

## Diaphragm Pump MP26H Ex-IIC

# MP26H-SS Ex-IIC, MP26H-SS/D Ex-IIC with diaphragm breakage monitoring system

 **II 2 G IIC T2X**

Instruction Manual  
Version 1.01.00



**Dear customer,**

Thank you for buying our product. In this instruction manual you will find all necessary information about this M&C product. The information in the instruction manual is fast and easy to find, so you can start using your M&C product right after you have read the manual.

If you have any question regarding the product or the application, please don't hesitate to contact M&C or your M&C authorized distributor. You will find all the addresses in the appendix of this manual.

For additional information about our products and our company, please go to M&C's website [www.mc-techgroup.com](http://www.mc-techgroup.com). There you will find the data sheets and manuals of all our products in German and English.

This Operating Manual does not claim completeness and may be subject to technical modifications.

© 03/2020 **M&C TechGroup** Germany GmbH. Reproduction of this document or its content is not allowed without permission from **M&C**.

Version: 1.01.00

## Contents

<b>1</b>	<b>General information</b> .....	<b>5</b>
<b>2</b>	<b>Declaration of conformity</b> .....	<b>5</b>
<b>3</b>	<b>Electrical standards</b> .....	<b>6</b>
<b>4</b>	<b>Warranty</b> .....	<b>6</b>
<b>5</b>	<b>Used terms and signal indications</b> .....	<b>7</b>
<b>6</b>	<b>Safety instructions</b> .....	<b>8</b>
6.1	Correct Use .....	9
6.2	Responsability of the user .....	9
6.3	Application in hazardous areas .....	10
6.4	Incorrect use .....	11
<b>7</b>	<b>Introduction</b> .....	<b>13</b>
<b>8</b>	<b>Description</b> .....	<b>13</b>
<b>9</b>	<b>Technical data</b> .....	<b>15</b>
9.1	MP26H-SS Ex- IIC without diaphragm breakage monitoring system .....	15
9.2	MP26H-SS/D Ex- IIC with diaphragm breakage monitoring system .....	16
<b>10</b>	<b>Receipt of goods and storage</b> .....	<b>17</b>
<b>11</b>	<b>Installation</b> .....	<b>17</b>
<b>12</b>	<b>Mounting</b> .....	<b>18</b>
12.1	Special mounting method, head and motor separated by a housing wall .....	19
<b>13</b>	<b>Electrical connection</b> .....	<b>20</b>
13.1	Protective motor switch .....	22
	.....	23
13.2	Motor connection .....	24
<b>14</b>	<b>Pneumatic connection</b> .....	<b>25</b>
14.1	Connecting the pump .....	25
14.2	Diaphragm breakage monitoring system .....	26
14.2.1	Connection and mounting of the optional flow sensor .....	26
<b>15</b>	<b>Operation</b> .....	<b>27</b>
15.1	Feeding of vapours .....	28
<b>16</b>	<b>Shut down of the pump</b> .....	<b>28</b>
<b>17</b>	<b>Maintenance</b> .....	<b>28</b>
17.1	Purging the pump .....	29
17.2	Cleaning the pump .....	29
17.3	Replacing diaphragm and valve plate .....	30
17.3.1	Dismounting .....	31
17.3.2	Mounting .....	31
<b>18</b>	<b>Environment protection</b> .....	<b>32</b>
<b>19</b>	<b>Troubleshooting</b> .....	<b>33</b>
<b>20</b>	<b>Spare parts</b> .....	<b>34</b>
<b>21</b>	<b>Appendix</b> .....	<b>34</b>

## List of illustrations

Figure 1	Construction pump head .....	13
Figure 2	Diaphragm pump MP26H Ex-IIC .....	14
Figure 3	Dimensions with a housing wall.....	19
Figure 4	Cut-out in the housing wall, section B-B .....	19
Figure 5	Monting height options for the separated pump head .....	20
Figure 6	Connection of three-phase current protective motor switch with single-phase current motor.....	22
Figure 7	Heating time $T_E$ in dependence of $I_A/I_N$ .....	23
Figure 8	Electrical connection .....	24
Figure 9	Earth connection .....	24
Figure 10	Diaphragm breakage monitoring system .....	26

## Head Office

**M&C TechGroup** Germany GmbH ♦ Rehhecke 79 ♦ 40885 Ratingen ♦ Germany  
Telephone: 02102 / 935 - 0  
Fax: 02102 / 935 - 111  
E - mail: [info@mc-techgroup.com](mailto:info@mc-techgroup.com)  
[www.mc-techgroup.com](http://www.mc-techgroup.com)

## 1 GENERAL INFORMATION

The product described in this manual has been built and tested in our production facility.

All M&C products are packed to be shipped safely. To ensure the safe operation and to maintain the safe condition, all instructions and regulations stated in this manual need to be followed. This manual includes all information regarding proper transportation, storage, installation, operation and maintenance of this product by qualified personnel.

Follow all instructions and warnings closely.

Read this manual carefully before commissioning and operating the device. If you have any questions regarding the product or the application, please don't hesitate to contact M&C or your M&C authorized distributor.

## 2 DECLARATION OF CONFORMITY



The product described in this operating manual complies with the following EU directives:

### **ATEX-Directive**

The product described in this manual is produced in accordance with the EU directive for devices and protection systems for appropriate use in hazardous areas 2014/34/EU appendix II.

### **EMV-Instruction**

The requirements of the EU directive 2014/30/EU "Electromagnetic compatibility" are met.

### **Low Voltage Directive**

The requirement of the EU directive 2014/35/EU "Low Voltage Directive" are met.  
The compliance with this EU directive has been examined according to DIN EN 61010.

### **Machinery Directive**

The requirements of the directive 2006/42/EC are met.

## RoHS Directive

The requirements of the RoHS2 ('Restriction of Hazardous Substances 2') directive 2011/65/EU and its annexes are met.

## Declaration of conformity

The EU Declaration of conformity can be downloaded from the **M&C** homepage or directly requested from **M&C**.

## 3 ELECTRICAL STANDARDS

The instrument's standard of the pump **MP26H Ex-IIC** corresponds to the safety requirements of the EU directive **2014/34/EU**.

As defined by the **machinery directive** 2006/42/EC, the pump is a non-completed machine and, therefore, cannot be understood as ready for use. The starting up of the uncompleted machine is prohibited as long as the machine in which the incomplete machine shall be integrated has been proofed to comply with the stipulations of the machinery directive 2006/42/EC. The basic requirements of the directive 2006/42/EG according to annexe I (general principles) are applied and met.

Manufacturer : **M&C TechGroup** Germany GmbH  
Rehecke 79  
40885 Ratingen  
Germany  
E-Mail: [info@mc-techgroup.com](mailto:info@mc-techgroup.com)  
[www.mc-techgroup.com](http://www.mc-techgroup.com)

## 4 WARRANTY

In case of a device failure, please contact immediately M&C or your M&C authorized distributor.

We have a warranty period of 12 months from the delivery date. The warranty covers only appropriately used products and does not cover the consumable parts. Please find the complete warranty conditions in our terms and conditions.

The warranty includes a free-of-charge repair in our production facility or the free replacement of the device. If you return a device to M&C, please be sure that it is properly packaged and shipped with protective packaging. The repaired or replaced device will be shipped free of delivery charges to the point of use.

## 5 USED TERMS AND SIGNAL INDICATIONS



**Danger**

The 'Danger' warning sign indicates that death, serious injury and/or significant material damage will be the consequence, if the appropriate precautions should not be taken.



**Warning**

The 'Warning' warning sign indicates that death, serious injury or damage to property may occur if the relevant precautionary measures are not observed.



**Caution**

The 'Caution' warning sign indicates that slight personal injury can occur if the appropriate safety precautions are not observed.

**Attention**

'Attention' indicates that an unintended result or situation can occur if the corresponding information is not taken into account.



**Note**

'Note' indicates important information relating to the product or highlights parts of the documentation for special attention.

**Qualified personnel**

'Qualified personnel' are experts who are familiar with the installation, commissioning, maintenance and operation of these types of products. The following knowledge is at least required for the work:

- Instructed person in EX-protection
- Trained person in the electrotechnical field
- Detailed knowledge of the manual and the applicable safety regulations.



'Ex' indicates important information about the product or about the corresponding parts in the instruction manual, relating to usage in potentially explosive atmospheres.



**High voltages!**  
Protect yourself and others against damages which might be caused by high voltages.



**Hot surface!**  
Contact may cause burn! Do not touch!

**Toxic!**

Acute toxicity (oral, dermal, inhalation)! Toxic when in contact with skin, swallowed or inhaled.

**Corrosive!**

These substances destroy living tissue and equipment upon contact.

Do not breathe vapors; avoid contact with skin and eyes.

**Wear protective gloves!**

Working with chemicals, sharpe objects or extremly high temperatures requires wearing protective gloves.

**Wear safety glasses!**

Protect your eyes while working with chemicals or sharpe objects. Wear safety glasses to avoid getting something in your eyes.

**Wear protective clothes!**

Working with chemicals, sharpe objects or extremly high temperatures requires wearing protective clothes.

## 6 SAFETY INSTRUCTIONS

### Observe the following basic safety procedures when using this equipment:

- Read these operating instructions carefully before start-up and use of the equipment! The information and warnings given in these operating instructions must be heeded.
- The Certificate of Conformity (see appendix) must absolutely be heeded:
- Work on electrical equipment is only to be carried out by trained specialists as per the regulations currently in force.
- Attention must be paid to the requirements of **VDE 0100** when setting high-power electrical units with nominal voltages of up to 1000V, together with the associated standards and stipulations.
- For use in hazardous area observe the relevant national and international instructions and regulations.
- Check the details on the type plate to ensure that the equipment is connected up to the correct mains voltage.
- Protection against touching dangerously high electrical voltages. Before opening the equipment, it must be switched and hold no voltages. This also applies to any external control circuits that are connected.



- The equipment is only to be set within the permitted range of temperatures.
- Check that the location is weather-protected. It should not be subjected to either direct rain or moisture.
- If an operation involves sample gases, which are toxic and hazardous to the health, protective measures need to be taken against any accidental leakage, e.g. unexpected damage of the pump bellows, the related tubing or tube connections.
- To troubleshoot failing or decreasing pump performance, we recommend installing a flow monitoring device downstream from the pump.
- The pump is only designed for sample gases, which are not contaminated with particles. It might be necessary to install a suitable particle filter upstream of the pump.
- The pump is not designed for liquid. To protect the pump against condensate, a cooler might be necessary to be installed upstream of the pump.
- Only gas or gas mixtures can be used, which do not react with each other or with materials of the pump components.
- Installation, maintenance, monitoring and any repairs may only be done by authorised personnel with respect to the relevant stipulations.

## 6.1 CORRECT USE

The pumps are designed for the feeding of gases and vapors only.

## 6.2 RESPONSABILITY OF THE USER



Warning

Only mount and operate the pumps under the operating parameters as described in “Technical Data” (chapter 9) and in the chapter “Application in hazardous areas (chapter 6.3).



Make sure that there will never occur a risk of explosion even in extreme operating situations (temperature, pressure) and during a system breakdown.

The pump is designed for mounting into another machine. The starting up is not allowed before the final product is ascertained to be in accordance with the directive 2006/42/EC.

Before using a sample gas, check whether the materials of pump head, diaphragm and valves are compatible with the medium.

Before feeding the medium, check whether the medium can be fed without any danger in its concrete application.

Feed only such gases that remain stable under the pressures and temperatures occurring in the pump.

### 6.3 APPLICATION IN HAZARDOUS AREAS


In hazardous areas (zones) only operate pumps of the corresponding equipment category and temperature class!

Each changing of the standard configuration with non specified parts or parts non-approved by M&C as well as repair and service works with non specified parts means a loss of the Ex-certificate.

- *In case of any doubt, do not hesitate to contact M&C directly or your M&C authorized dealer.*



The identification marks:

of the motor  II 2 G Ex eq IIC T3X

of the pump  II 2 G Ex IIC T2X

The pump is appropriate for mounting in zone 1.

Hazardous area IIC

Temperature class T2

The pump is appropriate for feeding of gases of zone 1.

Hazardous area IIC

Temperature class T2

*Meaning of X in the identification Ex (additional conditions) :*



The pump must only be operated in dry and clean rooms.

The pump should be mounted away from heat sources and freely ventilated with a minimum lateral distance of 100mm to other components in order to avoid any heat accumulation.

When mounting the pump outside, it must be installed in a protective housing with sufficient air ventilation. Direct insolation must be avoided.

Take care that no foreign objects can penetrate into the pump.



When classifying a pump environment to an explosion proof area (zone), the "Guidelines for explosion protection and prevention with examples (EX-RL)" must be heeded. In case of particular cases or if you have any doubt in defining the hazardous areas, give information to the controlling authority and adopt their decision.



For the operation in hazardous environment with inflammable gases, vapours and mists, the following is applicable: The lowest ignition temperature of the possible hazardous areas must be higher than the so-called „maximum surface temperature“ of the pump.

The maximum surface temperature is according to EN 60079-0 the highest temperature that is reached in the company under the most unfavourable conditions (but within the approved tolerances) on a part or the surface of the pump.

The maximum surface temperature results from the pump's construction and is specified as temperature class on the type plate of the pump. For feeding of dangerous mediums, the respective safety prescriptions must be heeded.

#### 6.4 INCORRECT USE



Warning

The pumps are not appropriate for feeding of fluids.

The pump must not feed gases and gas mixtures that may be explosive also in combination with air and that change the safety-related material properties. Furthermore, these gases or gas mixtures must not contain any solid particles that may produce inflammable friction sparks or percussion sparks in combination with the materials of the pump.



Warning

Please make sure to install and operate the pump for the intended use described in this instruction manual only.



Warning

The pump can only be operated within the parameters stated in the technical data in chapter 9.



Warning

The pump is not designed for liquids or particles.

It is prohibited to operate the pump with condensate.

Condensate accumulated inside the pump head destroys the pump.

Even if condensate might occur only on very rare occasions, the pump head needs to be rotated 180° facing downwards.

The pump head can be electrostatically charged by particles, liquids and drops of condensate.



Warning

The materials of the pump, which are in contact with the sample gas, need to be suitable for the used sample gas.



**Warning**

In order to operate the pump, it needs to be securely installed.



**Warning**

Install the pump only in **weather protected** areas.

Make sure to provide sufficient ventilation.



**Warning**

The permitted maximum pressure within the pump is 2 bar (gauge pressure).

Do not close the sample gas output. A sufficient sample gas flow needs to be provided to prevent the pump pressure from exceeding the permitted maximum pressure value.

A sufficient sample gas flow also prevents the temperature of the pump head to increase over the permitted temperature range.



**Warning**

If components downstream from the pump can block or reduce the sample gas flow, appropriate measure, e.g. a pressure valve, needs to be installed to prevent the process pressure from exceeding the maximum permitted pressure value.

## 7 INTRODUCTION

The **M&C** diaphragm pump **MP26H Ex-IIC** is appropriate for feeding corrosive gases. In its capacity and construction, it is designed especially for the problems in the analyse technique for measurement of hot gases. Version **MP26H-SS/D Ex-IIC** has a double diaphragm safety system which reports a diaphragm breakage via flow sensor (available as option).

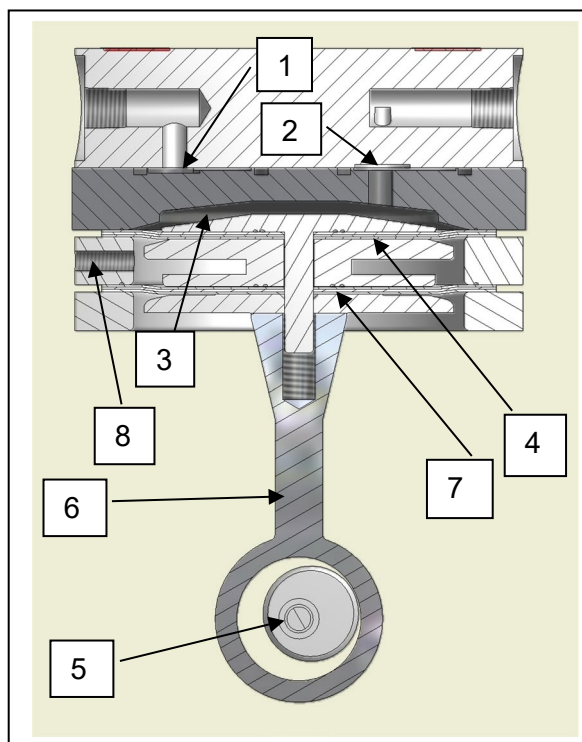
## 8 DESCRIPTION

The pump feeds, compresses and evacuates gases and vapors.

All medium touched parts of the pump are out of PTFE and stainless steel (SS316Ti). This makes the pump suitable for applications within heated sample gas conditioning units with corrosive gases.

The pump functions completely without grease. This secures that the sample gas remains analytically unchanged.

The elastic diaphragm **(4)** is moved up and down via the eccentric **(5)** and the connecting rod **(6)**. During the downstroke, the pump sucks in the feeded gas via the inlet valve **(2)**. During the upstroke, the diaphragm pushes the sample gas out of the pump head via the outlet valve **(1)**. Via the diaphragm, the feed room **(3)** is hermetically separated from the pump driving **(7)**.



**Figure 1 Construction pump head**

The pump head is mounted with space between body and head. This makes it possible **to heat the pump head externally**. Furthermore, the pump **MP26H-SS/D Ex-IIC** is equipped with a double diaphragm safety system and for a diaphragm breakage monitoring system. Below the pump diaphragm **(4)**, a pressure room is integrated which is shut off towards outside via another diaphragm **(7)** and can be controlled.

Working (4) and safety diaphragm (7) build up a pressure tight safety room. This safety room is controlled for tightness with a flow sensor and an external pressure medium. A functional pump does not consume any control gas. The flow sensor is connected via the bore hole (8) with thread M5 i.

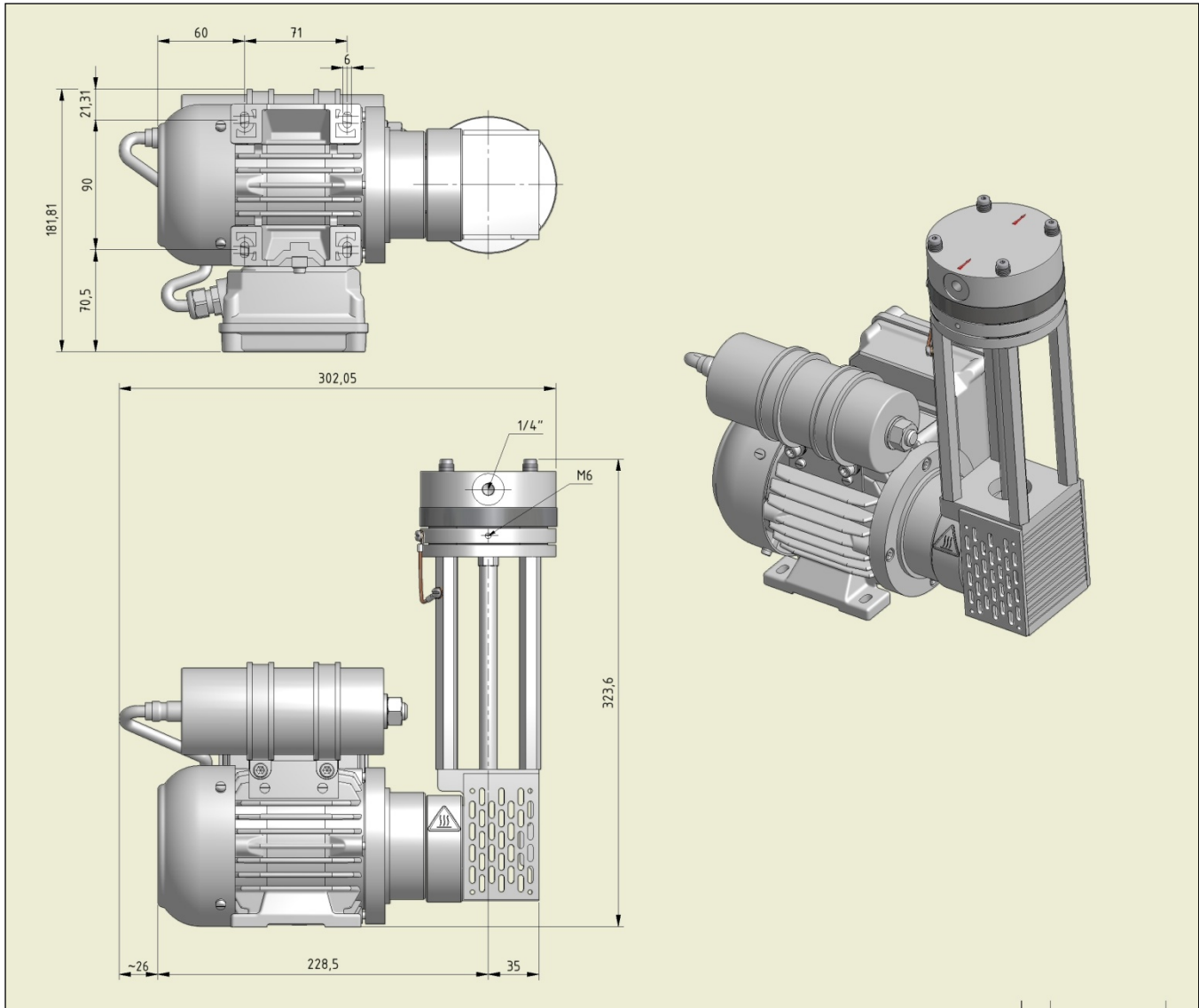


Figure 2 Diaphragm pump MP26H Ex-IIC

## 9 TECHNICAL DATA

### 9.1 MP26H-SS EX- IIC WITHOUT DIAPHRAGM BREAKAGE MONITORING SYSTEM

Diaphragm pump	MP26H Ex-IIC	
Type	MP26H-SS/D Ex-IIC	
Part No.	AAP0024	AAP0024a
Tension IEC34-1 (Tension $\pm 5\%$ , Frequency $\pm 2\%$ )	230 V 50 Hz	120 V 60 Hz
Identification	⊕ II 2 G Ex IIC T2X	
Protection	IP 20 - DIN 40050	
Pump capacity for Pressure suction side : -50 mbar rel. Pressure pressure side : 1 bar rel.	550 NI/hr	
Operating pressure	0.4 to 2 bar abs.	
Gas temperature	+5 to +180 °C [41 to 356 °F]	
Recommended control gas pressure for diaphragm rupture control	N2 0.2 – 0.4 bar	
Gas leak tightness of the pump head	< 6 x 10 <sup>-3</sup> mbar l/s	
Ambient temperature	for wet sample gas : +5 to +40 °C [41 to 104 °F] for dry sample gas : 0* to +40 °C [32 to 104 °F]	
Storage temperature	-20 to +60 °C [-4 to +140 °F]	
Current consumption	0.96 A	2 A
I <sub>A</sub> /I <sub>N</sub>	1.7	
Heating time T <sub>E</sub>	120 sec.	
Capacity factor cos φ	0.86	0.9
Capacity	70 W	90 W
Cable insertion	M16 x 1.5 clamp range 5.5 – 10 mm	
Gas connections	G1/8" i DIN ISO 228/1	
Medium touched parts	PTFE, 1.4571	
Weight	10.5 kg [≈ 23.1 lbs]	

\*The minimum ambient temperature refers to the start up phase of the pump. During operation a minimum ambient temperature of -20 °C [-4 °F] is possible, because the pump head then heats up.

## 9.2 MP26H-SS/D EX- IIC WITH DIAPHRAGM BREAKAGE MONITORING SYSTEM

Diaphragm pump	MP26H Ex-IIC	
Type	MP26H-SS/D Ex-IIC	
Part No.	AAP0023	AAP0023a
Tension IEC34-1 (Tension $\pm 5\%$ , Frequency $\pm 2\%$ )	230 V 50 Hz	120 V 60 Hz
Identification	Ⓔ II 2 G Ex IIC T2X	
Protection	IP 20 - DIN 40050	
Pump capacity for Pressure suction side : -50 mbar rel. Pressure pressure side : 1 bar rel.	550 NI/hr	
Operating pressure	0.4 to 2 bar abs.	
Gas temperature	+5 to +180 °C [41 to 356 °F]	
Connection thread sample gas	G 1/8" i	
Connection thread Diaphragm rupture control	M5 i	
Recommended control gas pressure for diaphragm rupture control	N2 0.2 – 0.4 bar	
Gas leak tightness of the pump head	< 6 x 10 <sup>-3</sup> mbar l/s	
Ambient temperature	for wet sample gas : +5 to +40 °C [41 to 104 °F] for dry sample gas : 0* to +40 °C [32 to 104 °F]	
Storage temperature	-20 to +60 °C [-4 to +140 °F]	
Current consumption	0.96 A	2 A
I <sub>A</sub> /I <sub>N</sub>	1,7	
Heating time T <sub>E</sub>	120 sec.	
Capacity factor cos φ	0.86	0.9
Capacity	70 W	90 W
Cable insertion	M16 x 1.5 clamp range 5.5 – 10 mm	
Gas connections	G1/8" i DIN ISO 228/1	
Medium touched parts	PTFE, 1.4571	
Weight	10.5 kg [23.1 lbs]	

\*The minimum ambient temperature refers to the start up phase of the pump. During operation a minimum ambient temperature of -20°C [4 °F] is possible, because the pump head then heats up.



## 10 RECEIPT OF GOODS AND STORAGE

- The gas sample probe should be removed carefully from the packaging and checked immediately for completeness against the delivery note.
- Check the goods for any damage incurred during transport and if necessary inform your transport insurer of any damage.



**Note**

The equipment should be stored in a protected, frost-free room.

## 11 INSTALLATION

The pump is built according to the generally accepted standards of technology and the occupational safety and accident prevention regulations. Nevertheless, dangers can occur during its use that result in bodily injuries of the user or third parties or that may damage the pump or other properties.



**Warning**

Only use pumps in perfect technical condition as well as according to its purpose, to safety regulations and in awareness of danger. Respect the operating and mounting instructions.

### **Qualified Personnel**

Make sure that only trained and instructed personnel works on the pump, especially during installation, connection and maintenance works. Make sure that the staff has read and understood the operating and installation instructions.



**Warning**

Whenever working on the pump, whenever operating the pump, the safety and accident prevention regulations must be heeded.



**Attention**

During operation, the pneumatic pipes to and away from the pump as well as the pump head are heated.



Special care must be taken when using hot fluids.

Do not touch these parts, burn hazard! Wear personal protective clothing!



**Attention**

Moving parts!

Do not grasp into the pump during operation.

## 12 MOUNTING

Only install the pump under the operating parameters and conditions as described in chapter 9 “Technical Data”. Dimensions see Figure 2.

Before mounting, store the pump at the installation location to bring it up to room temperature.



**Warning**

**Explosion danger due to deficient cooling air supply!**

Install the pump so that the fan wheel can intake sufficient cooling air.

Ensure sufficient ventilation and heat dissipation around the pump.

The pump must only be operated in dry and clean rooms.

The pump should be installed away from heat sources and freely ventilated with a minimum distance to other components of 100mm to prevent any accumulation of heat.

For outdoor installation, the pump must be installed in a housing with sufficient air ventilation. Avoid direct insolation.

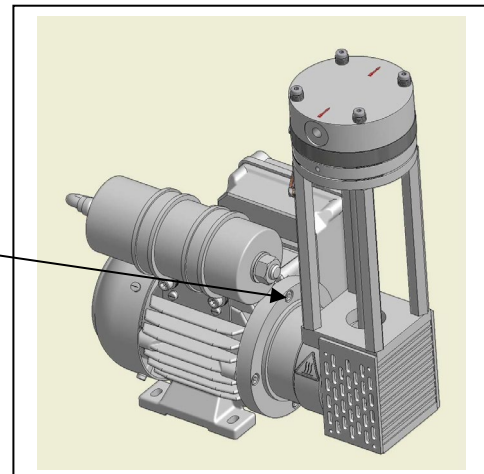
Make sure that no foreign particles can penetrate into the pump.

Install the pump at the highest position within the system to prevent any condensate collection inside the pump head.

Protect the pump against dust.

Protect the pump from vibrations and percussion. Use eventually appropriate rubber-bonded metals.

By loosening the four flange screws, the position of the pump head to the motor bottom can be changed in steps of 90°.

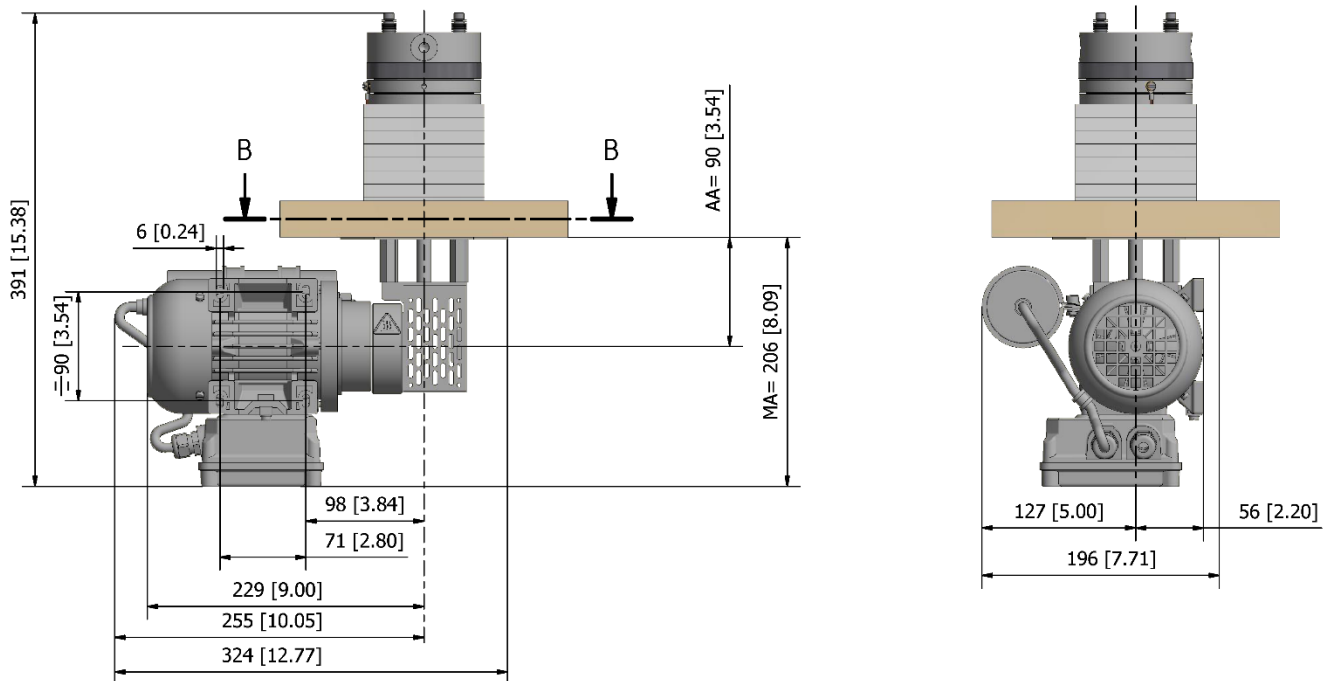


**Warning**

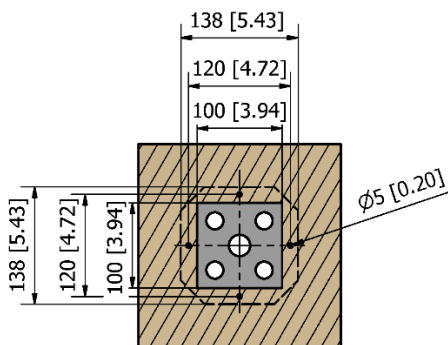
Do not start up the pump until it is firmly mounted.

## 12.1 SPECIAL MOUNTING METHOD, HEAD AND MOTOR SEPARATED BY A HOUSING WALL

Please specify when ordering.

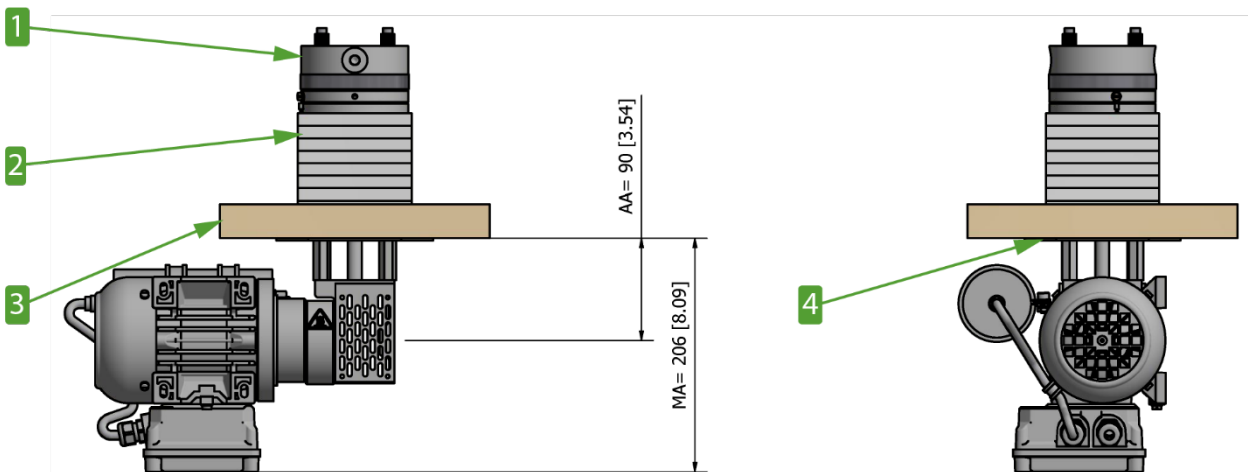


**Figure 3** Dimensions with a housing wall



**Figure 4** Cut-out in the housing wall, section B-B

The pump is supplied with 10 ISO plates. For the desired mounting height of the pump head above the housing wall, a corresponding number of ISO plates can be taken. For each ISO plate removed, the centre distance AA and the motor assembly MA increases by 11 mm.



1 Pump head 2 ISO plates  
3 Housing wall 4 ISO pressure plate

Figure 5 Monting height options for the separated pump head

### 13 ELECTRICAL CONNECTION

#### Qualified personnel

The motor must be connected to the electrical mains supply by a qualified person that is allowed to connect electrical equipment in hazardous areas.



Mortal danger from electric shock!

Only have the pump connected by an authorized specialist.

Only have the pump connected when the power supply is disconnected. The pump may only be connected to the power supply if it is certain that it can be safely operated in the potentially explosive atmosphere that is present.



Explosion danger due to electrostatic charge!

Install the pump so that ignition danger due to electrostatic charge is avoided.


Carefully connect the pump to earth.



Warning

When selecting cables and wiring, the general requirements for use in potentially explosive atmosphere must be met (see EN 60079 or DIN VDE 01 65). In particular cables and wiring must be chosen to withstand the expected mechanical, chemical and thermal conditions.

When routing cables and wiring, and making connections, the necessary conditions and safety measures must be observed (see EN 60079 or DIN VDE 01 65).

The cable fittings must be tested for potentially explosive atmosphere and approved with an EC-Type Examination Certificate  II 2 G.



The national and international prescriptions for instalment of electrical systems in hazardous areas must be heeded.



Warning

For the electrical connection, the general safety and starting up instructions are valid.



Warning

The range A according to IEC34-1 (tension  $\pm 5\%$ , frequency  $\pm 2\%$ ) must be observed to hold the heating within the permissible limits.



Warning

By its arrangement or by additional measures, the pump has to be protected against water, electrical, chemical thermal and mechanical influences so that the explosion protection remains valid during use.



Warning

In case there is a danger of atmospherical discharge, measures for protection against lightning have to be taken.

### 13.1 PROTECTIVE MOTOR SWITCH

After actuation, the protective and controlling units must switch off the plant component in all outer conductors and must not reset the system automatically.

In addition to the above mentioned requirements and the mounting instructions mentioned below under “electrical connection”, further instructions for mounting and electrical connection of the pump have to be heeded:

According to EN 60079-14, the client must protect the pump against inadmissible heating due to an overcurrent protective device with current-dependent delayed all-pole actuation (according to EN 60947).

The overcurrent protector has to be adjusted to the highest rated current of the motor (see rating plate).

Current controlled motors must only be used in continuous operation and unfrequent start-ups that produce no important starting temperature rise.

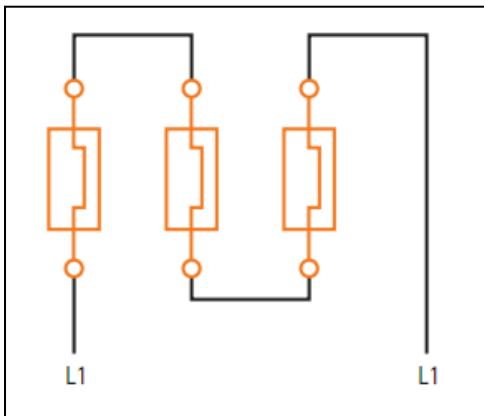
The overcurrent protective device with current-dependent delayed actuation has to be chosen so that the actuation time is not higher than the heating time  $T_E$  of the motor. The actuation time can be taken from the characteristic curve of the switch for the proportion of the motor to be protected. The ratio  $I_A/I_N$  as well as the heating time  $T_E$  are to be taken from the test plate of the motor or from chapter 9.

The overcurrent protective device has to be chosen so that the pump is protected even if the motor is blocked.



**Warning**

The pump must not be operated with variable frequencies on a converter.



**Figure 6 Connection of three-phase current protective motor switch with single-phase current motor**

When using a three-phase current protective motor switch, the live conductor L1 of a one-phase current motor must be switched as shown in the drawing.

Control of the characteristic curve of motor protection for the pump with starting current  $I_A/I_N = 1.7$  as multiple of the rated current  $I_N$  and a set value of the time  $T_E = 120s$ .

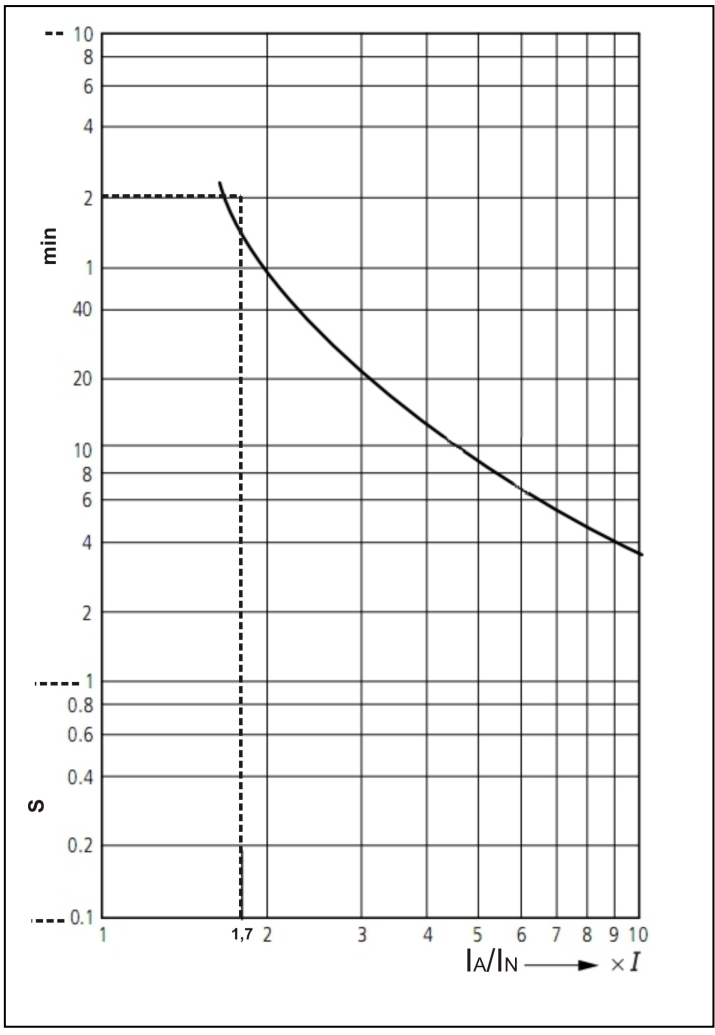


Figure 7 Heating time  $T_E$  in dependence of  $I_A/I_N$

### 13.2 MOTOR CONNECTION

Compare the supply voltage with the data on the motor type plate. For the power consumption, please see the type plate.

- Open the lid of the terminal box.
- In the terminal box, there are a terminal board and a cable gland with thread M 16 X 1.5 for the mains connection. The clamping range of this cable gland is between 5.5 mm and 10 mm. The maximum conductor cross section to be connected to the terminal is 2.5 mm<sup>2</sup>.
- Isolate each cable strand to at least 7 mm.
- The cable conductors must be connected with the cable sockets (max 2,5 mm<sup>2</sup>) to the slot clamps (protected against twisting) by means of a crimp connection. A soldered connection is not admissible.

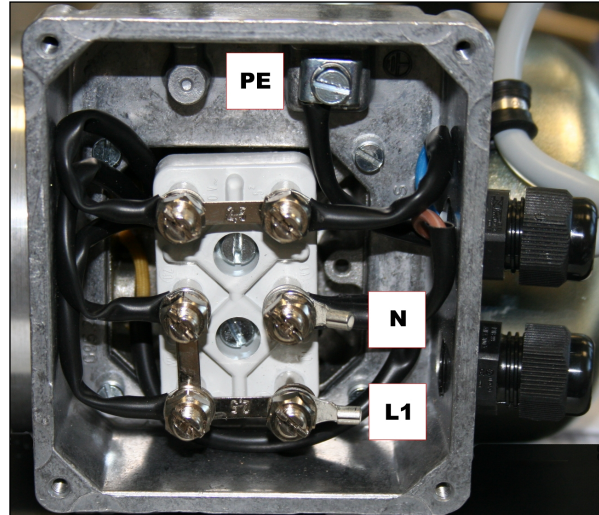


Figure 8 Electrical connection

- Pay attention to the creepage distance and the air gap according to EN 60079-0160079-7. Fasten the screws of the connection parts with a turning moment of 3 Nm. The screws must be protected against accidental loosening.
- Connect the earth conductor on the motor. Inside the terminal box, a screw (4 mm<sup>2</sup>) is provided for the connection of the earth conductor. According to the prescription of the VDE, this screw is marked with the earthing symbol and is equipped with an anti-twist pressure clamp. For the connection, the earth conductor must be insulated on approx. 20 mm. An additional earth screw is to be found on the housing foot.
- Keep the interior of the terminal box clean.
- Reshut the lid of the terminal box. Pay attention that the sealings are in good condition and are placed correctly.

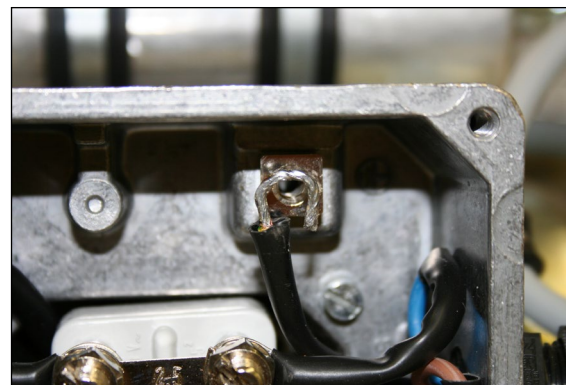


Figure 9 Earth connection



## 14 PNEUMATIC CONNECTION



Warning

Only connect components to the pump which are designed for the pneumatic data of the pump (see chapter 9, Technical data).



Warning



Protect the pump with a pressure relief device between the pressure connection of the pump and the first shut-off valve.

Danger of explosion during pressure relief if the medium mixes with the pump environment. Make sure that the medium cannot mix with the pump environment during pressure relief. During pressure relief, make sure that the medium is captured in a suitable container in such a way that there is no danger of explosion.



It is recommended to install flame barriers on the suction and pressure side of the pump.



In case the pump is used as vacuum pump, safely discharge the pump exhaust.

### 14.1 CONNECTING THE PUMP

- A marking on the pump head shows the direction of flow.
- Remove the protective plugs from the hose connection threads.
- Connect the suction and pressure line. Thread G 1/8" i. Install the suction and pressure line downwards to prevent condensate from running into the pump.

## 14.2 DIAPHRAGM BREAKAGE MONITORING SYSTEM

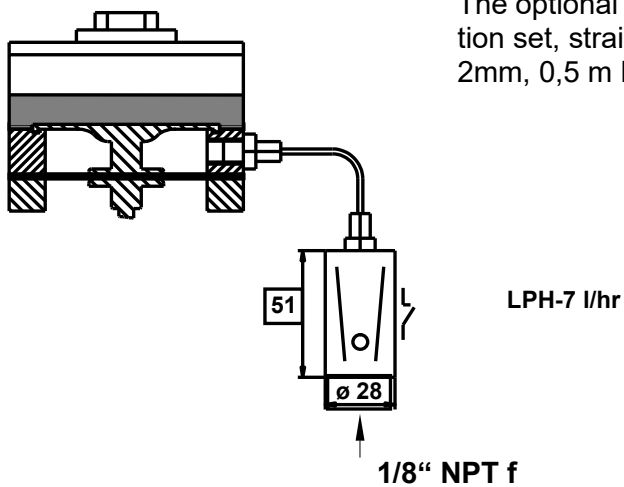


Figure 10 Diaphragm breakage monitoring system

### 14.2.1 CONNECTION AND MOUNTING OF THE OPTIONAL FLOW SENSOR

Mounting position: vertically

Alarm set point: 7 l/hr

Switching function: NC or NO depending on mounting position

NC = Lead wires towards above

Capacity: DC max. 24 V, 50 W, 1 A;

AC max. 24 V, 70 VA, 0.7 A

Material: Acrylic, PTFE, nickel-plated brass

Control gas N<sub>2</sub> pressure 0.2 -0.4 bar



**Warning**

In case the flow sensor is mounted in the ex zone, it must be operated with a respective intrinsically safe wiring device that is appropriate for the EX zone.

It is also possible to operate the double diaphragm safety system with other corresponding flow control devices. Switching point approx. 7 NI/hr.

## 15 OPERATION



Warning

When switching on, the pump must not work against pressure or vacuum. This also applies during operation after a short power failure.

When switching on, make sure that there is atmospheric pressure inside the lines.

During a standstill of the pump, establish atmospheric pressure in the lines.



Warning



Danger of explosion due to an excessive pressure and temperature increase!

Do not exceed the maximum permissible operating pressure of 2 bar abs..

When feeding air with a maximum permissible pressure of 1 bar, the head temperature is increased by 50 °C above the ambient temperature.

This must be considered when the pump head is heated externally.



Warning



Monitor pressure and immediately shut down the pump if the pressure exceeds the maximum permissible operating pressure. Eliminate fault (see chapter 19).



Warning

Only throttle or regulate the air or gas quantity in the suction line to prevent the maximum permissible operating pressure from being exceeded. If the air or gas quantity in the pressure line is throttled or regulated, make sure that the maximum permissible operating pressure is not exceeded.



Warning

Monitor the temperature of the pump and observe the upper pressure limits for compression heat.



Warning

The pumps functioning must be assured by a flow control on the downstream analyse. An indication for an eventually necessary pump maintenance may be a steady decrease of the sample gas flow. If the flow quantity falls below 50 %, a maintenance of the pump must be arranged (see chapter 19).



Warning



Danger of explosion due to increased ambient temperature.

Monitor the ambient temperature because the pump is already heated by compression and motor heat.

Make sure that enough cooling air is supplied.

**Warning**

Danger of severe physical injuries or important material damages. Every change vis-à-vis the normal operation (increased power consumption, temperatures or vibrations, unusual noises or smells, actuation of the control devices etc.) signifies that the function of the pump is affected.

Shut down the pump if there are changes compared with the normal operation, find the cause and eliminate the fault.

## 15.1 FEEDING OF VAPOURS

The life time of the diaphragm can be prolonged if there is no condensate produced inside the pump. Therefore, only execute the feeding of saturated or nearly saturated vapors with a heated pump, i.e. a heated pump head.

## 16 SHUT DOWN OF THE PUMP

When feeding aggressive mediums, purge the pump before shut down to prolongate the life time of the diaphragm.

## 17 MAINTENANCE

**Warning**

Work carefully when executing any maintenance work.

**Warning**

Danger of explosion due to wearing!

Therefore, it is necessary to check at regular intervals all components of the pump according to the following maintenance plan.

Maintenance plan:

Component to be checked	Measure
Pump	Check the pump for outside damages or leakages at appropriate intervals.
Condenser	Check at appropriate intervals the condition of the bond covers on the ventilation holes. Where the bond covers are damaged, the condenser has to be exchanged.
Diaphragms and valve plates	To be exchanged at the latest when the pump capacity is insufficient.

Component to be checked	Measure
Connecting rod bearing	To be exchanged after 17,000 operating hours or at the latest after 24 months.
Engine bearing	To be exchanged after 17,000 operating hours or at the latest after 24 months.
Lead through -, connecting - or leading-in parts	Check at appropriate intervals. When damaged, exchange the parts by original spare parts of perfect condition.



Warning

All maintenance works on explosion proof machines have to be executed according to the relevant national regulations "Regulation on electrical instalments in explosive areas" as well as considering the safety instructions of this manual.



Warning

All components such as clamps, leading-in cables and lines as well as plugs have to be replaced only by equivalent parts with EC-Type Examination Certificate.

### 17.1 PURGING THE PUMP

Before shut down, purge the pump under atmospherical conditions for some minutes with inert gas. If there is no danger of explosion, the pump may also be purged with air.



Warning

Danger of explosion due to purging the pump with air!  
In explosive areas or when using the pump with explosive mediums, it must be purged with inert gas and only by a qualified person.

### 17.2 CLEANING THE PUMP



Warning

Danger of explosion due to electrostatic charging of components! Only clean the pump with a humid cloth and non-inflammable cleaning agents.

If pression air is available, blow off the components.

### 17.3 REPLACING DIAPHRAGM AND VALVE PLATE



**Warning**

Dangerous tension!

Before executing any maintenance work, separate the pump from the mains!



Only an authorized person may separate the pump from the mains. Check and make sure that there is no tension.



**Warning**

Dangerous gases and fluids possible!

Before executing any maintenance work, purge the pump (see chapter 17.1)!

Spare parts needed:

- Wave diaphragm (One) : 1 per pump **MP26H-SS Ex-IIC** and 2 per pump **MP26H-SS/D Ex-IIC**  
wave diaphragm consists of 3 single plates)
- Valve plate : 2 per pump
- O-Ring : 2 per pump

Tools needed:

- Hexagon key 4 mm,
- Adjustable pin type face wrench for round nut with drilled holes in one face with 4mm diameter of dog point
- Heat resisting screw adhesive (DELO ML 5327 or comparable product)
- Felt tip pen



**Note**

Always change the diaphragms, valve plates and O-rings at the same time to maintain the capacity of the pump.



**Warning**

Make sure that the diaphragms, valve plates and O-rings are in perfect condition, clean and installed correctly.



**Warning**

Always change defective parts immediately.



**Warning**

Danger of explosion due to development of explosive atmosphere!

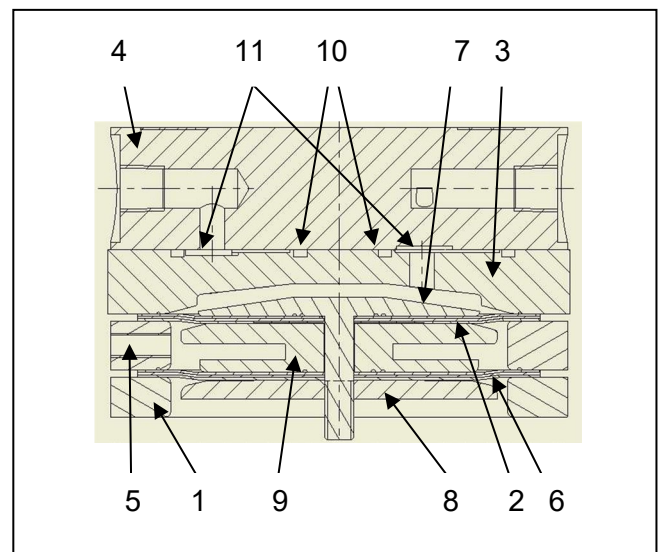
Utight connections may produce dangerous explosive atmospheres.

Check the tightness of the pneumatic connections of the pump.

### 17.3.1 DISMOUNTING

Execute every work step carefully and without use of force:

- Mark the position of intermediate plate (3) and head plate (4) and for **MP26H-SS/D Ex-IIC** also carrier (1) and intermediate plate diaphragm break control (5), relative to each other by a drawing line with a felt-tip marker. This is to ensure that the parts will be reassembled in correct position at a later stage.
- Release the four hexagon socket head cap screws and remove them together with the disk springs. The disk springs are fitted in order to maintain the tension of the wave diaphragm across the temperature range of the pump. Do not remove the disk springs from the screw to make sure that the position of the disks remain the same.
- Remove head plate (4).
- Remove valve plates (11) and O-rings (10) from intermediate plate (3).
- Remove intermediate plate (3).
- Release the retainer plate (7) by turning it anti-clockwise with a pin wrench or a retaining plate wrench. Take out the retainer plate and remove the above wave diaphragm (2).



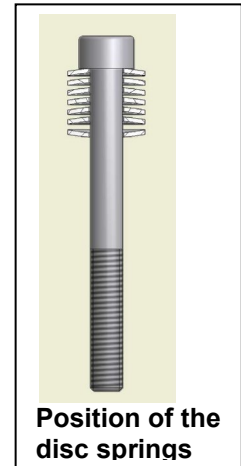
**Attention** For **MP26H-SS/D Ex-IIC** Adjusting washer(s) below the diaphragm support possible!

- For **MP26H-SS/D Ex-IIC** remove the pressure plate for diaphragm break control (9) and intermediate ring (5) as well as the below wave diaphragm (6) and supporting ring (1) with diaphragm support (8).
- Check all parts for cleanness and clean them if necessary; if there are any unevenness, scratchings and corrosion, exchange these parts.

### 17.3.2 MOUNTING

- For **MP26H-SS/D Ex-IIC** possibly lay adjusting washer(s) onto the prolongation of the connecting rod.
- For **MP26H-SS/D Ex-IIC** place the connecting rod plate (8) and the supporting ring (1) onto the prolongation of the connecting rod.
- For **MP26H-SS/D Ex-IIC** place the new wave diaphragm (6) at the bottom of the connecting rod plate (8).

- For **MP26H-SS/D Ex-IIC** place the pressure plate for diaphragm break control (9) and the intermediate ring diaphragm break control (5)
- Lay on top the wave diaphragm (2).
- Bring the parts into line according to the marking of the felt pen and align the wave diaphragms according to the bore holes of the cap screws.
- Screw in the cap screws for centring (pay attention to the position of the disc springs).
- Apply a short quantity of heat resisting screw adhesive onto the thread of the retainer plate (7) (eg. DELO ML 5327).
- Screw the retainer plate (7) into the prolongation of the connecting rod and tighten it firmly by means of a pin wrench or a retainer plate key.
- Unscrew the four cap screws again.
- Place the intermediate plate (3) according to the felt-tip pen markings.
- Insert the new valve plates (11) into the valve seats of the intermediate plate. The valve plates for pressure and suction side are identical; the position of the valve plates is determined by the shape of the valve seats.
- Fit the new O-rings (10) in the intermediate plate (3).
- Place the head plate (4) on the intermediate plate (3) in the position indicated by the felt-tip pen marking.
- Place the hexagon socket head cap screws with the disc springs and tighten them. Tightening torque: 5 Nm.
- Turn the motor shaft in order to check that the pump rotates easily.
- Check and ensure the gas-tightness of the pump head and the tubing:



**Warning**

Hazard of explosion caused by leaks!

Before putting the pump into operation again, check and ensure the gas tightness of the pump head and the tubing. Leakages may lead to explosion hazard!

## 18 ENVIRONMENT PROTECTION

Store and depollute all exchange parts in accordance with the environmental regulations. Consider the national and international prescriptions. This is especially valid for those parts that are contaminated with toxic agents.

The after sale service and any repair works must only be effected by **M&C**. Use only original spare parts for every maintenance work.



## 19 TROUBLESHOOTING



**Warning**



First disconnect the pump power supply before working on the pump!

Mortal danger due to electric shock!

Only a skilled staff must separate the pump from the power supply.

Check and ensure that the pump is de-energized.

### Qualified personnel

Failure malfunction	Possible cause	Check/Fault remedy
Pump does not transfer.	Connections or lines blocked.	Check connections and lines. Remove blockage.
	External valve is closed or filter is clogged.	Check external valves and filters.
	Condensate has collected in pump head.	Flush pump (see chapter 19.1).
	Diaphragm or valve plates are worn.	Replace diaphragm and valve plates (see section 19.3).
Flow rate, pressure or vacuum too low. (The pump does not achieve the output specified in the Technical data or data sheet.)	Condensate has collected in pump head.	Flush pump (see chapter 19.1). Install pump at highest point in system.
	There is gauge pressure on pressure side and at the same time vacuum or a pressure above atmospheric pressure on suction side.	Change the pressure conditions.
	Pneumatic lines or connection parts have an insufficient cross section or the throttled.	Disconnect pump from system to determine output values. Eliminate throttling (e.g. valve) if necessary. Use lines or connection parts with larger cross section if necessary.
	Leaks occur on connections, lines or pump head.	Eliminate leaks.
	Connections or lines completely or partially clogged.	Check connections and lines. Remove the clogging parts and particles.
	Head parts are soiled.	Clean head components.
	Diaphragm or valve plates are worn.	Replace diaphragm and valve plates.



**Note**

If you are unable to determine any of the specified causes, send the pump to the M&C service department (see address on page 5).

**Warning**

Clean or flush the pump before dispatch and remove all aggressive, poisonous or other dangerous fluids from the pump head!

## 20 SPARE PARTS

**Warning**

Danger of explosion due to use of inappropriate parts!

Except of standardized, customary and equivalent parts (e.g. roller bearings), only original spare parts must be used; this is also very important for the use of seals.

Wear, tear and replacement part requirements depend on specific operating conditions. The recommended quantities are based on experience and are not binding.

Sample gas pump MP26H Ex-IIC					
(V) Consumables (E) Recommended spare parts (T) Spare parts					
		Recommended quantity for Period of operation [years]			
Part No.	Description	V/E/T	1	2	3
90P5001	Wave diaphragm	V	6	12	18
90P5006	Valve plate	V	6	12	18
90P5011	O-ring	V	6	12	18

## 21 APPENDIX

- Declaration of Conformity




For additional product documentation please look on our home page:  
[www.mc-techgroup.com](http://www.mc-techgroup.com) .

## EU – Konformitätserklärung *EU Declaration of conformity*

im Sinne der Vorschriften nachfolgend genannter EU Richtlinien  
*according to the following EU directives*

Die **M&C TechGroup Germany GmbH** erklärt hiermit, dass nachfolgende Produktgruppen,  
 des Types  
*With this document, the M&C TechGroup Germany GmbH confirms, that the following  
 product types of these product groups*

Produktgruppen *Product groups* Messgaspumpe /  
 Sample gas pump

Types *Product types* MP26H SS Ex – IIC Abgesetzter Kopf  II 2 G Ex IIC T2

den grundlegenden Anforderungen der nachfolgenden Richtlinien entsprechen  
*comply with the essential requirements of the following directives*

EU-Richtlinie 2011/65/EU	RoHS
<i>EU-Directive 2014/65/EU</i>	<i>RoHS</i>
EU-Richtlinie 2014/34/EU	Explosionsschutz
<i>EU-Directive 2014/34/EU</i>	<i>ATEX directive</i>

Sowie die Übereinstimmung mit nachfolgenden Normen:  
*As well as in compliance with the following standards:*

EN 61010-1:2010

DIN EN 61000-3-2:2014  
 DIN EN 61000-3-2:2013  
 EN 1127-1:2011  
 DIN EN ISO 80079-36:2012  
 EN 60079-0:2012 A11 2013  
 EN60079-7:2015

Überspannungskategorie III; Verschmutzungsgrad 2  
*Overvoltage category III ; Pollution Degree 2*

EN60079-5:2015  
 DIN EN 60034-1:2011  
 DIN EN 55014-1:2006+A1:2009  
 DIN EN 55014-2:1997+A1:2001+A2:2008  
 DIN EN 61000-3-2:2006

Ratings, den 01.03.2020

**M&C TechGroup Germany GmbH** ..... **D-40885 Ratingen** ..... Hans-Jörg Rumm, Technical Director

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherungen  
 von Eigenschaften im rechtlichen Sinne.  
*This declaration certifies conformance with the above mentioned directives. Affirmation of attributes in a legal sense is not included.*  
 Die Sicherheitshinweise und Installationsanweisung der mitgelieferten Produktdokumentation sind zu beachten.  
*The safety declarations and installation instruction of the accompanying product documentation need to be considered.*

CE Konformitätserklärung 96053\_10101

Ursprungsdatum: 18.07.11

M&C TechGroup Germany GmbH  
 Geschäftsführer Olaf Sommer  
 Rehnecke 79, 40885 Ratingen  
 Germany

Tel +49 2102 935-0  
 Fax +49 2102 935-111  
 Info@mc-techgroup.com  
 www.mc-techgroup.com

Amtsgericht Düsseldorf  
 HRB 53843  
 USt-Ident-Nr. DE 814788475  
 WEEE-Reg.-Nr. DE 99278920

Stadtsparkasse Düsseldorf  
 KTO 1004359657 / BLZ 30050110  
 IBAN DE 32300501101004359657  
 BIC DUSS DE 33

M&C TechGroup  
 Gasentnahme- & Gasaufbereitungs-  
 technologie • Projektierung und  
 Bau von Analyse-Sondersystemen

## EU – Konformitätserklärung *EU Declaration of conformity*

Produktgruppen  
*Product groups*

Messgaspumpe /  
*Sample gas pump*

### **Anhang/Appendix**

Entsprechend Artikel 13 (1) b) ii) der 2014/34/EU ist die technische Dokumentation bei der benannten Stelle DEKRA EXAM GmbH hinterlegt. BVS 11 ATEX H/B 075.

According to article 13 (1) b) ii) of the directive 2014/34/EU, the technical documentation is deposited at the notified body DEKRA EXAM GmbH. BVS11 ATEX H/B 075.

Die Inbetriebnahme der unvollständigen Maschine ist so lange untersagt, bis festgestellt wurde, dass die Maschine, in die die unvollständige Maschine eingebaut werden soll, den Bestimmungen der Maschinenrichtlinie 2006/42/EG entspricht.

Da diese unvollständigen Maschinen Einbaugeräte sind, müssen die Netzanschlüsse und Einrichtungen zum Trennen und Ausschalten der unvollständigen Maschine sowie Überstrom- und Überlastschutzeinrichtungen beim entsprechenden Einbau berücksichtigt werden.

Darüber hinaus muss beim Einbau ein Berührungsschutz gegen bewegte und heiße Teile, soweit vorhanden, vorgesehen werden.

Diese unvollständige Maschine darf nicht im Freien aufgestellt werden. Inbetriebnahme nur mit geeigneter Witterungs- und Korrosionsschutzverkleidung.

The start-up of the incomplete machine is not allowed before declaration that the machine in which the uncomplete machine shall be installed corresponds to the regulations of the machine directive 2006/42/EG. Due to the fact that these uncomplete machines are built-in units, the power supply and the devices to separate and switch off the incomplete machine as well as the over-current and overload protection devices must be considered when mounting.

Furthermore, there must be provided a protection against contact of moving and hot parts as far as applicable. This uncomplete machine must not be installed in the open-air. Starting-up only with appropriate weather and corrosion protective enclosures.