION!

#### Warning of feed chemical spraying around

Feed chemical 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 wetted parts of the pump.

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



### 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.



### WARNING!

#### Adjusted pressure switches fail

- The switching point of the 42 V pressure switch must not be changed.
- The ATEX pressure switch must not be reprogrammed. It could result in overheating of the pump.



### 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 relating to operating instructions**

Prior to commissioning the system or system component, the system operator is obliged to obtain the latest safety data sheets from the supplier for the chemicals / resources to be used with the system. The operator should create the legal framework for safe operation of the system or system component, such as for example the preparation of operating instructions (operator duties), 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.

**Safety equipment**


**Fixed, isolating protective equipment**

When using the pump, ensure that all these parts are secured in position.

Protective equipment	May only be removed by*:
Protective cowling above the motor fan	Service
Terminal box cover, motor	Electrical technician, ATEX electrical technician, Service
Flange cover, side	Service
Only with add-on power end: motor connection cover	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.

**Other safety equipment - ATEX**



**WARNING!**

- Ensure that the following safety information is stuck to pumps that contain parts made of electrically non-conducting plastic.
- Ensure that the label is always fitted and legible.
- The label should indicate that:
  - Only use a soft cloth to carefully wipe plastic parts.
  - Always earth the discharge and suction lines first before working on the pump.

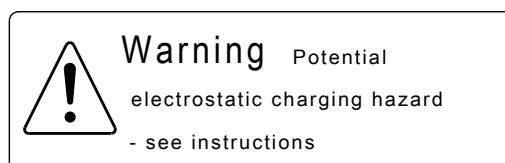


Fig. 2

**Requirements, if the motor is being installed independently**

The operator must be in a position to:

- Perform a risk assessment
- Create and attach a nameplate

- Create an EC Declaration of Conformity
- Adapt the operating instructions, if necessary
- Correctly install the motor
- With ATEX motors: perform an ignition hazard assessment

### Sound pressure level

Sound pressure level  $L_{pA} < 75$  dB according to EN ISO 20361

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

### 3 Storage, transport and unpacking

#### Safety information



#### WARNING!

The transporting of pumps which have been used with radioactive feed chemicals is forbidden!

They will also not be accepted by ProMinent!



#### WARNING!

Only return the metering pump for repair in a cleaned state and with a flushed liquid end - refer to the chapter "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 at [www.prominent.com](http://www.prominent.com).



#### 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.



#### CAUTION!

#### Danger of environmental damage

Pumps with a liquid end are supplied filled with oil.

- When transporting, take care that no oil can escape.

#### Storage

Personnel:  Technical personnel

1. ➤ Plug the caps on the valves.
2. ➤ Check whether the sealing screw is in place on the oil filler neck.
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 under the ambient conditions according to chapter "Technical Data".

**Ambient conditions**

- refer to "Technical Data" chapter.

## 4 Overview of device / control elements

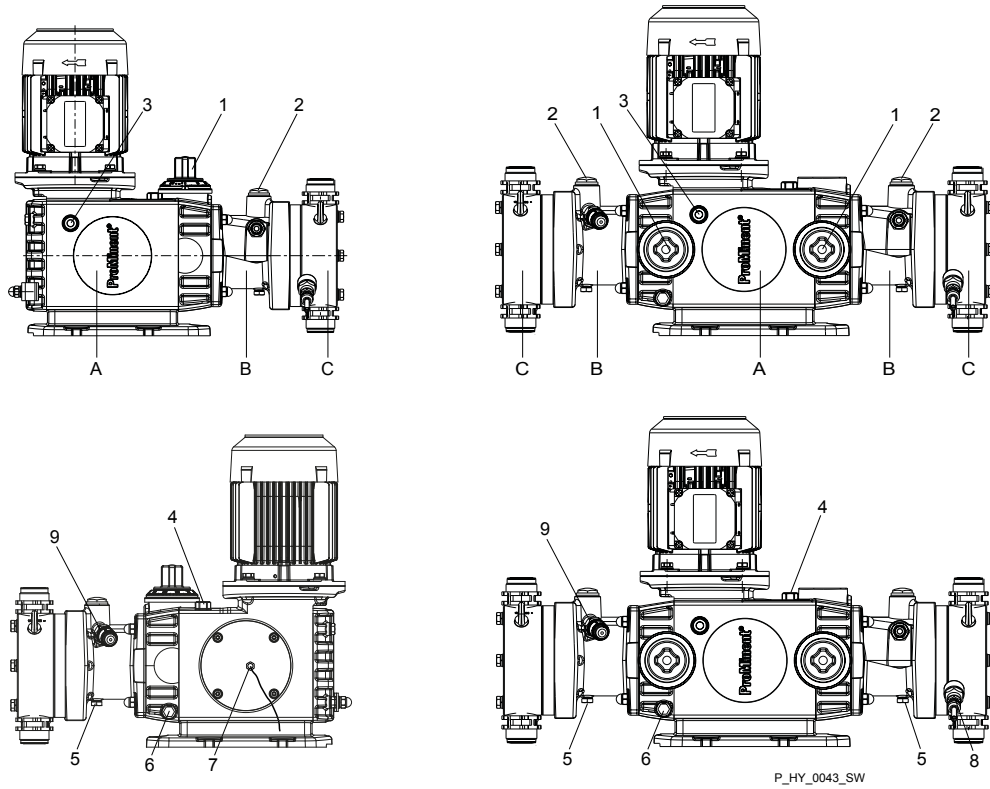


Fig. 3: Single head and double head version, Hydro/ 4

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>A Power end</li> <li>B Hydraulic end</li> <li>C Liquid End</li> <li>1 Stroke adjustment dial</li> <li>2 Bleed valve</li> <li>3 Oil inspection window</li> </ul> | <ul style="list-style-type: none"> <li>4 Gear bleeding plug</li> <li>5 Oil drain stopper</li> <li>6 Oil drainage plug</li> <li>7 Stroke sensor (optional)</li> <li>8 Diaphragm rupture sensor</li> </ul> |
|--|--|

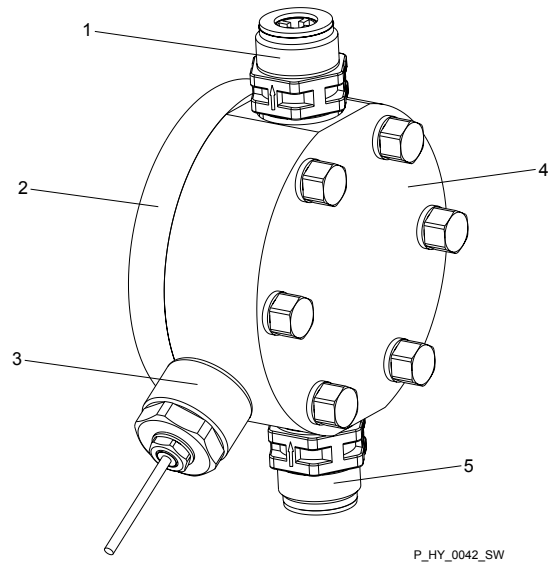


Fig. 4: Liquid end Hydro/ 4

- 1 Discharge valve
- 2 Diaphragm mounting plate
- 3 Diaphragm rupture sensor
- 4 Suction valve
- 5 Dosing head

## 5 Functional description

### Pump

The metering pump is an oscillating diaphragm pump, the stroke length of which can be adjusted.

### Hydraulic end

The hydraulic end has a bleed valve (2), a fixed pressure limitation valve (3) and optionally an overpressure signaller (1). The bleed valve (2) continuously bleeds the hydraulic end. The pressure limitation valve (3) provides protection for the pump power end and the diaphragm if the liquid feed pressure becomes too high. If the discharge side of the liquid end is blocked, the pressure limitation valve (3) opens at a pre-set pressure and allows the hydraulic oil to flow into the power end housing.

This does not guarantee protection of the system against overpressure! A relief valve should nevertheless be fitted in the case of the ATEX pump!

Above a heightened overpressure, the overpressure signaller (1) switches.

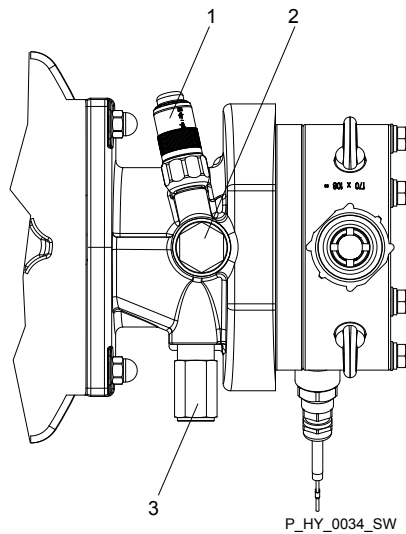


Fig. 5: Overview of hydraulic end HP4

## 6 Assembly



- Compare the dimensions on the dimension sheet with those on the pump.

### Motor installation - with designs without a motor

1. → Select a suitable motor - it should correspond to the data of one of the motors from the "Motor data" table - refer to "Technical data" chapter.


**WARNING!**

EX is relevant to all equipment and methods in areas at risk from explosion!

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

**WARNING!**

EX is relevant to all equipment and methods in areas at risk from explosion!

With a dog clutch: Ensure that the claw on the motor shaft is fixed at the correct height, see Fig.  'Motor installation - with designs without a motor' on page 19

3. → As you have converted an "incomplete machine" into a complete machine, perform a conformity assessment, risk assessment, produce an EC Declaration of Conformity, fit a company nameplate, ...  
With ATEX pumps: additionally perform an ignition hazard assessment
4. → Supplement the pump documentation / operating instructions.

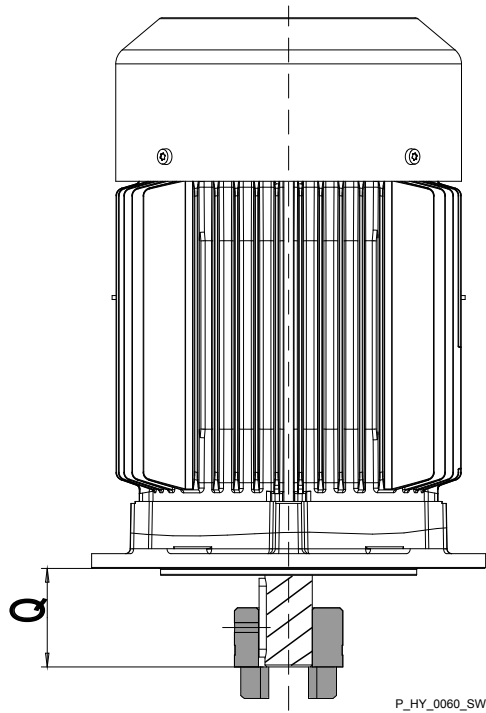


Fig. 6: Correct height of the clutch claw on the motor shaft

Hydro HP4

Size	Motor flange	Q
	143 / 145TC	2-1/8" 53,975
100	B5 / 250	60

Base

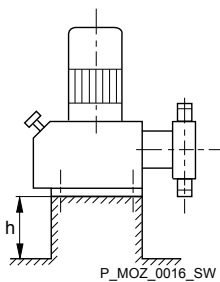


Fig. 7



**WARNING!**

**Danger of electric shock**

If water or other electrically conducting liquids penetrate into the drive housing, in any other manner than via the pump's suction connection, an electric shock may occur.

- Position the pump so that it cannot be flooded.



**WARNING!**

**The pump can break through the base or slide off it**

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



**Capacity too low**

Vibrations can disrupt the liquid end valves.

- Ensure that the base does not vibrate.



Space requirement

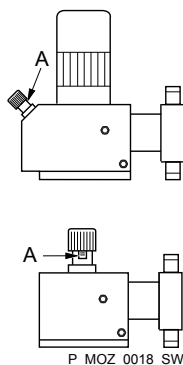


Fig. 8



**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.

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

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

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

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

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

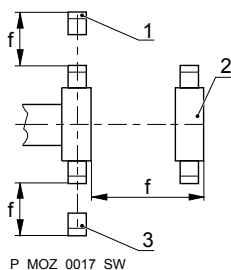


Fig. 9

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

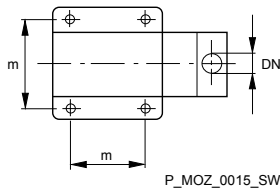


Fig. 10



### **Capacity too low**

*Vibrations can disrupt the liquid end valves.*

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

1. ➤ Take the dimensions (m) for the fixing holes from the appropriate dimension or data sheets.
2. ➤ Use sufficiently strong bolts to fix the pump to the base.  
With externally mounted pumps, use sufficiently strong bolts to fix the frame to the base.

## 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, to the operating instructions for the accessories.

### 7.1 Installation, Hydraulic

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

- Metering pumps in areas at risk from explosion are provided, as a matter of course, with an appropriate safety relief valve on the outlet side of the metering pump (which is used to protect against excessive heating due to overloading and impact sparks caused by the breakage of power end parts triggered by overloading).
- Likewise a temperature monitor or a pressure side flow control is to be fitted to metering pumps with hydraulic diaphragm control for T4. (Protection against impermissible heating up in the event of continuous operation by the internal relief valve).
- In the event of differing temperature classes amongst the various components, base operation of the complete pumps on the component with the lowest temperature class.
- Hydraulic diaphragm pumps are highly suitable, although the design with ATEX diaphragm rupture sensor and a pressure-side flow control is required.
- Ensure that installations in areas at risk from explosion are checked by a "recognised competent" person.
- Please note the relevant national regulations during installation!

**WARNING!****Danger of fire with flammable feed chemicals**

- Only pump combustible media using stainless steel or Hastelloy C dosing heads.
- Metering pumps can be used for metering combustible media, however fundamentally only use designed with ATEX diaphragm rupture sensors and a pressure-side flow control.
- During filling and draining of the liquid end, it is the responsibility of an expert to ensure that feed chemical does not come into contact with oxygen.
- If necessary, the operator should put in place further measures.



### **WARNING!**

#### **Warning of feed chemical reactions to water**

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

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



### **WARNING!**

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

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



### **CAUTION!**

#### **Warning of backflow**

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

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



### **CAUTION!**

#### **Suction problems possible**

The valves can no longer close properly when using 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. by the discharge line becoming clogged up or a valve being closed), 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 rupturing with 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!**

#### **Warning of the discharge line rupturing**

Hose lines with insufficient pressure rating may rupture.

- Only use hose lines with the required pressure rating.



**CAUTION!**

**Uncontrolled flow of feed chemical**

Feed chemical can leak 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 leak 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.
- Set up the installation properly.



**CAUTION!**

**Warning of lines coming loose**

Incorrectly installed suction, discharge and relief lines 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 correspond to the respective hose diameter.
- Always connect the lines without mechanical tension. Only connect steel piping with a flexible piping section to a plastic valve body - see the following figure.

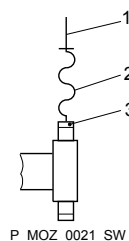


Fig. 11: Connect the steel piping to the plastic pump body as shown

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

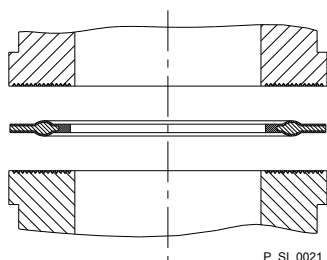


Fig. 12: Moulded composite seals with grooved insert



**CAUTION!**

**Warning against leaks**

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

- The pump is supplied with PTFE moulded composite seals with a flare, which are used for the pump connections. They seal the connections between grooved pump valves and ProMinent grooved inserts - see Fig. 12.
- However, in the event that a smooth insert is used (e.g. third party component), use a flat elastomer seal - see Fig. 13.

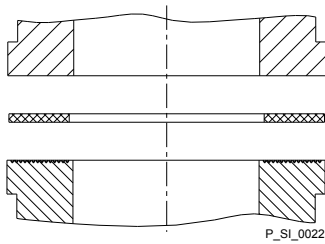


Fig. 13: Flat elastomer seal for a smooth insert



### 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!

#### Danger due to incorrect use of the pressure relief valve

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

- Use other mechanisms to protect the system's motor and gear against excess pressure.
- Use other mechanisms to protect the system against excess pressure.



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

## Diaphragm rupture sensor



### CAUTION!

#### Warning of unnoticed diaphragm rupture

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

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

## 7.1.1 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.

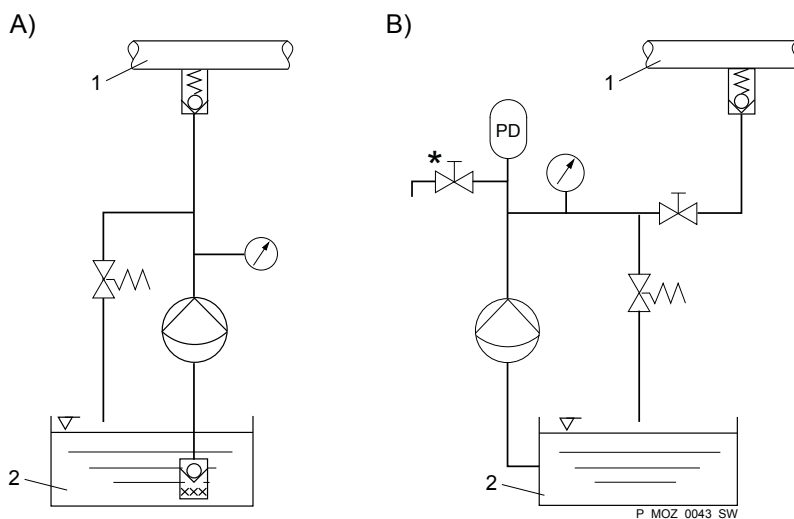


Fig. 14: (A) standard installation, (B) with pulsation damper

- 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

## 7.2 Installation, Electrical



### WARNING!

#### ATEX pump in areas at risk from explosion

- Only connect potential-free and non-isolating low voltage switch accessories, such as diaphragm rupture indicators, stroke rate instruments etc., to an intrinsically safe circuit in areas at risk from explosion.
- If several electrical components are connected together, test and confirm the safety of the entire connected system in terms of its safety. This can either be in the form of a Declaration of Conformity from the supplier (ProMinent) for the entire unit or, with the supply of individual components, with the operator's explosion protection document.
- Only use motor protection switches, mains switches and fuses permitted for use in areas at risk from explosion in line with the manufacturer's information as electrical components in areas at risk from explosion.
- Electrically connect the electrical units, listed on the wiring diagram in the appendix, cleanly and permanently to an electrically clean earthing point, e.g. with an earthing bar in your system.
- Electrically connect units connected to each other with a potential equalisation cable, cleanly and permanently to an electrically clean potential equalisation point, e.g. with a potential equalisation bar in your system.
- Note the enclosed documentation for the individual electrical components.
- Please note the relevant national regulations during installation!



### WARNING!

#### Danger of electric shock

Improper or unprofessional installation can lead to electric shocks.

- Crimp cable end sleeves onto all stripped cable conductors.
- Only technically trained personnel are authorised to undertake the electrical installation of the unit.



### 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.

What requires electrical installation?

- Motor
- External fan (identity code option)
- Frequency converter (identity code option)
- Stroke control drive (identity code option)
- Stroke actuator (identity code option)
- Diaphragm rupture sensor (standard)
- Stroke sensor (identity code option)
- Excess pressure signalling (identity code option)
- Heating cartridge (identity code option)
- Protective temperature limiter (identity code option)
- Earthing wires (to be provided on site, mandatory in areas at risk from explosion)
- Potential equalisation line (to be provided on site, mandatory in areas at risk from explosion)

**Motor**

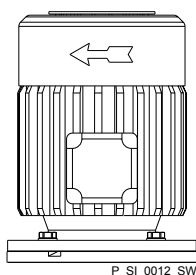


Fig. 15: Direction of rotation of motor



**WARNING!**

**ATEX pump in areas at risk from explosion**

- Protect power end motors using a suitable motor protection switch. Use approved motor protection for Ex"e" motors in this application. (Protection against heating from overloading)
- Provide a time-delay residual current device.
- Ensure that motors are only installed and checked in areas at risk from explosion by a "recognised competent" person.
- Cleanly earth the motor via the mains cable.
- Note 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 on conducting parts of the motor with an integrated frequency converter and on the lines themselves for 3 minutes after the mains voltage has been switched off.

- After switching off, allow the unit 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 against 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 switching off the mains voltage.


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



### CAUTION!




#### The 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  'Motor' on page 29.



*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 emergency cut-off management of the system.
3.  Only use a suitable cable to connect the motor to the power supply.



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



**Motor data sheets, special motors, special motor flanges, external fans, temperature monitoring**

- Motor data sheets can be requested for the 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 possible on request.

**External fans**



**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 in line with 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 drives**

Connect the motors in accordance with the enclosed wiring diagram or according to the wiring diagram affixed to the inside of the housing.



**CAUTION!**

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

Otherwise, they will be damaged.

**Diaphragm rupture sensor (optional)**



**WARNING!**

**Danger of electric shock**

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

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



**WARNING!**

**Risk of fire after a diaphragm rupture**

The electric diaphragm rupture sensor should switch off the pump immediately after a diaphragm rupture.

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



### CAUTION!

#### Danger resulting from unnoticed diaphragm rupture

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

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



### CAUTION!

#### Additional damages with ruptured diaphragm

If damage is caused or if the hydraulic oil mixes with the feed chemical, the diaphragm should not rupture completely.

- The diaphragm rupture sensor should stop the pump immediately.  
Only restart the pump once the diaphragm has been replaced.

#### a) Diaphragm rupture sensor with switch contact



- *The cable can be connected as required.*

#### b) Namur sensor, inherently safe

The monitor / feed supply installed by the customer should be able to evaluate the current variations of the Namur sensor to indicate a diaphragm rupture!



### WARNING!

#### In areas at risk from explosion:

- For the Namur sensor NJ1,5-8GM-N, also note the details of the type examination certificate PTB 00 ATEX 2048 X.

## Overpressure sensor



### WARNING!

#### Danger of electric shock

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

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



### CAUTION!

#### Danger resulting from unnoticed diaphragm rupture

If the pump has been ordered with an electric overpressure sensor, it should also be electrically installed.

- Install and electrically connect the enclosed overpressure sensor to a suitable monitoring device.

#### a) Overpressure sensor - 42 V diaphragm pressure switch



– The cable can be connected as required.

**a) Overpressure sensor - ATEX pressure switch**

(precise type: EDS 4448-0060-P-AN3- 004)



The type code is also given in the "Technical Data" chapter.



**WARNING!**

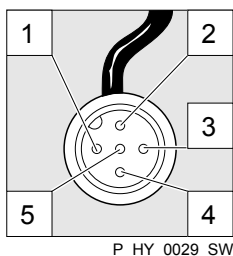
During installation, pay attention to the accompanying manual "HYDAC Operating Instructions for Pressure Switch Series EDS 4400 with ATEX Approval", in particular with regard to:

- Potential equalisation along the intrinsically safe power circuit
- Conduit installation
- Checking of the seals
- Permitted barriers
- Configuration of  $r_{pm}$  and  $I_{max}$
- Permitted connector plugs



**WARNING!**

Never reprogram the pressure switch without the written authorisation of ProMinent GmbH, Heidelberg.



P\_HY\_0029\_SW

Fig. 16: Cable assignment

**Plug assignment**

Pin	Cable colour	Process connector
1	brown	+U <sub>B</sub>
2	white	0 V
3	blue	0 V
4	black	Out 1
5	grey	0 V

**When using combustible media:**



**WARNING!**

**Risk of fire after a diaphragm rupture**

The electric diaphragm rupture sensor should switch off the pump immediately after a diaphragm rupture.

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

### Stroke sensor (optional)

- ▶ Connect the stroke sensor to a suitable monitoring device as per the details in the "Technical Data" chapter - also observe its technical data!

The monitor / feed supply installed by the customer should be able to evaluate the current variations of the Namur sensor to indicate a diaphragm rupture!



#### **WARNING!**

##### **In areas at risk from explosion:**

- For the Namur sensor NJ1,5-8GM-N, also note the details of the type examination certificate PTB 00 ATEX 2048 X.

### Heating cartridge

- ▶ Install the heating cartridge according to its documentation. Only connect it to the power supply provided and/or the protective temperature limiter (for ATEX)!

### Earthing wires (mandatory with ATEX)

Connect the electrical components in the complete installation supplied, cleanly and securely, to an electrically clean earthing point, for instance using an earthing bar provided on site – refer to earthing diagrams in the Appendix.

### Potential equalisation wires (mandatory with ATEX)

The entire installation is factory-supplied with the necessary potential equalisation wires. From the potential equalisation wires on this system, lead another potential equalisation cable electrically cleanly and securely to an electrically clean potential equalisation point, for instance to a potential equalisation bar on site.

### Other units

- ▶ Install the other units as per their documentation.

## 8 Decommissioning and Disposal

### Safety information

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

- Have a suitably competent person check whether the appropriate installation information from the "Installation" chapter has been implemented correctly.
- Have a "recognised competent person" check the electrical installation and in particular the intrinsically safe electric circuit.
- Set the opening pressure of the relief valve at a maximum of no more than 1.5 times the rated pressure of the pump.

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

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

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

**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.

**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.

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

**WARNING!****Adjusted pressure switches fail**

- The switching point of the 42 V pressure switch must not be changed.
- The ATEX pressure switch must not be reprogrammed. It could result in overheating of the pump.



### WARNING!

#### Only motors with a frequency converter: Danger of electric shock

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

- After switching off, allow the unit 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 switching off the mains voltage.

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



### CAUTION!

#### Feed chemical could escape

- Check suction and discharge lines, liquid end and valves for leak-tightness and tighten if necessary.
- Check whether the necessary flushing pipes or bleed lines are 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 "Technical Data" chapter (pressure, viscosity, resistance, ...).

## Test the diaphragm rupture sensor



### CAUTION!

#### Feed chemical can escape unnoticed

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

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



**CAUTION!**

If damage can be caused or if the hydraulic oil mixes with the feed chemical, only restart the pump following a diaphragm rupture once the diaphragm has been replaced.

**Testing the overpressure sensor**

Create an overpressure in the discharge line to check whether the overpressure sensor triggers at the correct pressure.

**CAUTION!**

Never reprogram the ATEX pressure sensor.

**Pressure relief valve****CAUTION!**

Never adjust the pressure relief valve.

**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.

**Installing a vent screw**

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



*On a new product, slight oil marks on the pump do not indicate leaks.*

### Use the safety relief valve



#### 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.

### Checking the oil level

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

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

### Avoid particles



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

- *Install a suitable filter in the suction line.*

### Adjust the relief valve

Only in areas at risk from explosion: set the opening pressure of the relief valve at a maximum of no more than 1.5 times the rated pump pressure .

### Only with a heating cartridge: check the action of the heating cartridge

Check the heating action of the heating cartridge and effectiveness of the protective temperature limiter. Do not allow overheating to occur, especially in areas at risk from explosion!

### Only at low temperatures: allow the pump to warm up

1. ➤ Switch on the heating cartridge, set the stroke length of the pump to "0" and start the pump.
2. ➤ Allow the pump to warm up for 5 minutes.
3. ➤ Set the stroke length of the pump to the required value.

### Only with add-on power end: check the clutch

- Check that the clutch is correctly aligned and runs smoothly.

### Earthing wires (mandatory with ATEX)

Check whether the earthing wires to the pump's electrical units are correctly connected and wired to a clean earth – refer to the earthing diagrams in the Appendix.

### Potential equalisation wires (mandatory with ATEX)

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

## 8.1 Bleeding the liquid end

When bleeding the liquid end or priming against pressure:

Relieve the suction and discharge line from pressure!

With dangerous or unknown feed chemicals, take suitable protective measures according to the safety data sheet!

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

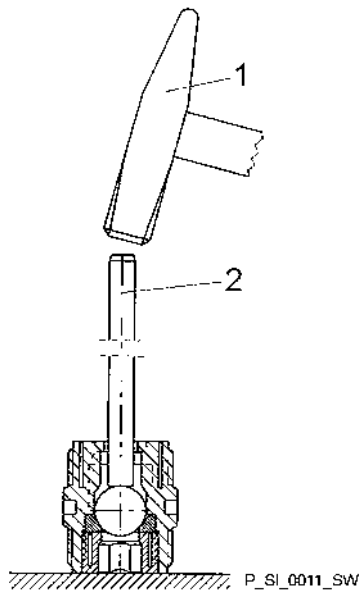


Fig. 17: Tapping the valve set disc



**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 Calibrating the Stroke Control Drive (Optional)

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

## 9 Maintenance

### Safety information



#### WARNING!

##### ATEX pump in areas at risk from explosion

- Generally check the proper operation of the system, particularly of the power end and bearings, by regular monitoring (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 escaping, investigate the leak immediately and eliminate the cause.
- Check the proper 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.
- Only with independently fitted motors: Check / replace the worn clutch gear ring etc.
- Only with add-on power end: Check / replace the worn clutch gear ring/DZ element.
- Check the seals of the pressure switch for leak-tightness.
- When cleaning plastic components, ensure that no electrostatic charges are generated by excessive friction.
- Always earth the discharge and suction lines against the pump before working on it to prevent electrostatic charge.
- Have ProMinent Service replace wear parts, such as bearings, when there is an identifiable incidence of unacceptable wear.
- Check whether potential equalisation lines are all still sitting correctly with clean contacts.
- Check whether earth lines are all still sitting correctly with clean contacts. Refer to the earthing drawings if need be – refer to Appendix.
- Only use genuine spare parts as replacements.
- We recommend using appropriate diagnostic equipment for bearing damage to ensure the early detection of bearing damage.
- Carry out tests and repair in compliance with DIN EN IEC 60079-17 and ensure that they are only performed by "experienced personnel with the requisite knowledge".
- These measures constitute the minimum protective measurements stipulated by ProMinent. It is the duty of the operator to eliminate any other dangers identified by appropriate measures.



#### WARNING!

##### ATEX pump in area at risk from explosion

Static electricity can cause ignition sparks.

- Always earth the discharge and suction lines first before working on the pump.

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

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

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

**WARNING!**

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

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

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

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

**WARNING!****Warning of dangerous or unknown feed chemical**

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

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

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

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

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



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



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

- *Use only original spare parts.*
- *Use the correct spare parts kits. If in doubt, refer to the exploded views and ordering information in the appendix.*

### Inspection, daily

Check the pump installation for:

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



#### **WARNING!**

**In areas at risk from explosion:**

Stop the pump immediately and rectify anything unusual.  
You may have to contact ProMinent Service.

## Maintenance work:

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>■ Only pumps with add-on power end or "without motor": check the gear ring/DZ element of the ROTEX® clutch according to their manual. Open the inspection window on the flange to check. If the clutch is OK, you can then increase the maintenance interval to 4000 hours.</li> <li>■ If the clutch is not clearly OK: Call ProMinent Service.</li> </ul>	Technical personnel
	ATEX pump only: Check the seals of the EDS 4448 pressure switch at regular intervals (depending on the climatic conditions and the feed chemical) in relation to their serviceability and replace if necessary.	Technical personnel
	Check the correct seating and state of the metering lines at both discharge and suction ends.	Technical personnel
	Check that the suction valve and discharge valve are sitting firmly.	Technical personnel
	Check whether the diaphragm rupture sensor stops the pump or generates an alarm after it is triggered, see the "Repair" chapter.	Technical personnel
	Check that the diaphragm rupture sensor is sitting firmly.	Technical personnel
	Check whether the overpressure signal triggers in the event of overpressure.	Technical personnel
	Check the secure seating of the overpressure signal.	Technical personnel
	Check the secure seating of the pressure limitation valve (50 Nm).	Technical personnel
	With the pump running, check whether bubbles rise in the window of the bleed valve.	Technical personnel
	Check that the flow is correct: Allow the pump to prime briefly.	Technical personnel
	Check the tightness of the entire liquid end - particularly around the leakage hole!	Technical personnel
	Check that the dosing head bolts are tight.	Technical personnel
	Check that the electrical connections are intact.	Electrician Electrical technician with additional explosion protection qualification
	Check the firm, clean electrical connection of the earthing wires.	Electrician Electrical technician with additional explosion protection qualification
	Check the firm, clean electrical connection of the potential equalisation wires.	Electrician Electrical technician with additional explosion protection qualification
Check the oil level.	Technical personnel	
After approx. 4,000 operating hours	Only pumps with add-on power end or "without motor": check the gear ring/DZ element of the ROTEX® clutch according to their manual. Open the inspection window on the flange to check.	Technical personnel
After approx. 5000 operating hours	Change hydraulic oil - refer to "Changing hydraulic oil" in this chapter.	Instructed personnel
	ATEX design only: Check whether the seals of the overpressure signalling system are OK and, if in doubt, replace.	Technical personnel
	ATEX design only: Check the effectiveness of the protective temperature limiter for the heating cartridge.	Technical personnel

Interval	Maintenance work	Personnel
	ATEX design only: Check the heating cartridge and the protective temperature limiter for externally visible damage and/or corrosion on the housing and connection parts. Immediately have damaged parts replaced with genuine spare parts by the manufacturer.	Customer Service department
After approx. 10,000 operating hours **	Diaphragm change - refer to "Diaphragm change" in the "Repair" chapter.	Technical personnel
After approx. 20,000 operating hours	Follow the motor manufacturer's recommendations - refer to operating instructions for the motor.	

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

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

\*\* under normal loading. With very unfavourable metering parameters: Shorter intervals.

### Hydraulic oil change



#### WARNING!

##### Risk of burns due to hot hydraulic oil

The hydraulic oil may become very hot when the pump is exposed to extensive loading.

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



#### WARNING!

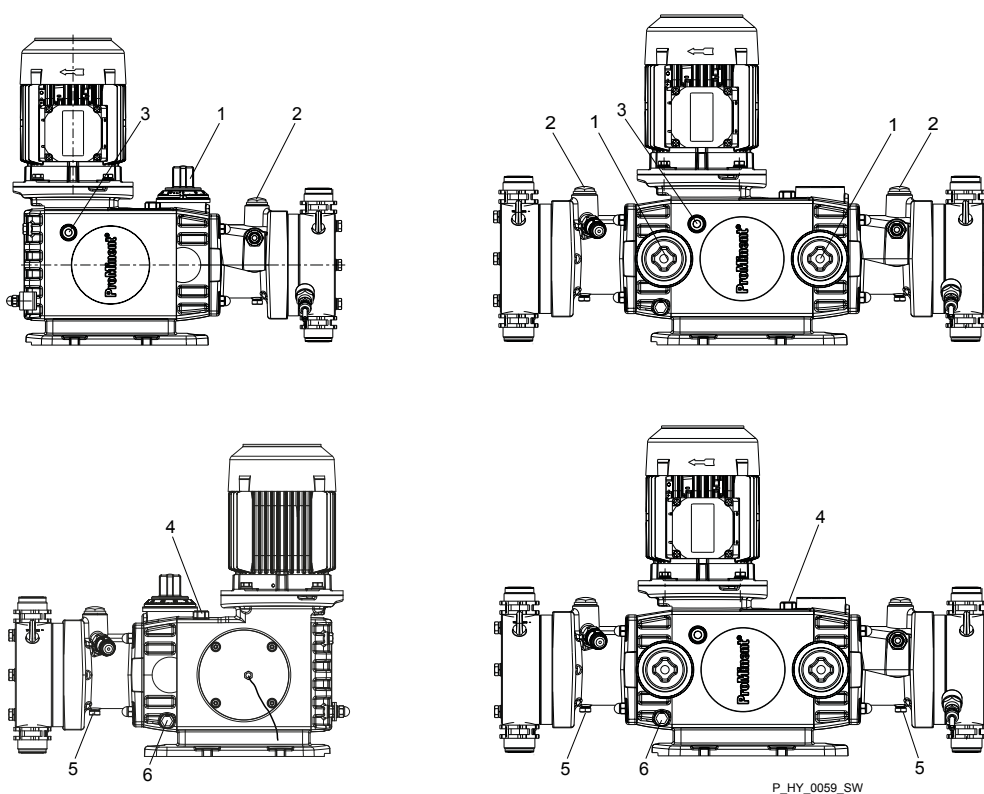
If the pump must be operated using hydraulic oil compatible with foodstuffs, then only foodsafe hydraulic oil must be used.

### Drain the hydraulic oil

With the double-head versions, perform the following work simultaneously on both dosing heads.

1. ➤ Set the stroke adjustment dial (1) to "0".
2. ➤ Remove the vent screw (4).
3. ➤ Place an oil trough under the oil drainage plug (6).
4. ➤ Unscrew the oil drainage plug (6) from the power end housing.
5. ➤ Allow the hydraulic oil to run out of the power end.
6. ➤ Place an oil trough under the hydraulic end.
7. ➤ Unscrew the oil drainage stopper (5) out of the hydraulic end.
8. ➤ Allow the hydraulic oil to run out of the hydraulic end.
9. ➤ Screw in the oil drainage plug (6) with a new seal.
10. ➤ Screw in the oil drainage stopper (5) with a new seal.





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### Fill with hydraulic oil

With the double-head versions, perform the following work simultaneously on both dosing heads.

1. ➤ Set the stroke adjustment dial (1) to "100 %" and unscrew the bleed valve (2).
2. ➤ Slowly fill hydraulic oil through the opening for the gearbox vent stopper (3) until the oil inspection window (3) is 1/3 covered.
3. ➤ Start the pump.
4. ➤ Allow the pump to run for a further 1... 2 minutes.
5. ➤ Top up with hydraulic oil if necessary.
6. ➤ Screw the bleed valve (2) back in.
7. ➤ Replace the vent screw (4).
8. ➤ Check whether these whole openings are tightly sealed again, especially in areas at risk from explosion!



#### WARNING!

Only in areas at risk from explosion: After 1 day, check whether the oil drainage stopper (5) and the oil drainage plug (6) are still tight.

# 10 Repairs

## Safety information



**WARNING!**

**ATEX pump in areas at risk from explosion**

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



**WARNING!**

**ATEX pump in area at risk from explosion**

Static electricity can cause ignition sparks.

- Always earth the discharge and suction lines first before working on the pump.



**WARNING!**

**Fire hazard with flammable media**

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

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.



**WARNING!**

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



**CAUTION!**

**Warning of feed chemical spraying around**

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

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



**WARNING!**

**Warning of dangerous or unknown feed chemical**

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Observe the 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.

**WARNING!****Hot oil and hot components**

The hydraulic oil and the hydraulic end may become very hot when the pump is exposed to heavy loading.

- Allow the pump to cool before starting work.

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

Never reprogram the ATEX pressure sensor.

**CAUTION!**

Never adjust the pressure relief valve.



*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. If in doubt, refer to the exploded views and ordering information in the appendix.*

## 10.1 Replacing the diaphragm

### Notes

**WARNING!**

Observe the safety information at the beginning of the chapter.



### CAUTION!

#### A diaphragm rupture may remain unnoticed

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

- Take the multi-layer diaphragm out of the packaging just before installing it.
- Never allow dirt to come into contact with the multi-layer diaphragm.
- Do not "inspect" the partial membranes.

With the double-head versions and add-on power ends, perform the following work simultaneously on both dosing heads.

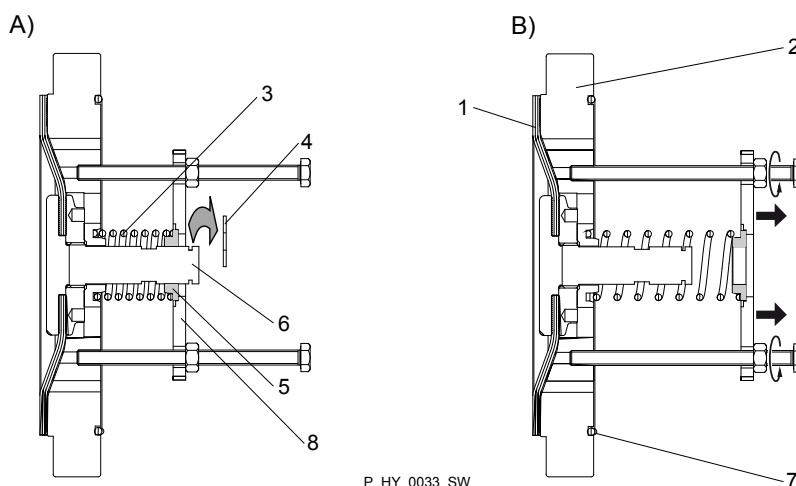
### Drain the hydraulic oil from the hydraulic end

Position numbers - see chapter "Maintenance"

1. Turn the stroke adjustment dial (2) more than 100% to the stop.
2. Remove the vent screw (3).
3. Place an oil trough under the hydraulic end.
4. Unscrew the oil drainage stopper (4) out of the hydraulic end.
5. Allow the hydraulic oil to run out of the hydraulic end.
6. Screw in the oil drainage stopper (4) with a new seal.

### Replacing the diaphragm on the HP4

1. Depressurise the suction and discharge lines.
2. Unscrew the suction and discharge lines from the liquid end. Is the hydraulic oil drained - see above?
3. Remove the liquid end with the dosing head screws from the hydraulic end.
4. Release the diaphragm mounting plate (2) with diaphragm (1) from the dosing head.



P\_HY\_0033\_SW

Fig. 18

5. ➤

**WARNING!****Warning of injury to eyes**

The very strong spring (3) and the spring collar (5) on the diaphragm anchor (6) may spring away when loosening the safety collar (4).

- Use the mounting aid (8) to remove!
- Wear safety glasses.

Place the mounting plate (8) with the depressed side down against the spring collar (5).

6. ➤ Secure the mounting plate with the two bolts (M6 with nuts) onto the diaphragm mounting plate (2): screw the bolts into the threads provided - Fig. 18.
7. ➤ Lower the two nuts onto the mounting plate and then 1 mm deeper.
8. ➤ Release the safety collar (4).
9. ➤ Unscrew the two nuts uniformly in order to slowly release the spring (3) tension.
10. ➤ Pull the spring (3) with the spring collar (5) from the diaphragm anchor (6).
11. ➤ Remove the diaphragm / diaphragm anchor combination from the diaphragm mounting plate (2).
12. ➤ Clean the parts completely, especially the wetted parts, see Fig. Fig. 19
13. ➤ Place the new diaphragm / diaphragm anchor combination into the diaphragm mounting plate (2).
14. ➤ Push the diaphragm spring (3) with the spring collar (5) on to the diaphragm anchor (6).
15. ➤ Secure the mounting plate (8) with the two bolts (M6 with nuts) onto the diaphragm mounting plate (2): screw the bolts into the threads provided.
16. ➤ Lower the two nuts uniformly down to the groove of the diaphragm anchor for the safety collar and then 1 mm deeper.
17. ➤ Engage the safety collar (4) safely in the groove of the diaphragm anchor.
18. ➤ Unscrew the two nuts until there is no longer spring tension and then remove the mounting aid and the bolts.
19. ➤ Replace the O-ring (7) between the diaphragm mounting plate (2) and the hydraulic end.
20. ➤ Place the diaphragm (1) with the diaphragm mounting plate (2) inside the hydraulic end.

21. ▶ Position the dosing head with the bolts so that the suction connector is pointing downwards - diaphragm rupture sensor must be at the bottom.
22. ▶ First gently tighten the dosing head bolts and then tighten cross-wise, tightening torque - ⚡ 'Tightening torques' on page 50.
23. ▶ Test the diaphragm rupture sensor - see ⚡ Chapter 10.2 'Repair the Diaphragm Rupture Sensor' on page 51
24. ▶ Screw the suction and discharge line on to the liquid end.

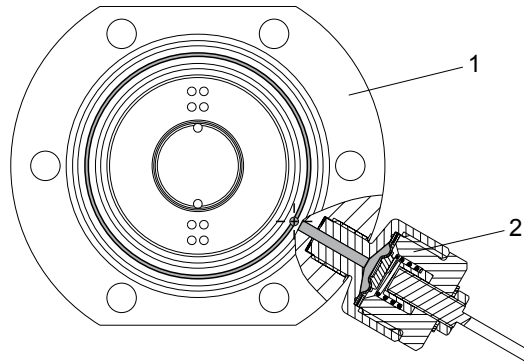


Fig. 19: Areas wetted by Hydro/ 4 (grey shaded)

## Tightening torques

Data	Value	Unit
Tightening torque for bolts:	40.0	Nm

## Fill hydraulic oil in the hydraulic end

With the double-head versions, perform the following work simultaneously on both dosing heads.

1. ▶ Set the stroke adjustment dial (1) to "100%" and open the safety relief valve (2) - tighten the knurled screw.
2. ▶ Slowly fill hydraulic oil through the opening for the gearbox vent stopper (4) until the oil inspection window (3) is covered to 1/2.
3. ▶ Start the pump.
4. ▶ Allow the pump to run for 1... 2 minutes.
5. ▶ Replace the vent screw (3).
6. ▶ Close the safety relief valve (1) - loosen the knurled screw.
7. ▶ Check the pump for tightness at maximum back pressure.



### WARNING!

Only in areas at risk from explosion: After 1 day, check whether the oil drainage stopper (5) and the oil drainage plug (6) are still tight.



Check the starting torque of the dosing head bolts again after 24-hours of operation!

## 10.2 Repair the Diaphragm Rupture Sensor



### WARNING!

#### Warning of feed chemical

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

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

30 V version

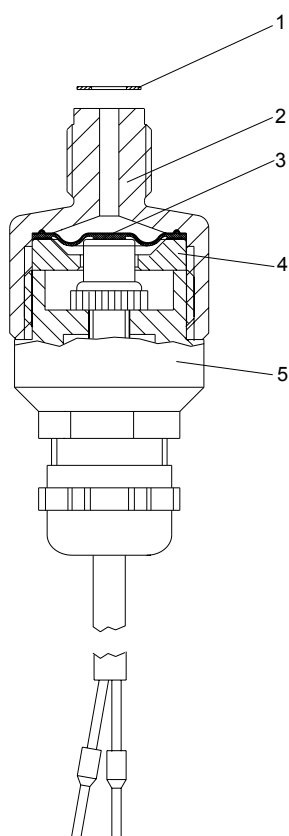


Fig. 20

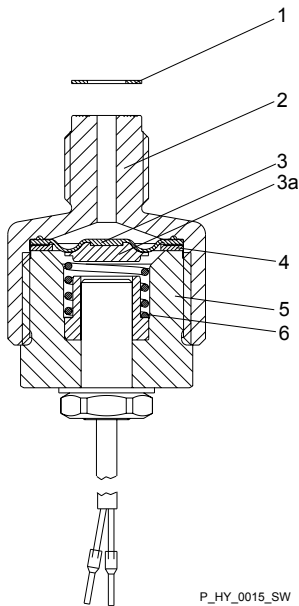
### Check diaphragm rupture sensor

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

### Replace separating diaphragm of the diaphragm rupture sensor

1. ➤ Disconnect the diaphragm rupture sensor from the power supply.
2. ➤ When changing the diaphragm, unscrew the diaphragm rupture sensor from the dosing head.
3. ➤ Grasp the upper section (2) of the diaphragm rupture sensor.
4. ➤ Hold the body (5) in place with an open-ended spanner.
5. ➤ Unscrew the top of the diaphragm rupture sensor.
6. ➤ Clean the soiled parts.
7. ➤ Lay the new separating diaphragm (3) with the light side (PTFE) down into the upper section (2).
8. ➤ Lay the plate (4) with the uneven side down into the upper section (2).
9. ➤ Screw the body (5) into the upper section and screw tighten.
10. ➤ Check the diaphragm rupture sensor as described in "Check diaphragm rupture sensor".

## ATEX version



P\_HY\_0015\_SW

Fig. 21

11. ▶ If the diaphragm rupture sensor does not operate clearly and reliably, then a new diaphragm rupture sensor must be used without fail.

### Checking the diaphragm rupture sensor

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

### Replace the separating diaphragm of the diaphragm rupture sensor

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



*Do not tamper with the lacquer-protected nut.*

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



## 10.3 Calibrating the Capacity

It is only worth calibrating the capacity if you wish to carry out particularly precise metering at a completely different back pressure.

The capacity of the hydraulic diaphragm metering pump is only to a minimal extent dependent on the back pressure. And the pumps are factory-calibrated to maximum operating pressure. (Value of maximum operating pressure - see the pressure stage on the indicating dial or safety relief valve).

The plant or production facility can calibrate each pump to a back pressure lower than the nominal pressure ordered.

The following pressure stages (in bar) are available:

Pump	7	10	16	25
HP4	X	X	X	X



### WARNING!

ATEX pump only: Take suitable precautions in premises at risk of explosion regarding the feed chemical in the open measuring cylinder - see handling instructions below.



You can only calibrate the capacity when the discharge line is connected and under normal operating conditions. As the capacity is dependent on the actual back pressure.

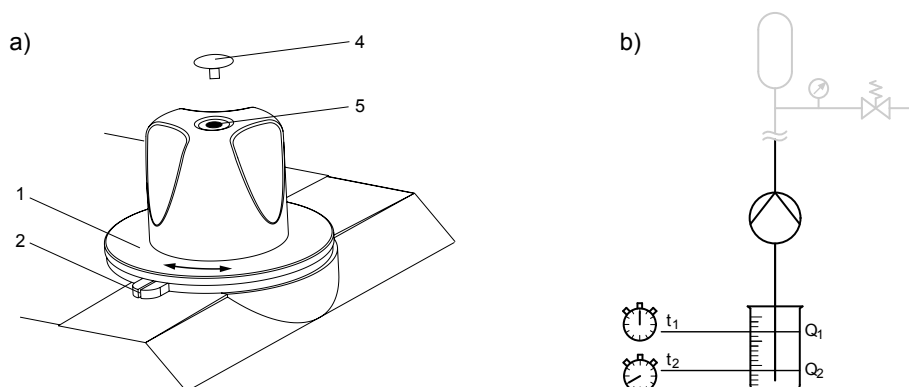


Fig. 22: a) Adjust indicating dial, b) Diagrammatical construction for calibration

Materials required:

- Measuring beaker
- Stop watch

1. ➔ Switch off the pump.
2. ➔ Turn the stroke adjustment dial to maximum, beyond 100% to the stop.
3. ➔ API versions only: Remove the metal cap from the stroke adjustment dial.
4. ➔ Remove the cap (4) from the stroke adjustment dial and slacken off the screw (3) beneath slightly.
5. ➔ Lead the suction line into a measuring beaker - see Fig. 22.
6. ➔ Fill the measuring beaker with feed chemical.
7. ➔ Start the pump.

8. ▶ As soon as the system back pressure of the system has been reached, determine the fill level  $Q_1$  and start the stopwatch.
9. ▶ Run the pump for a while.
10. ▶ At the same time determine the fill level  $Q_2$  and stop the stopwatch.
11. ▶ Calculate the capacity value.
12. ▶ Use the stroke adjustment dial to reduce the capacity and repeat steps 7 to 10 until the required value is reached.
13. ▶ Turn the indicating dial (1) only until the 100% marking is precisely above the indicating slot (2).
14. ▶ Carefully tighten the screw (3) in the stroke adjustment dial and replace the cap (4).
15. ▶ API versions only: Press the metal cap onto the stroke adjustment dial.

## 10.4 Replacing the Power End Bearing

Only have ProMinent Service replace the power end bearing!

# 11 Troubleshooting

## Safety information



### WARNING!

#### ATEX pump in areas at risk from explosion

- Generally ensure proper operation (no leaks, unusual noises, high temperatures, unusual smell ...) especially of the power end and bearings.
- 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.
- When cleaning plastic components, ensure that no electrostatic charges are generated by excessive friction. - see warning label.
- 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.
- Carry out tests and repair in compliance with DIN EN IEC 60079-17 and ensure that they are only performed by "experienced personnel with the requisite knowledge".
- Only have a "recognised competent person" check the electrical installation and in particular the intrinsically safe electric circuit.
- 



### WARNING!

#### ATEX pump in area at risk from explosion

Static electricity can cause ignition sparks.

- Always earth the discharge and suction lines first before working on the pump.



### WARNING!

#### Fire hazard with flammable media

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

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.



### 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 dangerous or unknown feed chemical**

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

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



### **WARNING!**

#### **Risk of injury from the fan impeller**

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

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



### **WARNING!**

#### **Adjusted pressure switches fail**

- The switching point of the 42 V pressure switch must not be changed.
- The ATEX pressure switch must not be reprogrammed. It could result in overheating of the pump.



### **WARNING!**

#### **Only motors with a frequency converter: Danger of electric shock**

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

- After switching off, allow the unit 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 switching off the mains voltage.

- After switching off, allow the unit 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
	The feed chemical has particles larger than 0.3 mm.	Install a suitable filter in the suction line.	Technical personnel
	Safety relief valve is open.	Unscrew knurled screw in safety relief valve.	Instructed personnel
	Safety relief valve is heavily worn as discharge line is greatly constricted.	Replace safety relief valve and remove blockage from discharge line.	Technical personnel
	Insufficient hydraulic oil in the power end.	Refill with hydraulic oil until oil inspection window is 1/3 covered - see "Diaphragm change" in the "Repair" chapter.  Investigate and remedy the cause of the oil loss.	Instructed personnel
	An oil inspection window is leaking.	Replace the oil inspection window in line with the operating instructions.	Technical personnel
	Indicating dial is set incorrectly.	Set indicating dial - see "Calibrate metering capacity" in the "Repair" chapter.	Technical personnel
	The motor is wired incorrectly.	1. Check the mains voltage and mains frequency.  2. Wire the motor correctly.	Electrician
	The mains voltage has failed.	Eliminate the cause.	Electrician
The diaphragm rupture sensor has triggered.	Operating diaphragm ruptured and alarm has not sounded.	<ul style="list-style-type: none"> <li>■ Replace multi-layer diaphragm immediately - see "Replacing diaphragm" in the "Repair" chapter.</li> <li>■ Replace separating diaphragm of the diaphragm rupture sensor- see "Replacing the separating diaphragm, diaphragm rupture sensor" in the "Repair" chapter.</li> </ul>	Technical personnel
	The operating diaphragm has ruptured.	<ul style="list-style-type: none"> <li>■ Replace multi-layer diaphragm immediately - see "Replacing diaphragm" in the "Repair" chapter.</li> <li>■ Replace separating diaphragm of the diaphragm rupture sensor- see "Replacing the separating diaphragm, diaphragm rupture sensor" in the "Repair" chapter.</li> </ul>	Technical personnel

## Troubleshooting

<b>Fault description</b>	<b>Cause</b>	<b>Remedy</b>	<b>Personnel</b>
The overpressure sensor has triggered.	There is a blockage in the discharge line.	Clear the blockage.	Technical personnel
	The system back pressure was momentarily too high.	Clear the cause of the back pressure.	Technical personnel
The power end motor is very hot.	The discharge line is seriously constricted.	<ul style="list-style-type: none"><li>■ Rectify any constriction of the discharge line.</li><li>■ Have the safety relief valve checked.</li></ul>	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 combustible media: These may start to burn when combined with oxygen.

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

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

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

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

**WARNING!****Danger from chemical residues**

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

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

**WARNING!****Warning of dangerous or unknown feed chemical**

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

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

**WARNING!****Hot oil and hot components**

The hydraulic oil and the hydraulic end may become very hot when the pump is exposed to heavy loading.

- Allow the pump to cool before starting work.



### 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 can be damaged by incorrect and improper storage or transportation.

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

Personnel: ■ Technical personnel

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 safety data sheet! Flush the dosing head thoroughly when using hazardous feed chemicals!
4. ➤ Drain the hydraulic oil - see chapter "Maintenance".
5. ➤ Thoroughly clean the liquid end and the housing of chemicals and dirt.
6. ➤ Possible additional work - see chapter "Storage, Transport and Unpacking".

## 12.2 Disposal

Personnel: ■ Technical personnel



### WARNING!

#### Danger due to spring tension

There is a spring under high tension between the diaphragm and the diaphragm mounting plate.

- HP4 only: Only dismantle the combination diaphragm / diaphragm mounting plate using the mounting aid - see the "Overhaul" chapter - "Metering diaphragm replacement".
- Wear safety glasses.



**WARNING!****Danger due to spring tension**

There is a spring under high tension below the hydraulic cap under the diaphragm mounting plate.

- Only remove the hydraulic cap in line with the "Hydro repair and configuration instructions."

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

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

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

## 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

HP4a operating at 50 Hz

Type	Minimum pump capacity at maximum back pressure			Maximum stroke rate	Suction lift	Permissible priming pressure, suction side	Connector size
	bar	l/h	ml/stroke				
250130	25*	130	31	71	3 m	1 bar	G1 1/2-DN25
250190	25*	190	31	103	3 m	1 bar	G1 1/2-DN25
250250	25*	250	31	136	3 m	1 bar	G1 1/2-DN25
250350	25*	350	31	188	3 m	1 bar	G1 1/2-DN25
250400	25*	400	31	214	3 m	1 bar	G1 1/2-DN25
160210	16*	210	50	71	3 m	1 bar	G1 1/2-DN25
160300	16*	300	50	103	3 m	1 bar	G1 1/2-DN25
160400	16*	400	50	136	3 m	1 bar	G1 1/2-DN25
160550	16*	550	50	188	3 m	1 bar	G1 1/2-DN25
160625	16*	625	50	214	3 m	1 bar	G1 1/2-DN25
100330	10	330	78	71	3 m	1 bar	G 2" – DN32
100480	10	480	78	103	3 m	1 bar	G 2" – DN32
100635	10	635	78	136	3 m	1 bar	G 2" – DN32
100880	10	880	78	188	3 m	1 bar	G 2" – DN32
101000	10	1000	78	214	3 m	1 bar	G 2" – DN32
70465	7	465	109	71	3 m	1 bar	G2 1/4-DN 40
70670	7	670	109	103	3 m	1 bar	G2 1/4-DN 40
70890	7	890	109	136	3 m	1 bar	G2 1/4-DN 40
71230	7	1230	109	188	3 m	1 bar	G2 1/4-DN 40
71400	7	1400	109	214	3 m	1 bar	G2 1/4-DN 40

\* Maximum back pressure with TTT, PPT and PCT material versions: 10 bar!

All figures refer to water at 20 °C.

Priming lift / priming pressure (dry) determined for empty suction line and empty liquid end and as well as clean and moistened valves (the figures are lower with valve springs).

The suction lift / suction pressure applies to filled suction lines and filled liquid end - when installed correctly.

HP4a operating at 60 Hz

Type	Minimum pump capacity at maximum back pressure				Maximum stroke rate	Suction lift	Permissible priming pressure, suction side	Connector size
	bar	psi	l/h	gph				
250130	25*	362	155	40.9	86	3 m	1 bar	G1 1/2-DN25
250190	25*	362	230	60.8	124	3 m	1 bar	G1 1/2-DN25
250250	25*	362	300	79.3	164	3 m	1 bar	G1 1/2-DN25
250350	25*	362	420	111.0	225	3 m	1 bar	G1 1/2-DN25
160210	16*	230	250	66.0	86	3 m	1 bar	G1 1/2-DN25
160300	16*	230	360	95.1	124	3 m	1 bar	G1 1/2-DN25
160400	16*	230	480	126.8	164	3 m	1 bar	G1 1/2-DN25
160550	16*	230	660	174.4	225	3 m	1 bar	G1 1/2-DN25
100330	10	145	400	105.7	86	3 m	1 bar	G 2" – DN32
100480	10	145	580	153.2	124	3 m	1 bar	G 2" – DN32
100635	10	145	760	200.8	164	3 m	1 bar	G 2" – DN32
100880	10	145	1050	277.4	225	3 m	1 bar	G 2" – DN32
70465	6	87	560	147.9	86	3 m	1 bar	G2 1/4-DN 40
70670	6	87	805	212.7	124	3 m	1 bar	G2 1/4-DN 40
70890	6	87	1070	282.7	164	3 m	1 bar	G2 1/4-DN 40
71230	6	87	1450	383.0	225	3 m	1 bar	G2 1/4-DN 40

\* Maximum back pressure with TTT, PPT and PCT material versions: 10 bar!

All figures refer to water at 20 °C.

Priming lift / priming pressure (dry) determined for empty suction line and empty liquid end and as well as clean and moistened valves (the figures are lower with valve springs).

The suction lift / suction pressure applies to filled suction lines and filled liquid end - when installed correctly.

### 13.2 Metering reproducibility

Data	Value	Unit
Reproducibility	±1	% *

\* with measurements taken under constant conditions, minimum 10 % stroke rate and water at 20 °C - when installed correctly and with a back pressure of at least 1.5 bar

### 13.3 Viscosity

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

Design	Range	Unit
no valve springs	0 ... 200	mPas
with valve springs	200 ... 500	mPas

### 13.4 Weight

For pumps with a standard motor.

Hydro HP4 SST	Design	Weight approx.
		kg
Simplex	Single head	96
Duplex	Single head	160
Duplex	Double head	220
Triplex	Single head	220
Triplex *	Single head	260

\* with Exde motor with frequency converter

### 13.5 Wetted Materials

Material version	Liquid end	Suction/pressure connector	Seals	Valve seats	DN 25 ball valve Valve balls	From DN 32 / DN 40 plate valves Valve plates / valve spring
SST	Stainless steel 1.4404	Stainless steel 1.4404	PTFE	PTFE	Stainless steel 1.4404	Stainless steel 1.4404 / Hast. C
PVT	PVDF	PVDF	PTFE	PTFE	Glass	Ceramic / E-CTFE
HCT	Hastelloy C	Hastelloy C	PTFE	PTFE	Ceramic	Hast. C / E-CTFE
PCT	PVC	PVDF	PTFE	PTFE	Glass	Ceramic / E-CTFE
PPT	PP	PVDF	PTFE	PTFE	Glass	Ceramic / E-CTFE
TTT	PTFE	PVDF	PTFE	PTFE	Glass	Ceramic / E-CTFE

### 13.6 Ambient conditions

#### 13.6.1 Temperatures

Pump, compl.

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

Data	Value	Unit
Ambient temperature in operation ("Standard" version, for drive):	-10 ... +40	°C
Ambient temperature in operation ("Low temperature" version, for drive):	-25 ... +40	°C
Ambient temperature in operation ("Low temperature Zone 2" version, for drive):	-20 ... +40	°C

\* Only with heating heating cartridge

PP liquid end

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

PC liquid end

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

PVT - ATEX liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	65	°C
Minimum temperature "Standard"	-10	°C
Minimum temperature "Low temperature Zone 2"	-20	°C

PVT liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	65	°C
Max. temperature, for 15 min at max. 2 bar	100	°C
Minimum temperature "Standard"	-10	°C
Minimum temperature "Low temperature Zone 2"	-20	°C
Minimum temperature "Low temperature"	-25	°C

TT - ATEX liquid end

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

## Technical Data

### TT liquid end

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

### HCT - ATEX liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	90	°C
Minimum temperature "Standard"	-10	°C
Minimum temperature "Low temperature Zone 2"	-20	°C

### HCT liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	90	°C
Max. temperature, for 15 min at max. 2 bar	120	°C
Minimum temperature "Standard"	-10	°C
Minimum temperature "Low temperature Zone 2"	-20	°C
Minimum temperature "Low temperature"	-25	°C

### SST - ATEX liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	90	°C
Minimum temperature "Standard"	-10	°C
Minimum temperature "Low temperature Zone 2"	-20	°C

### SST liquid end

Data	Value	Unit
Max. temperature, long-term at max. operating pressure	90	°C
Max. temperature, for 15 min at max. 2 bar	120	°C
Minimum temperature "Standard"	-10	°C
Minimum temperature "Low temperature Zone 2"	-20	°C
Minimum temperature "Low temperature"	-25	°C

### 13.6.2 Air humidity

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

\*non-condensing (according to DIN IEC 60068-2-30)  
50 % rel. humidity with actuator

### 13.6.3 Installation Height

Data	Value	Unit
Maximum installation height*:	1000	m above sea level

\* Install higher at your own risk.

We urgently advise calling in the services of a specialist for ATEX pumps when using ATEX pumps!

### 13.7 Housing Degree of Protection

Data	Value
Protection against contact and humidity*	IP 55

\*according to DIN VDE 470 (EN IEC 60529)

### 13.8 Motor Data

#### Electrical data

Identity code specification	Phase, protection	Rated voltage	Mains supply frequency	Rated output	Manufacturer's designation	Remarks
S	3 phase, IP 55	220-240 V / 380-420 V	50 Hz	1.1 kW		
		250-280 V / 440-480 V	60 Hz	1.1 kW		
R	3 phase, IP 55	230 V / 400 V	50/60 Hz	1.5 kW		with PTC, speed control range 1:20 with external fan 1 phase 230 V; 50/60Hz
Z	3 phase, IP 55	230 V / 400 V	50/60 Hz	1.5 kW		Speed control, complete
V0	3 phase, IP 55	400 V	50/60 Hz	1.5 kW		Variable speed motor with integrated frequency converter
L1	3 phase, II2GExeIIIT3	220-240 V / 380-420 V	50 Hz	1.1 kW	EAFY 90S/4I-11T	
L2	3 phase, II2GExdIICT4	220-240 V / 380-420 V	50 Hz	1.1 kW	KPER 90 L4	with PTC, speed control range 1:5

## Technical Data

Identity code specification	Phase, protection	Rated voltage	Mains supply frequency	Rated output	Manufacturer's designation	Remarks
P1	3 phase, II2GEEexIIIT3	254-277 V / 440-480 V	60 Hz	1.1 kW	DEx 90 S/4K	
P2	3 phase, II2GEEexdIICT4	254-277 V / 440-480 V	60 Hz	1.1 kW	DEx 90 S/4K	with PTC, speed control range 1:5
V2	3 phase, II2GEEexdIICT4	400 V $\pm$ 10 %	50/60 Hz	1.5 kW	CD90 L1-4I	EX variable speed motor with integrated frequency converter



### **Motor data sheets, special motors, special motor flanges, external fans, temperature monitoring**

- Motor data sheets can be requested for the 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 possible on request.

## 13.9 Diaphragm Rupture Sensor



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

### Contact (standard)

#### Contact loading, max.

at voltage	Maximum current
30 V DC	1 A

The contact is an opener.

The contact is an potential-free.



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



Install the sensor according to the "Installation, Electrical" chapter. Observe its documentation.

Name of sensor: 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	+



Install the sensor according to the "Installation, Electrical" chapter. Observe its documentation.

The sensor is type NJ1,5-8GM-N.

### 13.10 Pressure Limitation Valve (HP4)

Pressure stage	7 bar	10 bar	16 bar	25 bar
Opening pressure	14 bar	18 bar	25 bar	36 bar

### 13.11 Pressure Switch (For Signalling Overpressure)

Pressure switch 42 V

Size	Value	Unit
Maximum voltage	42	V
Rated current (ohmic load):	4	A
Switching power:	100	VA

The contact is an opener.



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

ATEX pressure switch



**CAUTION!**

Observe the accompanying manual "HYDAC Operating manual pressure switch series EDS 4400 with ATEX approval".


Type identification

Type identification	Feature	Property
EDS 4	Designation of the pressure switch	EDS 4
4	Accuracy:	Thin film/relative pressure
4	Mechanical connector:	G ¼ A DIN 3852, external thread
8	Electrical connection:	Unit plug, M12x1, 5-pin
0060	Measuring range:	specification in bar
P	Control output:	programmable
A	Certification:	ATEX
N	Electrical strength:	125 V AC relative to the housing
3	Degrees of protection:	II 2G Ex ia IIC T4
004	Modification number:	0.5 mm nozzle pressed in or integrated
		including accessories ZBE 08S-02 coupling socket M12x1, angled with 2 m wire, screened
F	Sealing material:	FPM
1	Connecting material:	Stainless steel
200	Cable length:	2 m (standard)

Size	Value	Unit
Voltage	14 ... 28	V

### 13.12 Stroke sensor

Namur sensor (identity code specification "Stroke sensor": 1)



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

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	+



*Install the sensor according to the "Installation, Electrical" chapter. Observe its documentation.*

*Name of sensor: NJ1,5-8GM-N.*

### 13.13 Heating cartridge

Technical data - see enclosed operating instructions:

"ELMESS operating instructions liquid heater type NAHF11 ...; HRHF11".

### 13.14 Protective temperature limiter (ATEX only)

Technical data - see enclosed operating instructions:

"ELMESS protective temperature limiter II (2) G [EEx ib] IIC/IIB II (2) D [Ex ib D] BVS 06 ATEX F 002 X".

### 13.15 Filling volumes

#### 13.15.1 Hydraulic oil

Use	Manufacturer	Name	Viscosity class	Part no.
Standard	Mobil	Mobilube 1 SHC *	75W - 90	1005823

\* or comparable hydraulic oil

Use	Manufacturer	Name	Viscosity class	Part no.
Food	Mobil	SHC Cibus *	220	1007610

\* or comparable hydraulic oil

Required amount of oil			Supplied amount of oil
Type	Single head version	Double head version	
HP 4:	approx. 5.5 l	approx. 6.1 l	7.0 l

### 13.16 Sound pressure level HP4a

**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)

### 13.17 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**

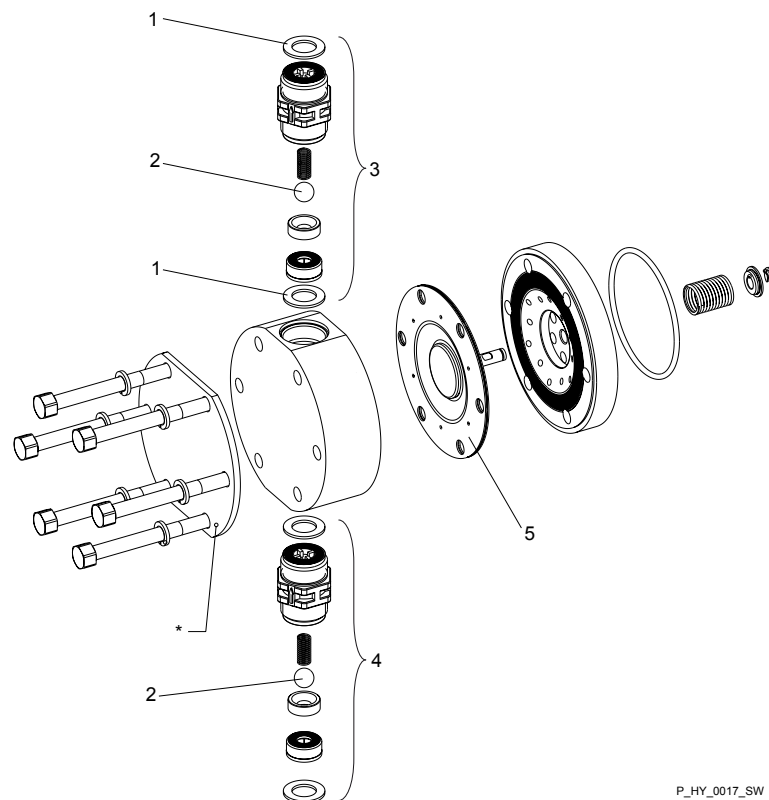
The motor data sheets for the modified version are valid. They may deviate from the standard motor data sheets.

**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 Ordering Information

### 14.1 Exploded view of the drawing



P\_HY\_0017\_SW

Fig. 23: Exploded view of Hydro liquid end Numbered positions = PVT set of spare parts - range for supply. Technical changes reserved.

- |   |                           |   |                                 |
|---|---------------------------|---|---------------------------------|
| 1 | Seals (Set)               | 4 | Suction connection assy.        |
| 2 | Valve balls               | 5 | Diaphragm                       |
| 3 | Pressure connection assy. | * | Reinforce plate - only with PVT |

### 14.2 Spare parts kits

The spare part kits include the replacement parts for the liquid ends.

Standard delivery for material version PVT

- 1 - Diaphragm
- 1 - Suction connection assy.
- 1 - Pressure connection assy.
- 2 - Valve balls
- 1 - Set of seals, compl.

Standard delivery for material version SST / HCT

- 1 - Diaphragm
- 2 - Valve balls
- 1 - Set of seals, compl.

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## Ordering Information

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### Spare parts kits Hydro/ 4

for types: 250130, 250190, 250250, 250350, 250400:

for liquid end	Material version	Part no.
FMH 400 - DN 25	PVT	1043763
	PVT with valve	1023057
	SST	1040812
	SST with valve	1040813
	HCT	1040860
	HCT with valve	1022716

for types: 160210, 160300, 160400, 160550, 160625:

for liquid end	Material version	Part no.
FMH 625 - DN 32	PVT	1043775
	PVT with valve	1040863
	SST	1040824
	SST with valve	1040825
	HCT	1040861
	HCT with valve	1040862

for types: 100330, 100480, 100635, 100880, 101000:

for liquid end	Material version	Part no.
FMH 1000 - DN 32	PVT	1043776
	PVT with valve	1040866
	SST	1040826
	SST with valve	1040827
	HCT	1040864
	HCT with valve	1040865

for types: 0704650, 070670, 070890, 071230, 071400:

for liquid end	Material version	Part no.
FMH 1400 - DN 40	PVT	1043777
	PVT with valve	1040869
	SST	1040828
	SST with valve	1040829
	HCT	1040867
	HCT with valve	1040868

## 14.3 Diaphragms

### Metering diaphragm PTFE / 1.4404

for liquid end	Pump type	Part no.
FMH 400	250130, 250190, 250250, 250350, 250400	1040808
FMH 625	160210, 160300, 160400, 160550, 160625	1040809
FMH 1000	100330, 100480, 100635, 100880, 101000	1040810
FMH 1400	0704650, 070670, 070890, 071230, 071400	1040811

### Metering diaphragm PTFE / SST coated

for liquid end	Pump type	Part no.
FMH 400	250130, 250190, 250250, 250350, 250400	1044847
FMH 625	160210, 160300, 160400, 160550, 160625	1044848
FMH 1000	100330, 100480, 100635, 100880, 101000	1044849
FMH 1400	0704650, 070670, 070890, 071230, 071400	1044850

### Metering diaphragm PTFE / Hast. C, coated

for liquid end	Pump type	Part no.
FMH 400	250130, 250190, 250250, 250350, 250400	1040874
FMH 625	160210, 160300, 160400, 160550, 160625	1040875
FMH 1000	100330, 100480, 100635, 100880, 101000	1040876
FMH 1400	0704650, 070670, 070890, 071230, 071400	1040877

## 14.4 Pressure relief valves

Opening pressure $P_N$	Part no.
7 bar	1039667
10 bar	1039667
16 bar	1039668
25 bar	1039668

## 14.5 Pressure switch

Version	Part no.
with 30 m connecting cable	on request

## 14.6 General

### Hydraulic oil

The pump uses an hydraulic oil that lubricates the gear at the same time.

Use	Manufacturer	Name	Viscosity class	Part no.
Standard	Mobil	Mobilube 1 SHC *	75W - 90	1005823
Foodsafe	Mobil	SHC Cibus *	220	1007610

\* or comparative hydraulic oil

### Seals

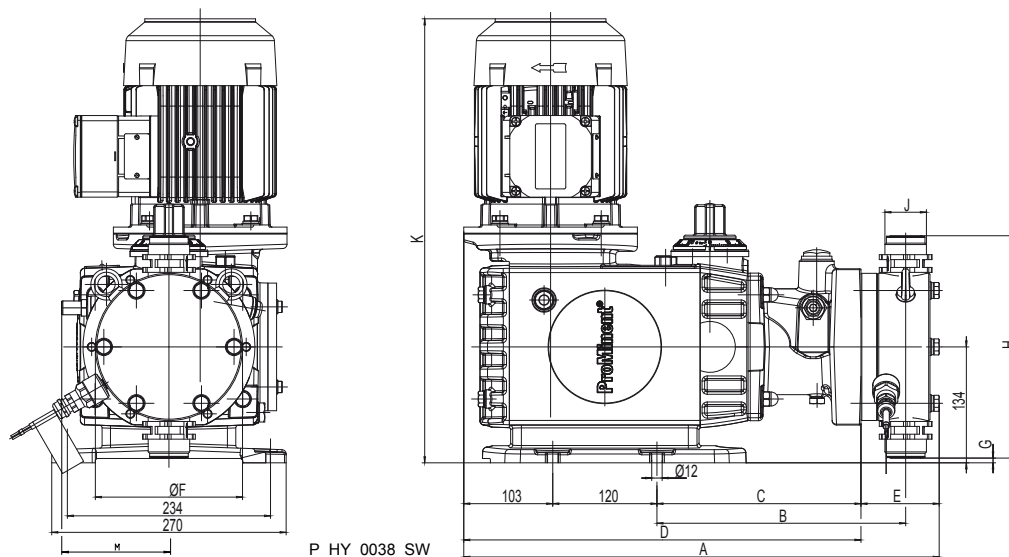
Seal for	Part no.
Oil drainage stopper (copper, hydraulic end)	1004803
Oil drainage stopper (O-ring, power end)	740803
Diaphragm rupture indicator contact (flat seal)	483920
Diaphragm rupture indicator Namur (flat seal)	483920



# 15 Dimensions

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

Dimension sheet for Hydro HP4 (HP4a single head pump)



P\_HY\_0038\_SW

Fig. 24: Illustration not strictly binding.

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	548	553	583	593
A	PV	558	563	596	605
B	SS/HC/PV	287	288	316	322
C	SS/HC/PV	235	235	255	255
D	SS/HC/PV	458	458	478	478
E	SS/HC	90	95	106	116
E	PV	100	105	119	126
ØF	SS/HC/PV	170	198	226	249
G	SS/HC/PV	6	-9	-29	-58
H	SS/HC/PV	256	284	324	382

## Dimensions

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
J	SS/HC/PV	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
M	-	120	120	189	189

	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde motor with frequency converter	Motor, controllable
K	544	505	603	854	636	545

Dimension sheet for Hydro HP4 (HP4a double head pump)

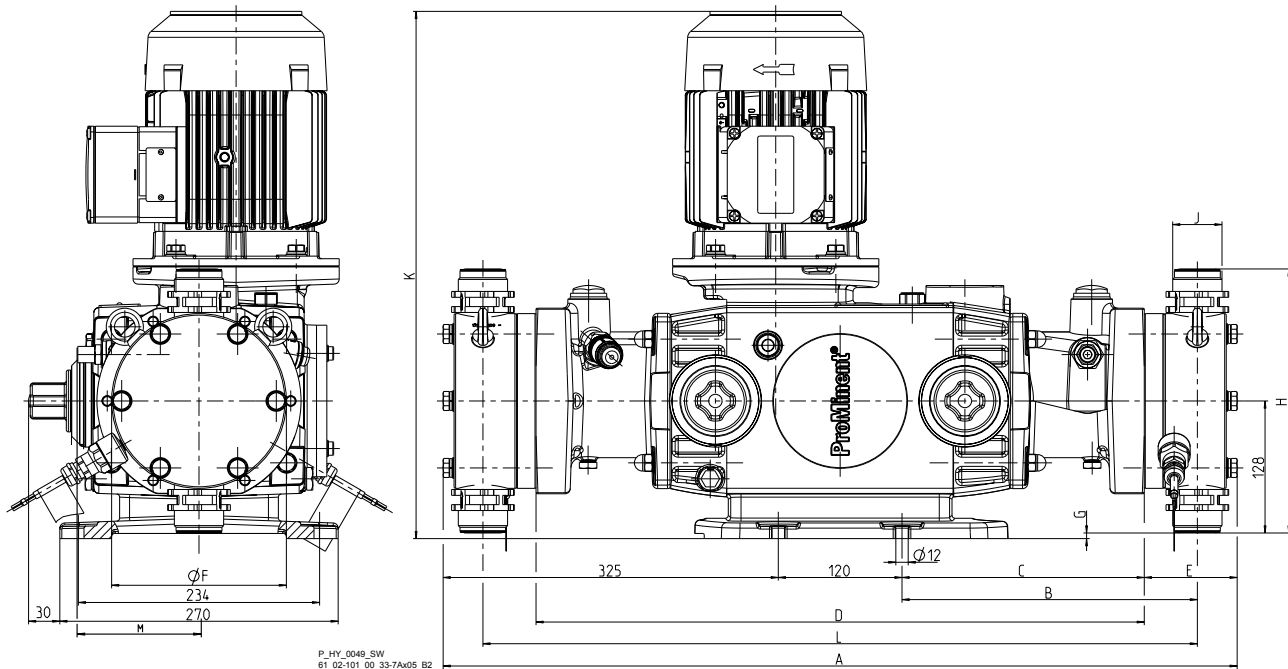


Fig. 25: Illustration not strictly binding.

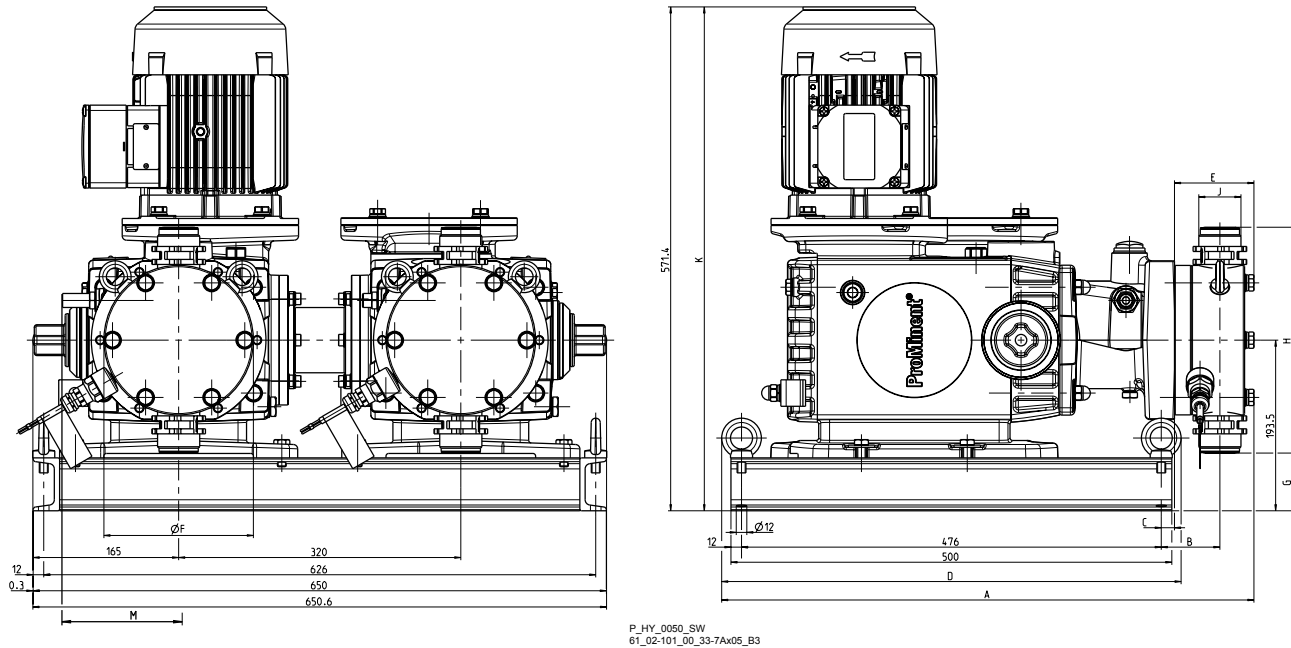
Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	770	780	841	861
A	PV	780	790	854	873
B	SS/HC/PV	287	288	316	322
C	SS/HC/PV	235	235	255	255
D	SS/HC/PV	590	590	630	630

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
E	SS/HC	90	95	106	116
E	PV	100	105	119	128
F	SS/HC/PV	170	198	226	249
G	SS/HC/PV	6	-9	-29	-58
H	SS/HC/PV	256	284	324	382
J	-	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
L	-	693	696	752	764
M	-	120	120	189	189

	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde motor with frequency converter	Motor, controllable
K	544	505	603	854	636	545

## Dimensions

### Dimension sheet Hydro HP4 (duplex single head pump)



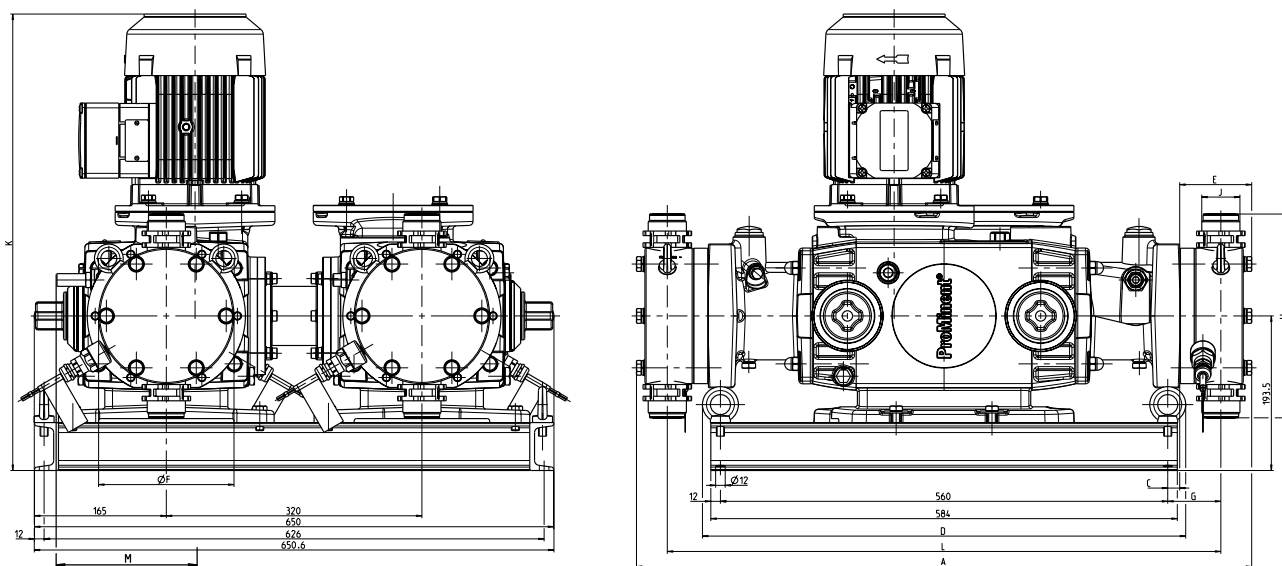
P\_HY\_0050\_SW  
61\_02-101\_00\_33-7Ax05\_B3

Fig. 26: Illustration not strictly binding.

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	604	609	639	649
A	PV	614	619	652	661
B	SS/HC/PV	67	68	96	102
C	SS/HC/PV	15	15	35	35
D	SS/HC/PV	521	521	534	534
E	SS/HC	90	95	106	116
E	PV	100	105	119	128
F	SS/HC/PV	170	198	226	249
G	SS/HC/PV	66	51	31	2
H	SS/HC/PV	256	284	324	382
J	-	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
M	-	120	120	189	189

	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde frequency converter motor	Motor, controllable
K	604	565	663	914	696	605

Dimension sheet for Hydro HP4 (HP4a duplex double head pump)



P\_HY\_0061\_SW  
6T\_02-101\_00\_33-7Ax05\_B4

Fig. 27: Illustration not strictly binding.

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	770	780	841	861
A	PV	780	790	854	873
B	SS/HC/PV	287	288	316	322
C	SS/HC/PV	235	235	255	255
D	SS/HC/PV	590	590	630	630
E	SS/HC	90	95	106	116
E	PV	100	105	119	128
F	SS/HC/PV	170	198	226	249
G	SS/HC/PV	6	-9	-29	-58
H	SS/HC/PV	256	284	324	382
J	Valve	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
L	-	693	696	752	764
M	-	120	120	189	189

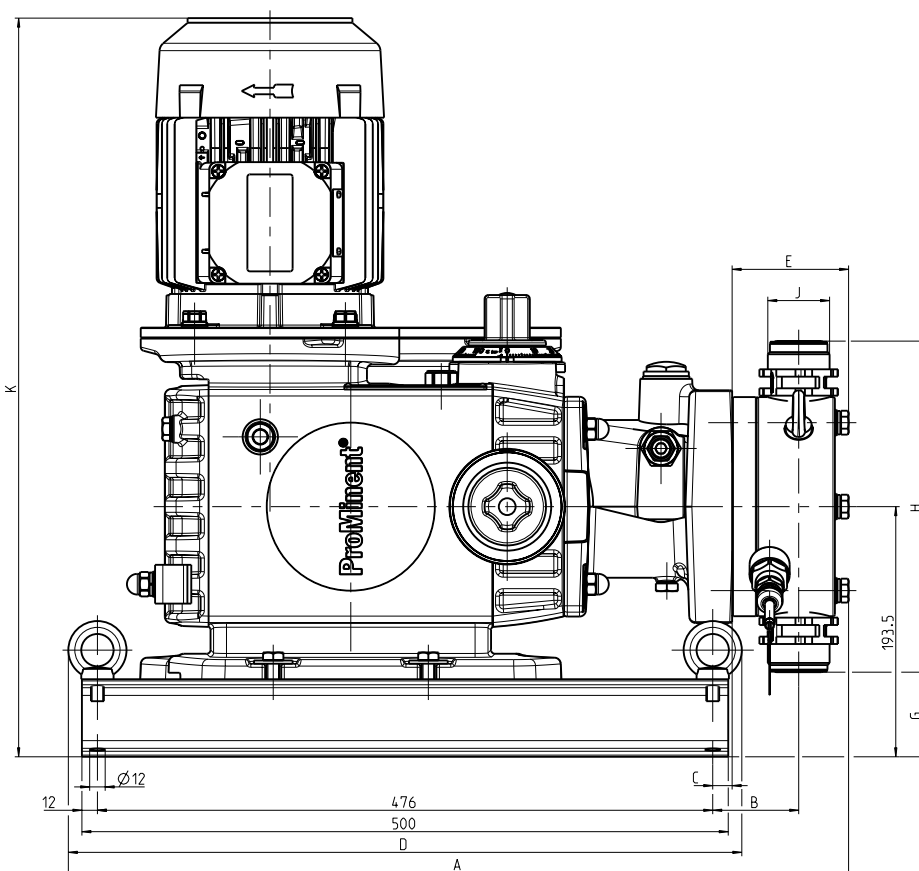
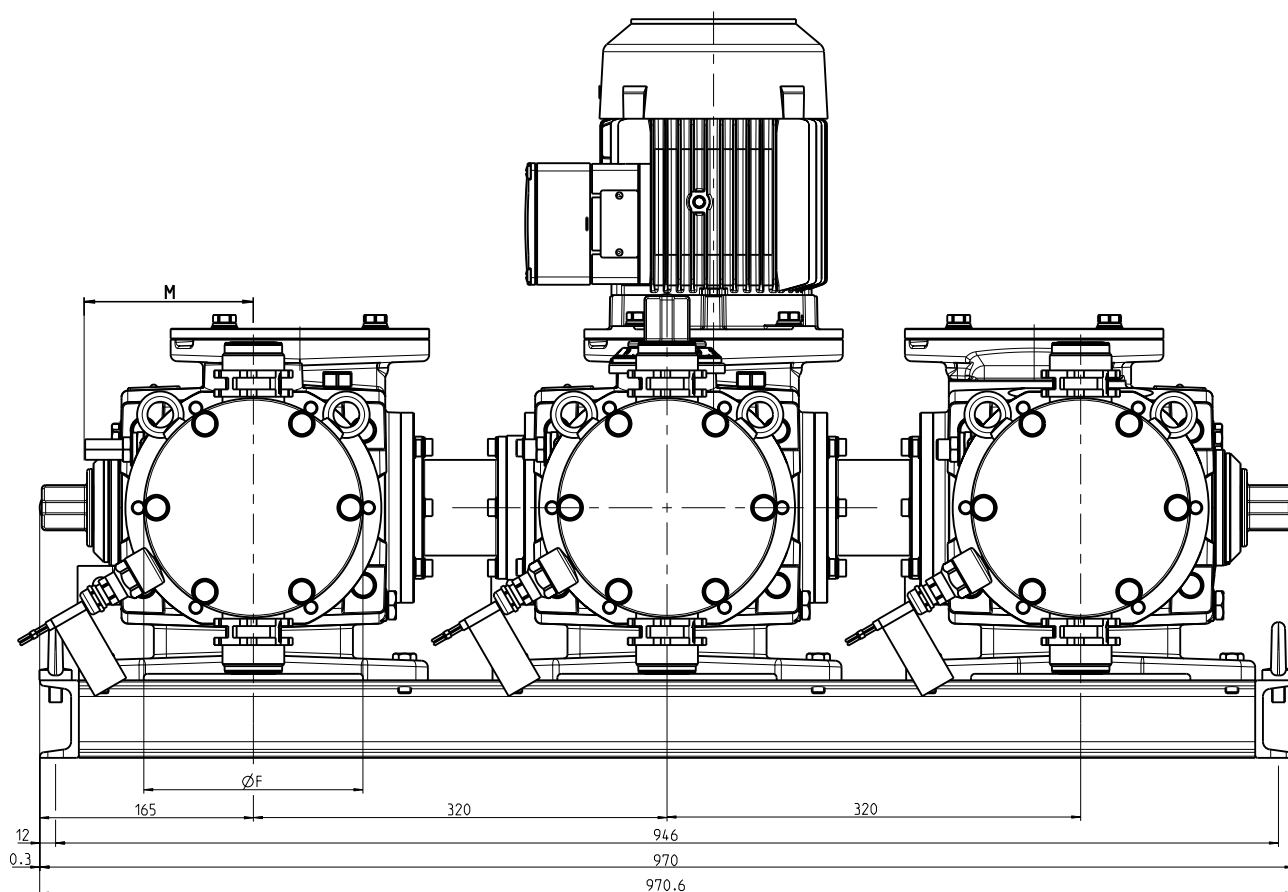
	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde frequency converter motor	Motor, controllable
K	544	505	603	854	636	545

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## Dimensions

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Dimension sheet for Hydro HP4 (HP4a tri-plex pump)



P\_HY\_0052\_SW  
61\_02-101\_00\_33-7Ax05\_B5

Fig. 28: Illustration not strictly binding.

## Dimensions

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	604	609	639	649
A	PV	614	619	652	661
B	SS/HC/PV	67	68	96	102
C	SS/HC/PV	15	15	35	35
D	SS/HC/PV	521	521	534	534
E	SS/HC	90	95	106	116
E	PV	100	105	119	128
F	SS/HC/PV	170	198	226	249
G	SS/HC/PV	66	51	31	2
H	SS/HC/PV	256	284	324	382
J	SS/HC/PV	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
M	-	120	120	189	189

	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde frequency converter motor	Motor, controllable
K	604	565	663	914	696	605



Dimension sheet for Hydro HP4 (HP4a with ATEX FC)

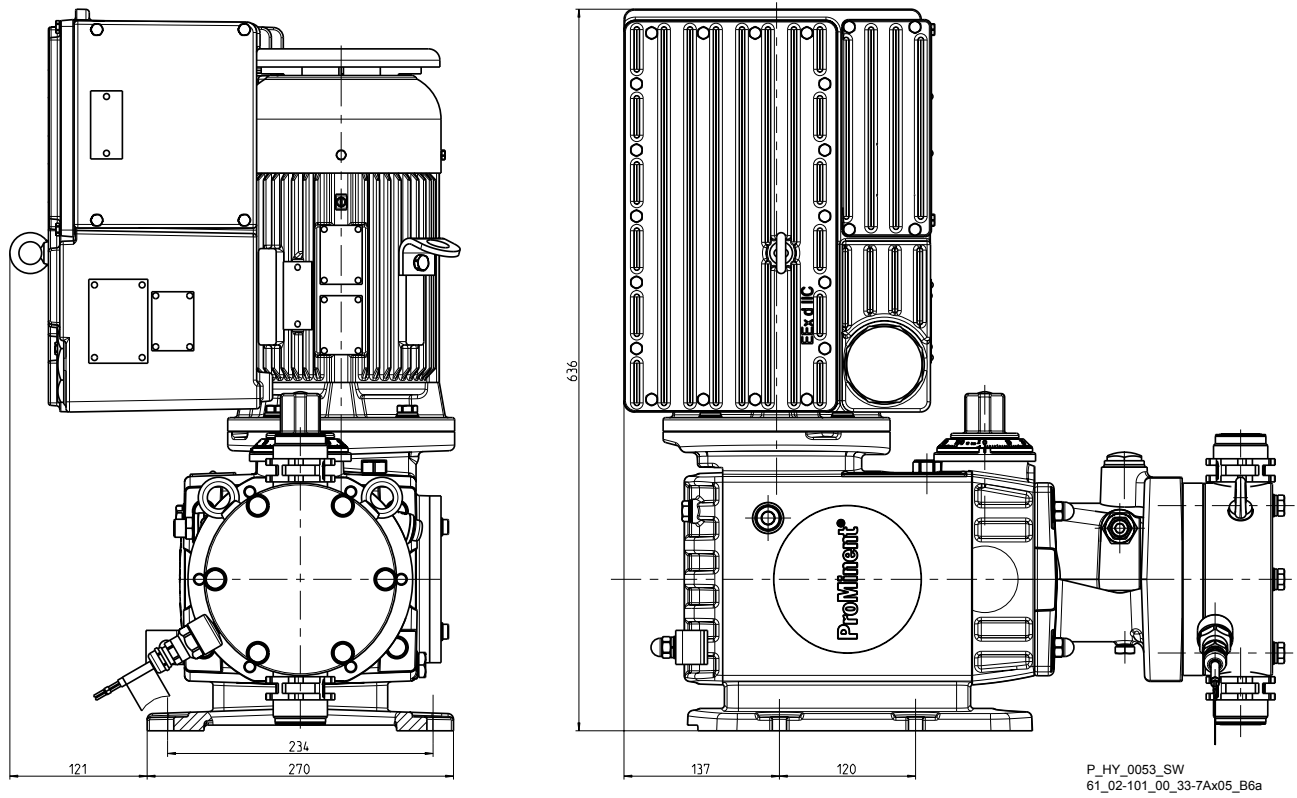
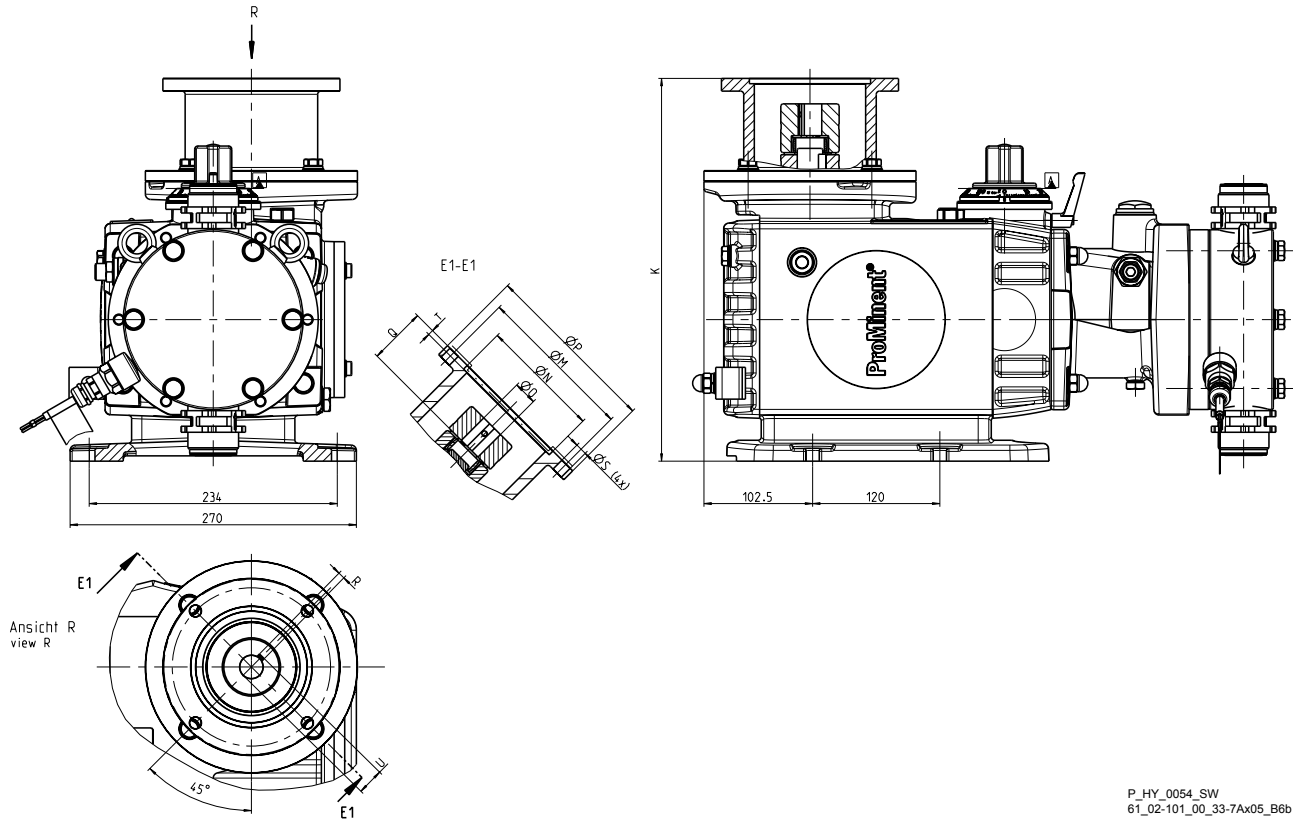


Fig. 29: Illustration not strictly binding.

# Dimensions

## Dimension sheet for Hydro HP4 (HP4a without motor with motor flange)



P\_HY\_0054\_SW  
61\_02-101\_00\_33-7Ax05\_B6b

Fig. 30: Illustration not strictly binding.

Size	Motor flange	P	M	N	S	U	Q	T	R	U	K
	143	6.575"	5.875"	4.5"	0.433"	0.875"	2-1/8"	0.197"	3/16"	0.964"	14.21"
	145TC	167	149.23	(H7) 114.3 (H7)	11	22.23	53,975	5	4.7625	24.49	361
100	B5/250	250	215	180 (H7)	15	28	60	5	8	31.3	367

Dimension sheet for Hydro HP4 (HP4a  
without motor without motor flange)

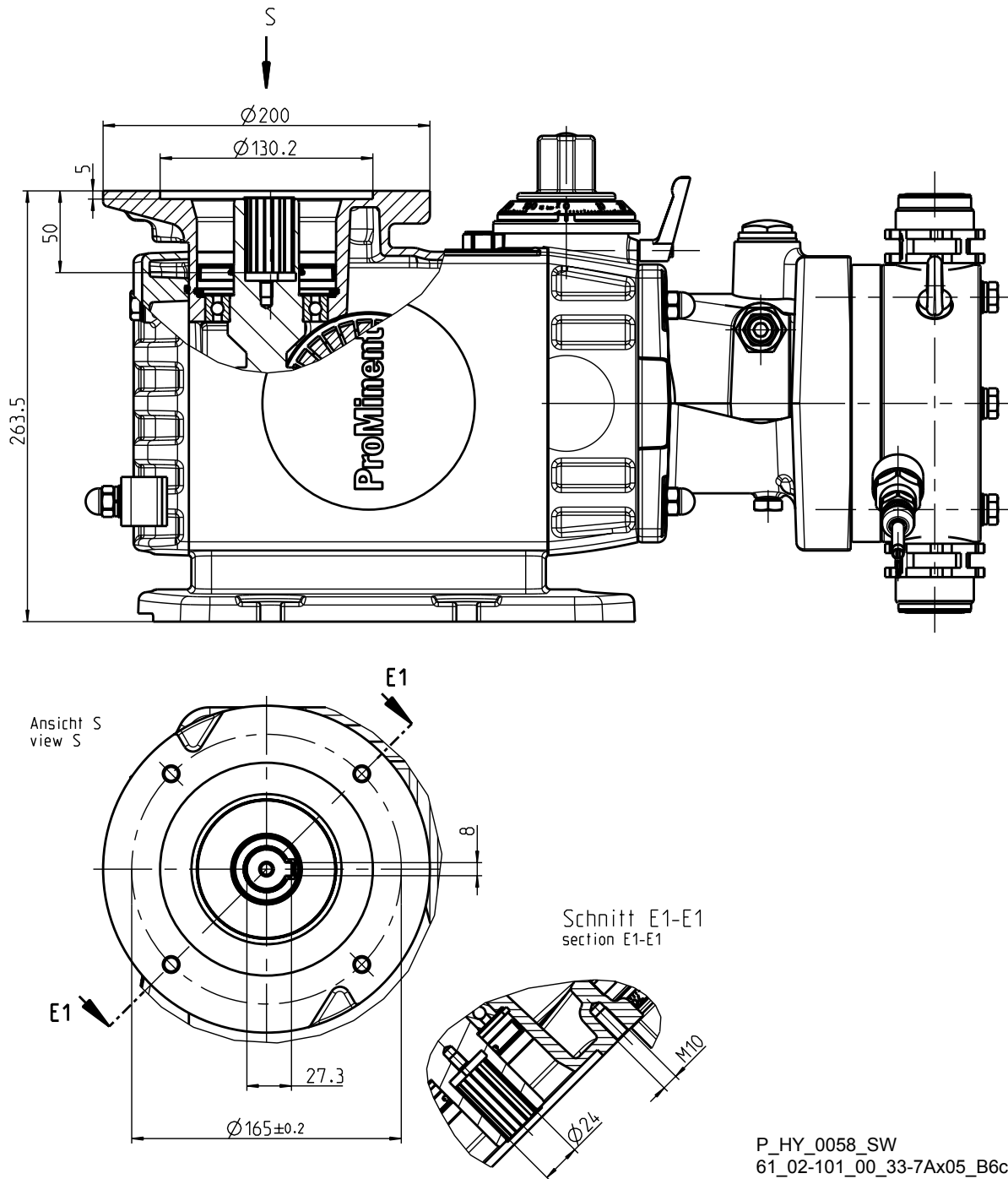


Fig. 31: Illustration not strictly binding.

## Dimensions

### Dimension sheet for Hydro HP4 (HP4a single pump with servomotor)

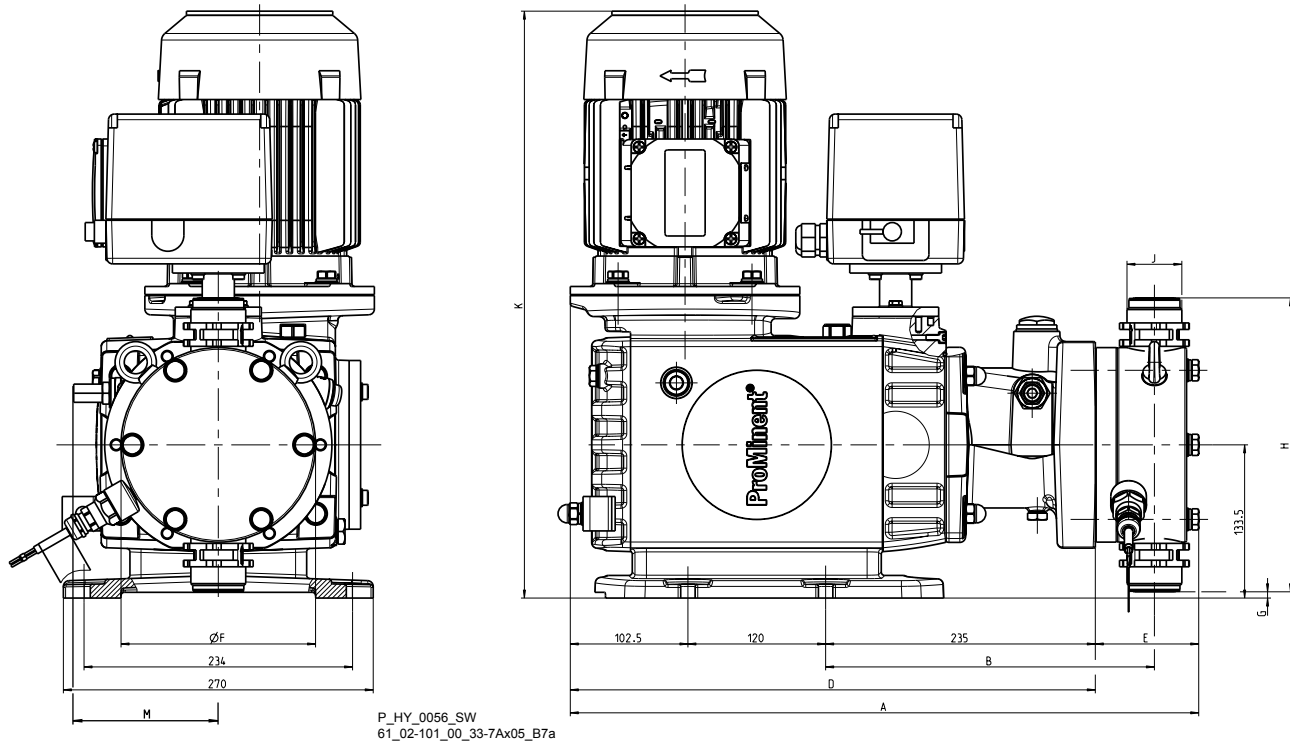
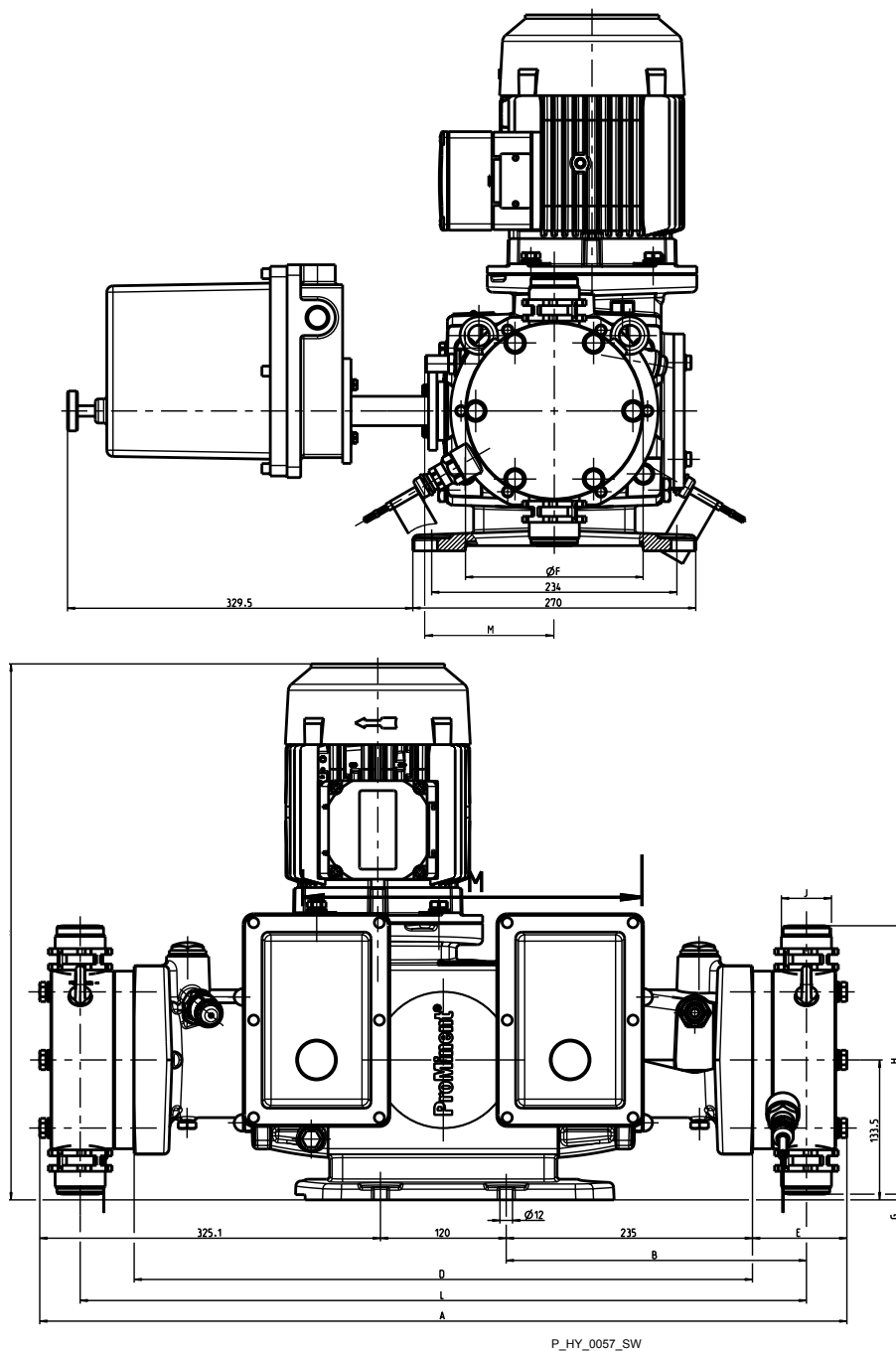


Fig. 32: Illustration not strictly binding.

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	548	553	583	593
A	PV	558	563	596	605
B	SS/HC/PV	287	288	316	322
C	SS/HC/PV	235	235	255	255
D	SS/HC/PV	458	458	478	478
E	SS/HC	90	95	106	116
E	PV	100	105	119	128
ØF	SS/HC/PV	170	198	226	249
G	SS/HC/PV	6	-9	-29	-58
H	SS/HC/PV	256	284	324	382
J	SS/HC/PV	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
M	-	120	120	189	189

	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde frequency converter motor	Motor, control-lable
K	544	505	603	854	636	545

Dimension sheet for Hydro HP4 (HP4a double pump with servomotor)



P\_HY\_0057\_SW

Fig. 33: Illustration not strictly binding.

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
A	SS/HC	770	780	841	861
A	PV	780	790	854	873
B	SS/HC/PV	287	288	316	322

## Dimensions

Liquid end	Type	250130	160210	100330	070465
		250190	160300	100480	070670
		250250	160400	100635	070890
		250350	160550	100880	071230
		250400	160625	101000	071400
C	SS/HC/PV	235	235	255	255
D	SS/HC/PV	590	590	630	630
E	SS/HC	90	95	106	116
E	PV	100	105	119	128
F	SS/HC/PV	170	198	226	249
G	SS/HC/PV	6	-9	-29	-58
H	SS/HC/PV	256	284	324	382
J	Valve	DN25, G1 1/2	DN25, G1 1/2	DN32, G2	DN40, G2 1/4
L		693	696	752	764
M	-	120	120	189	189

	Standard motor	Exe motor	Exde motor	Motor with frequency converter	Exde frequency converter motor	Motor, controllable
K	544	505	603	854	636	545

Dimension sheet for Hydro HP4 (HP4a with heating cartridge)

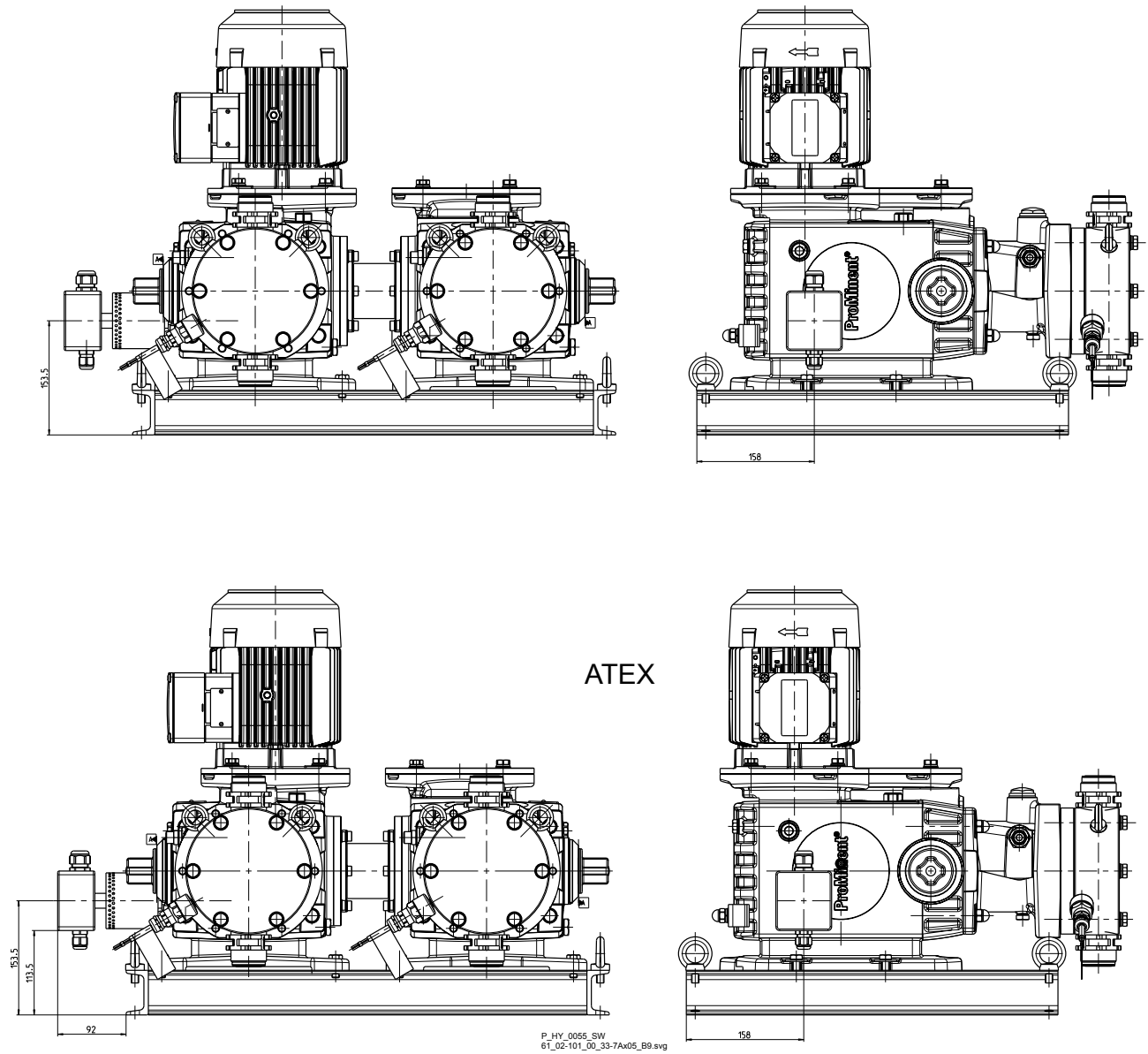
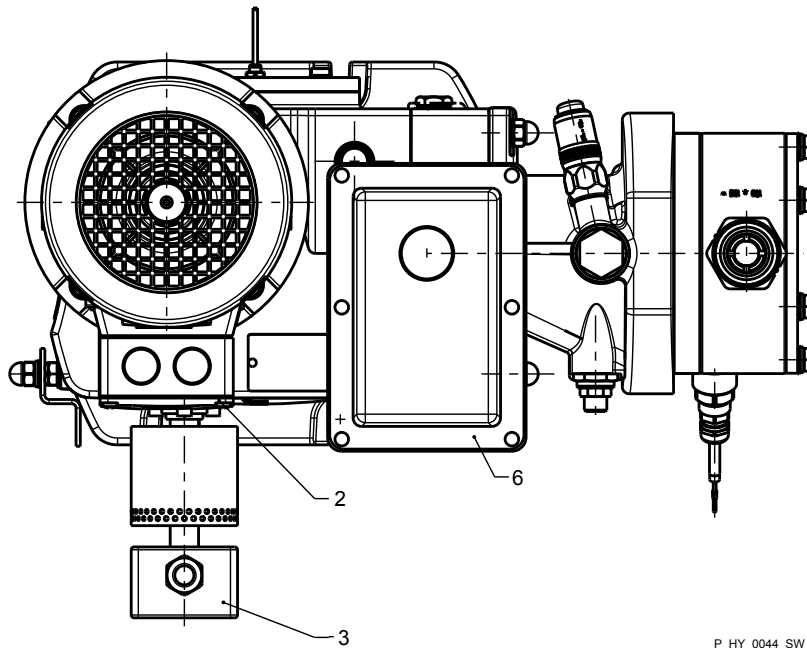


Fig. 34: Illustration not strictly binding.

# 16 Earthing drawing

Simplex single head Hydro HP4 with actuator and heating cartridge



- 2 Motor
- 3 Heating cartridge (optional)

- 6 Actuator

P\_HY\_0044\_SW



## 17 EC Declaration of Conformity for Hydro Machines

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

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

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

### Extract from the EC Declaration of Conformity

Designation of the product:	Metering pump product range Hydro 2, Hydro 3 and Hydro 4
Product type:	HP2a... HP3a... HP4a...
Serial number:	see nameplate on the unit
Relevant EC directives:	EC Machinery Directive (2006/42/EC) EC EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive 2006/95/EC according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	EN ISO 12100, EN 809 EN 60204-1 EN 61000-6-2/4
Date:	30.09.2013

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

## 18 EC Declaration of Conformity for Machines ATEX HP4 without heating cartridge

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,

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

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

### Extract from the EC Declaration of Conformity

Designation of the product:	Metering pump, product range Hydro 4 Design for use in areas at risk from explosion in line with ATEX Directive (94/9/EC)
Product type:	HP4a ----- § \$ -% & with characteristics § = "L" or "P" and \$ = "1" or "2" or § = "V" and \$ = "2" % = "0" or "K" or "1" or "2" or "A" or "B" or "C" or "D" & = "0" or "1"
Serial number:	see nameplate on the unit
Relevant EC directives:	EC ATEX Directive (94/9/EC) EC Machinery Directive (2006/42/EC) EC EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive 2006/95/EC according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	EN 13463-1:2009, EN 13463-5:2011 EN ISO 12100:2010, EN 809:1998+A1:2009 EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011 EN 60204-1:2006/A1:2009
EX specification of the entire system:	II 2G IIC T3 X for \$ = "1" and % = "0" or "K" II 2G IIC T4 X for \$ = "2" and % = "0" or "K" II 2G IIB T3 X for \$ = "1" and % = "1", "2", "A", "B", "C", "D" II 2G IIB T4 X for \$ = "2" and % = "1", "2", "A", "B", "C", "D" X: maximum medium temperature 90 °C
Date:	30.09.2014

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

## 19 EC Declaration of Conformity for ATEX HP4 machines with heating cartridge

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,

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

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

### Extract from the EC Declaration of Conformity

Designation of the product:	Metering pump, product range Hydro 4 Design for use in areas at risk from explosion in line with ATEX Directive (94/9/EC)
Product type:	HP4a ----- § \$ -% & with characteristics § = "L" or "P" and \$ = "1" or "2" or § = "V" and \$ = "2" % = "0" or "K" or "1" or "2" or "A" or "B" or "C" or "D"
Serial number:	see nameplate on the unit
Relevant EC directives:	EC ATEX Directive (94/9/EC) EC Machinery Directive (2006/42/EC) EC EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive 2006/95/EC according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	EN 13463-1:2009, EN 13463-5:2011 EN ISO 12100:2010, EN 809:1998+A1:2009 EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011 EN 60204-1:2006/A1:2009
EX specification of the entire system:	II 3G IIC T3 X for \$ = "1" and % = "0" or "K" II 3G IIC T4 X for \$ = "2" and % = "0" or "K" II 3G IIB T3 X for \$ = "1" and % = "1", "2", "A", "B", "C", "D" II 3G IIB T4 X for \$ = "2" and % = "1", "2", "A", "B", "C", "D" X: maximum medium temperature 90 °C
Date:	30.09.2014

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

## 20 EC Declaration of Conformity for ATEX HP4 machines without heating cartridge

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,

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

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

### Extract from the EC Declaration of Installation

Designation of the product:	Metering pump without motor, product range Hydro 4 Design for use in areas at risk from explosion in line with ATEX Directive (94/9/EC)
Product type:	HP4a ----- § A -% & with the characteristic § = "1" or "3" or "4" % = "0" or "K" or "1" or "2" or "A" or "B" or "C" or "D" & = "0" or "1"
Serial number:	see nameplate on the unit
Relevant EC directives:	EC ATEX Directive (94/9/EC) EC Machinery Directive (2006/42/EC) EC EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive 2006/95/EC according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Only operate the pump once you have determined that the machine into which the pump has been installed meets the provisions of the Machinery Directive.	
Harmonised standards applied, in particular:	EN 13463-1:2009, EN 13463-5:2011 EN ISO 12100:2010, EN 809:1998+A1:2009 EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011 EN 60204-1:2006/A1:2009
EX specification of the entire system:	II 2G IIC T4 X for % = "0" or "K" II 2G IIB T4 X for % = "1", "2", "A", "B", "C", "D" X: maximum medium temperature 90 °C
Assess the risk of ignition when joining together pump and motor.	
Date:	30.09.2014

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

## 21 EC Declaration of Installation for ATEX HP4 machines with heating cartridge

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,

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

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

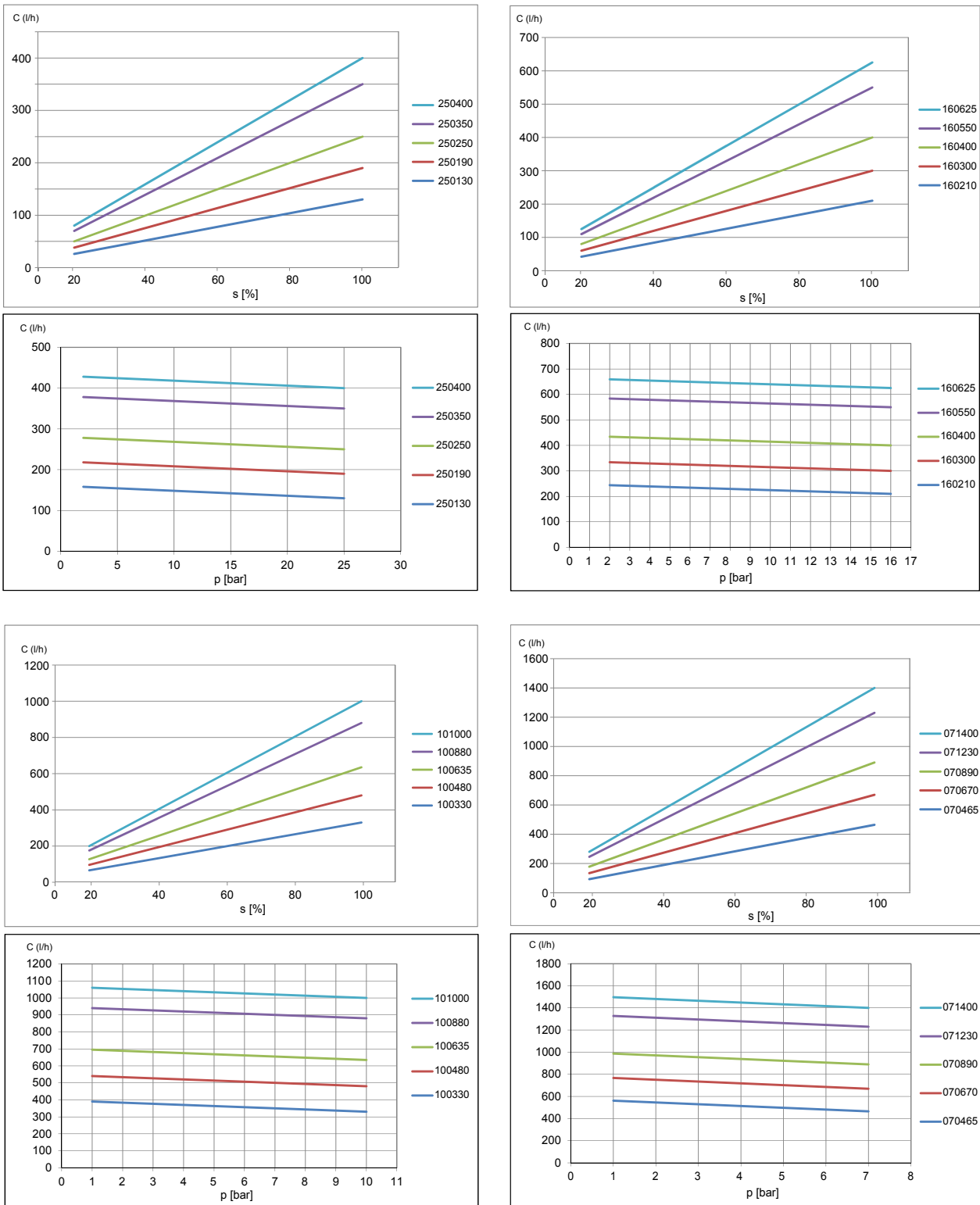
### Extract from the EC Declaration of Installation

Designation of the product:	Metering pump without motor, product range Hydro 4 Design for use in areas at risk from explosion in line with ATEX Directive (94/9/EC)
Product type:	HP4a ----- § A -% 3 with the characteristic § = "1" or "3" or "4" % = "0" or "K" or "1" or "2" or "A" or "B" or "C" or "D"
Serial number:	see nameplate on the unit
Relevant EC directives:	EC ATEX Directive (94/9/EC) EC Machinery Directive (2006/42/EC) EC EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive 2006/95/EC according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Only operate the pump once you have determined that the machine into which the pump has been installed meets the provisions of the Machinery Directive.	
Harmonised standards applied, in particular:	EN 13463-1:2009, EN 13463-5:2011 EN ISO 12100:2010, EN 809:1998+A1:2009 EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011 EN 60204-1:2006/A1:2009
EX specification of the entire system:	II 3G IIC T4 X for % = "0" or "K" II 3G IIB T4 X for % = "1", "2", "A", "B", "C", "D" X: maximum medium temperature 90 °C
Assess the risk of ignition when joining together pump and motor.	
Date:	30.09.2014

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

## 22 Diagrams for adjusting the capacity

Hydro/ 4 HP4a H



P\_HY\_0067\_SW

Fig. 35: Capacity C at minimal back pressure according to the stroke length s and metering capacity C on the basis of back pressure p for different types of a series.

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Internet: [www.prominent.com](http://www.prominent.com)

The latest version of the operating instructions is available on our homepage.

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