Embracing Challenge

Analytical Diaphragm Pump Series MP®

MP26-H1 heated at 180 °C

Instruction Manual
Version 1.00.02

Dear customer,

Thank you for buying our product. In this manual you will find all necessary information about this M&C product. The information in the 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 instruction manual.

For additional information about our products, please go to M&C's website www.mc-techgroup.com. There you can find the data sheets and manuals of our products in German and English.

Version: 1.00.02

Content

List of illustrations

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1 GENERAL INFORMATION

The product described in this instruction 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 instruction manual need to be followed. This instruction 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

CE - Certification

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

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.

Declaration of conformity

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

3 SAFETY INSTRUCTIONS

Observe the following general safety procedures when mounting, starting up or operating this equipment:

Read this operating manual before starting up and use of the equipment. The information and warnings given in this operating manual must be heeded.

Any 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 (IEC 364) when setting high-power electrical units with nominal voltages of up to 1000 V, together with the associated standards and stipulations.

Check the details on the type plate to ensure that the equipment is connected to the correct mains voltage.

Protection against touching dangerously high electrical voltages:
Before opening the equipment, it must be switched off and hold no voltages. This also applies to any external control circuits that are connected.

The device is only to be used within the permitted range of temperatures and pressures.

Check that the location is weather-protected. It should not be subject to either direct rain or moisture.

The device must not be used in hazardous areas.

Installation, maintenance, monitoring and any repairs may only be done by authorized personnel with respect to the relevant stipulations.

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

This means that death, severe physical injuries and/or important material damages **will occur** in case the respective safety measures are not fulfilled.

Warning

This means that death, severe physical injuries and/or important material damages **may occur** in case the respective safety measures are not fulfilled.

Caution

This means that minor physical injuries **may occur** in case the respective safety measures are not fulfilled.

Attention

This means that a material damage may occur in case the respective safety measures are not met.

Note

These are important information about the product or parts of the operating manual which require user's attention.

Qualified Personnel

These are persons with necessary qualification who are familiar with installation, use and maintenance of the product.

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

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, pointed objects or extremely high temperatures requires wearing protective gloves.

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

Wear protective clothes!
Working with chemicals, pointed objects or extremely high temperatures requires wearing protective clothes.

6 INTRODUCTION

The electrically heated diaphragm pump **MP26-H1** is suitable for corrosive hot wet gases. It is constructed especially for gas transportation in hot wet gas analysis systems.

7 DESCRIPTION

All sample wetted parts of the pump **MP26-H1** are made of PTFE. This makes the pump suitable for hot wet applications with corrosive gases.

The pump works absolutely lubricant free. This means that the sample remains analytically unchanged.

Due to a special diaphragm and valve system the pump operates maintenance-free.

The pump head is heated up by an aluminium heater body. It includes the heater cartridges (two each) and the capillary sensor of the thermostat. The pump head has a metal cover with thermal insulation.

The set-temperature of 0 to 180 °C [32 to 356 °F] can be adjusted at the thermostat, located in the terminal box beside the pump head. The thermostat has an excess temperature limiter which permanently switches off the heating if the set temperature is exceeded by 30 °C [54 °F]. I this case the heater must be reset by hand. The ***RESET*** button is located at the upper right side of the thermostat.

The thermostat has an low-temperature alarm which activates a contact if the temperature decreases 30 °C [54 °F] under the set temperature. This status alarm is located on the terminal strip as a potential-free switch over contact.

The motor is protected by a motor protection switch, which is installed in the terminal box as well. The motor can be switched on and off by pressing the button ‘On/Off’ at the side of the terminal box. External switching of the motor is also possible with a potential free contact.

The **MP26-H1** is available in 230 V or 115 V.

The standard **MP26-H1** is designed for applications at a maximum gas flow of 10 l/min.

- Maximum temperature for medium during operating: -20 to +200 °C [-4 to 392 °F].
- The pump must be protected from the effects of dust and water.
- Before use please check the compatibility of the material.

8 TECHNICAL DATA

Diaphragm pump	**MP26-H1..**	
Part No.	**02P1300**	**02P1305**
Power supply	230 V,50 Hz	115 V,60 Hz
Degree of protection	IP44 DIN 40050	
Capacity max.	**10.0 l/min** without pressure	
Operating pressure	0.3 to 2.2 bar abs.	
Sample temperature	-30 to +80 °C [-22 to 176 °C]	
Ambient temperature	-10 to +40 °C [14 to 104 °C]	
Storage temperature	-15 to +60 °C [5 to 140 °C]	
Gas connections	RC 1/4" female	
Electrical standard	EN 61010 Part 1	
Material of sample wetted parts	PTFE	
Weight	6.5 kg [≈ 14.3 lbs]	

8.1 AMBIENT CONDITIONS

When the pump is in operation mode the following ambient conditions must be maintained:

- Ambient temperature during operating: -10 to + 40 °C [14 to 104 °C].
- The pump must be protected from dust and water.
- During operating an adequate supply of air for cooling must be provided.

9 FLOW CHARACTERISTICS

The following chart shows the performance of the diaphragm pump type **MP26-H1**.

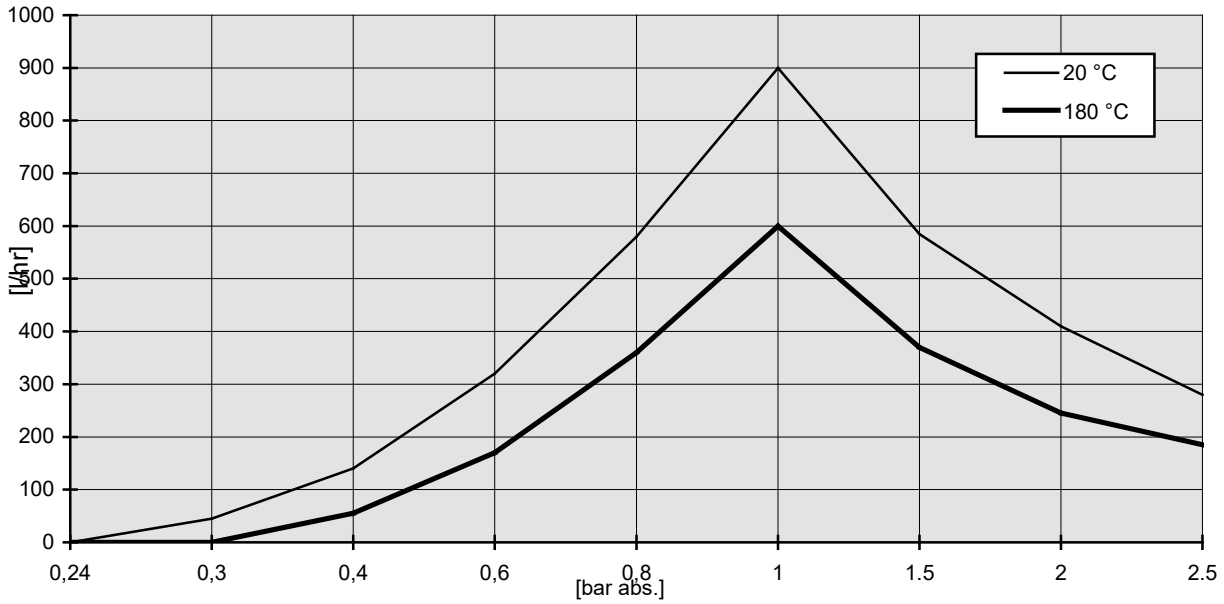


Figure 1 Flow characteristics MP26-H1

10 RECEIPT OF GOODS AND STORAGE

- Please take the sample pump and possible special accessories carefully out of the packaging material immediately after arrival and compare the goods with the items listed on the delivery note!
- Check the goods for any damage caused during delivery and, if necessary, notify your transport insurance company without delay of any damage discovered.

Note

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

11 INSTALLATION INSTRUCTIONS

When installing the pump make certain that accident prevention regulations and safety instructions including those for subsequent operation are observed. The safety instructions must be observed.

Note

The pumps must only be used for their intended purpose.
The pump must only be used in the conditions specified in the technical data.
Specific safety instructions concerning sample must be observed.
The pump should be installed away from heat sources and freely ventilated to prevent any accumulation of heat.
The pumps have no protection against water. In this case, as far as it is relevant, measures to protect the pump must be taken before start-up.
For outdoor installation, the pump must be installed in a housing protected from frost in the winter and sufficiently ventilated in summer. Exposure to direct sunlight must be avoided.

The protection class of the pumps **MP26-H1** is IP44.

Warning

It is essential to provide protection for persons against contact with live parts (e.g. electrical connections, motor windings) and moving parts (e.g. fan). Protection against the entry of foreign bodies must also be provided.

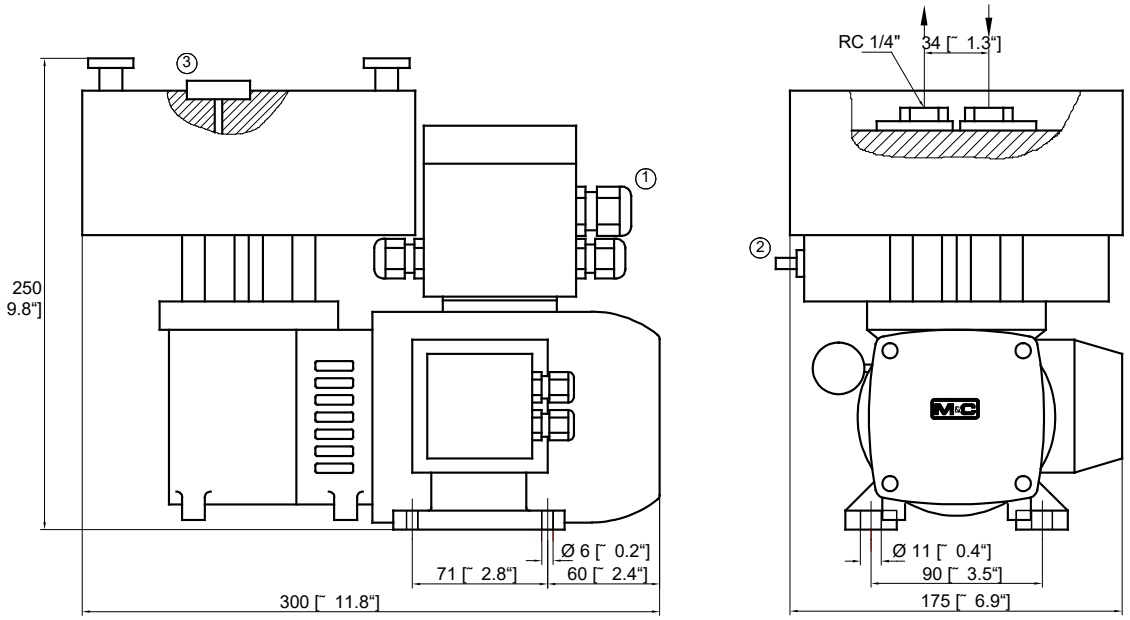
Note

Pumps have mechanical moving parts that can induce vibrations. To prevent damages at the pump or at peripheral components/facilities as well as minimizing noise development an appropriate vibration decoupling is necessary. For this M&C can deliver e.g. anti-vibration pads.
This explicit is also valid for the connection of the sample lines at the pump head.

11.1 MECHANICAL

- The dimensions of the mountings are given in Figure 2.
- The pump is provided for assembly and therefore it must be fastened with screws.
- Install the pump so that the fan can draw in sufficient cooling air.
- Install the pump so that accidental finger contact with the fan is impossible.

Figure 2 shows the dimensions of the diaphragm pump.



Dimension in mm [Inches]

① 2 x PG13, 1 x PG9
② Heater elements
③ Thermometer, indicator for 50 to 250 °C [122 to 482 °F]

Figure 2 Dimensions [mm and Inches] MP26-H1

11.2 ELECTRICAL CONNECTIONS

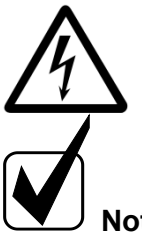
When making the electrical installation, shown in Figure 3, the safety regulations must be observed. In particular make sure that the electricity supply is isolated before trying to connect the pump.

Warning

The diaphragm pumps type MP26-H1 must not be used in hazardous areas.

When connecting the equipment, please ensure that the supply voltage is identical with the information provided on the model type plate.

The supply voltage is only allowed to deviate max. +6 % respectively -10 % from the indication on the model type plate.



Note

Take care that safety regulations are observed when connecting the pump to the power supply.

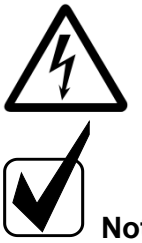
Attention must be paid to the requirements of IEC 364 (DIN VDE 0100) when setting high-power electrical units with nominal voltages of up to 1000 V, together with the associated standards and stipulations.

Check the details on the type plate to ensure that the equipment is connected up to the correct mains voltage.

A main switch and matching fuse must be provided externally (EN 60335-1).

For electrical details see technical data.

1. Remove the lid of the connection box. The electrical connection layout is located in the lid.
2. Insert the mains cable (min. 3 x 1.5 mm²) through the threaded cable gland and connect to the appropriate terminals (see Figure 3).
3. Insert the signal cable through the treaded cable connection and connect to the appropriate terminals (see Figure 3).
4. Screw lid back on.



Note

The earth-wire (ground) must be connected to the motor.

The pump must be installed so that contact with live parts (connections, possibly windings) is impossible.

Figure 3 shows the electrical connection of the diaphragm pump.

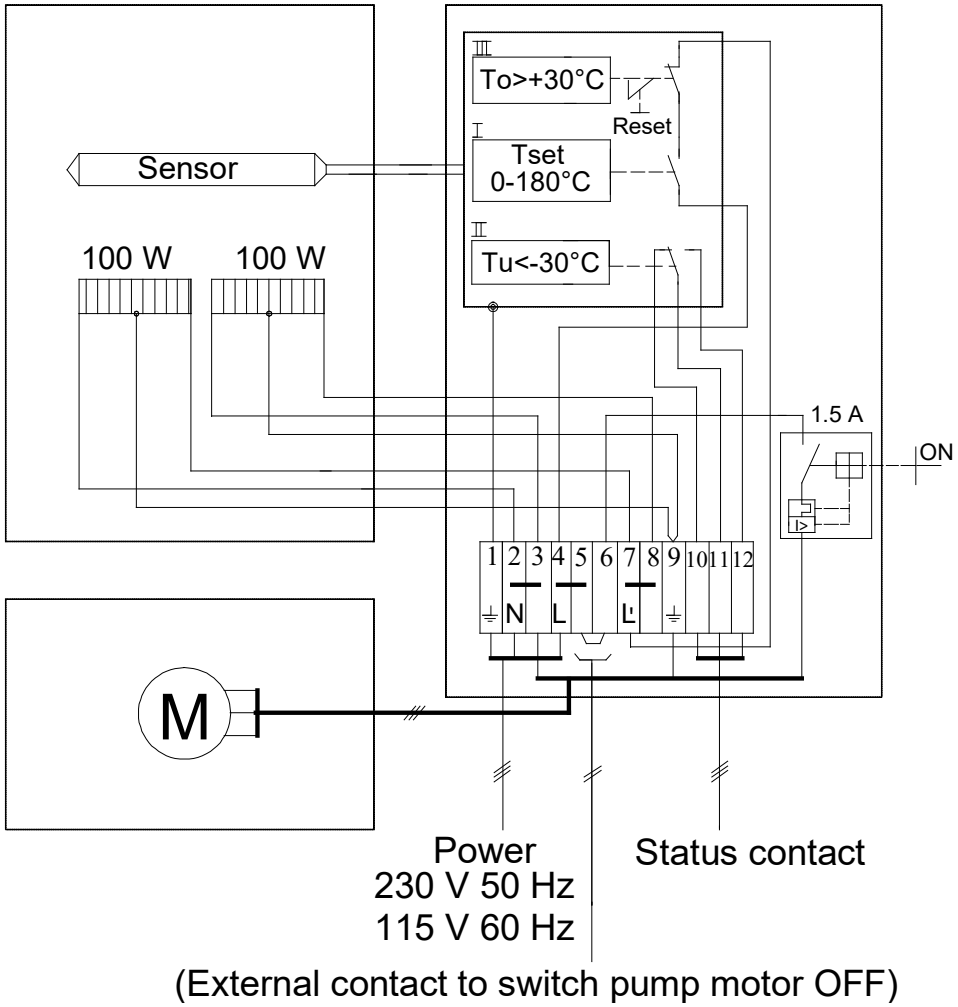


Figure 3 Electrical connection

11.3 PNEUMATIC

Note

Components connected to the pump must be designed according to the pneumatic performance of the pump (see technical data).

The pump must only be used in the conditions specified in the technical data.

1. Remove the protection plugs from the port threads (thread size RC 1/4” female).
2. Accessories like temperature resistant hose connections are screwed into the port threads by sealing tape.
3. Connect the suction and pressure heated lines.

11.4 HOSE-/TUBE CONNECTIONS

The gas inlet and outlet hoses/tubes are connected on the top of the pump. Standard RC 1/4" female threaded joints are available for the connection of the gas sample lines.

Note

The valve body must be fixed while mounting the fittings because moving may change the pump capacity.

Do not confuse hose-/tube connections for sample gas inlet and outlet; the connections are labelled accordingly!

Check for tightness of all sample lines after connection!

The tightness of the connections can only be guaranteed if the end section of the connection hose/tube is flat (use a hose-cutter)!

When connecting the sample gas supply hoses or tubes to the corresponding threaded connections, pay attention to the following points:

1. Loosen the sleeve nut of the clamping-ring threaded joint by turning to the left. Take care that the nut is removed carefully from the body of the threaded joint to avoid losing the clamping ring which is mounted loose in the nut.
2. Push the sleeve nut over the connection hose/tube.
3. Push the clamping ring onto the connection hose/tube with the thicker bulge pointing to nut.
4. Push the hose/tube onto the supporting nipple in the threaded joint.
5. Tighten the sleeve nut by hand.

The hose/tube is now mounted in such a way that it cannot slip and is resistant to pressure.

The appropriate tube or hose threaded joint connections are available optionally from M&C.

12 START-UP

Specific safety instructions for media being handled must be observed.
Before pumping a medium, the compatibility of materials of pump head, diaphragm and valves with the medium must be checked (for pump materials: see chapter 8 technical data).

Observe before initial start-up:

- The pump must not start against pressure or vacuum. When it is switched on the pressure in the suction and pressure lines must be atmospheric. This must be so even when the pump re-starts after the power has been cut off for a short period.
- The maximum permissible operating pressure (see chapter 8 technical date) must not be exceeded, even when the flow is restricted.
- To prevent the maximum permissible operating pressure being exceeded, restriction or control of the air or gas flow should only be carried out in the suction line.
- If restriction or control of the air or gas flow is made on the pressure side ensure that the maximum permissible operating pressure is not exceeded.
- When the pump is at a standstill the inlet and exhaust must be at normal atmospheric pressure.
- Diaphragm and valve plates are the only parts subject to wear. Wear is usually indicated by a drastic reduction in the pneumatic performance. When replacing parts proceed as described in chapter 15.1.
- Ambient conditions: see technical data.

For start-up follow these steps:

1. Push motor protection switch that the button is moving out.

2. Switch on mains power supply.

The total heating-up time is approximately 1 hour. After approximately 30 minutes the pump temperature exceeds the low-temperature alarm (30°C below rated value). After these another 30 minutes are needed to reach the operating temperature.

3. The motor can be started after pushing the motor protection switch (button is moving in).

13 CLOSING DOWN

Note

The area in which the pump is situated when not in use must be kept free of frost at all times.

If the pump is putting out of action for a short time no particular measures need to be taken.

14 MAINTENANCE

Observe the plant- and process-specific safety measures before carrying out maintenance work.

Warning

It is necessary to take the pump off the mains before any assembly, maintenance or repair work is carried out!

Wait until the temperature is low enough to do maintenance.

Diaphragm and valve plates are the only parts of the pump subject to wear. They are easy to change.

Warning

Aggressive medium is possible.

Wear protective glasses and proper protective clothing during disassembly, repair or cleaning!

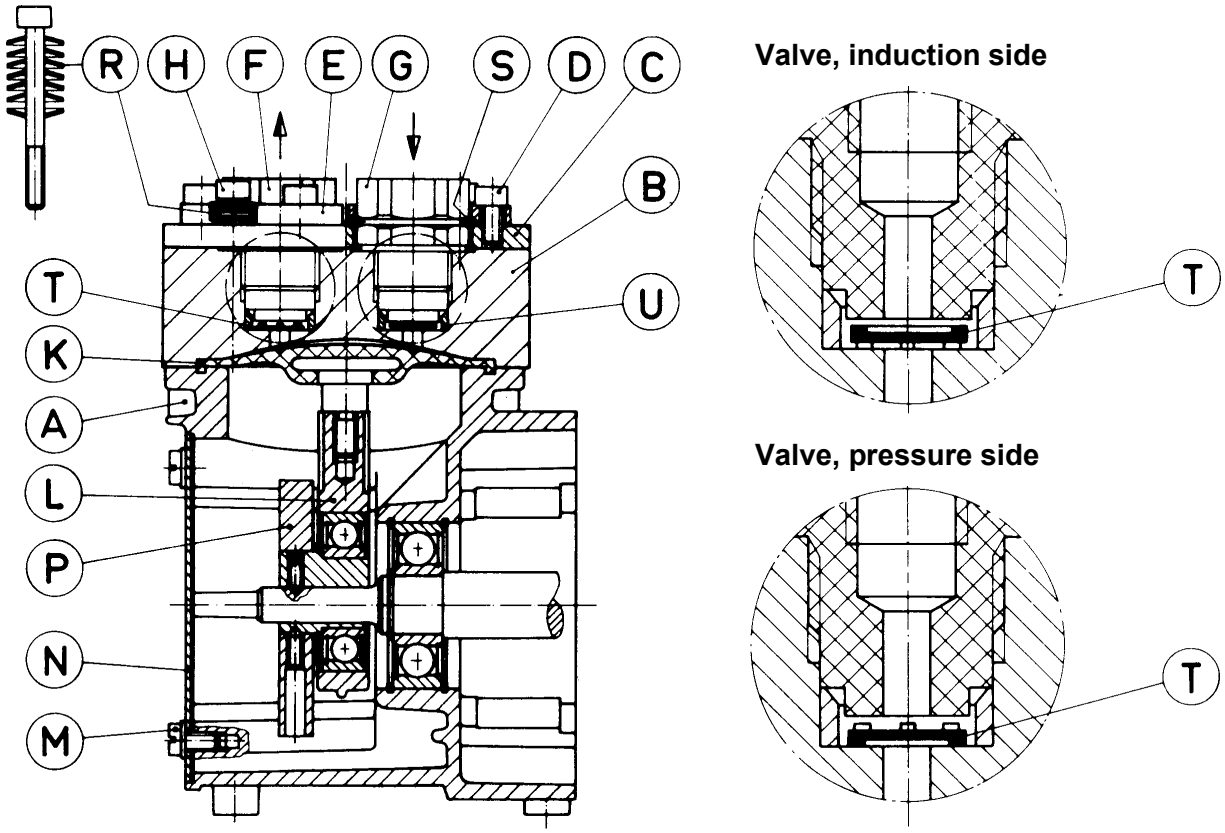


Figure 4 Sectional drawing MP26-H1

Parts and tools required:

- Valve plates, sealing rings (2 for each pump head) and structured diaphragm(s)
- Screwdriver No. 1

Note

Always change valve plates, diaphragm and sealing rings at the same time.

The diaphragm(s), valve plates and sealing rings must be replaced in the sequence described in chapter 14.1.

14.1 REMOVING THE DIAPHRAGM AND VALVE PLATES

Remove the heater assembly from the pump head:

1. Unscrew the knurl nuts at the top of the pump head and take the cover off.
2. Unscrew each of the 2 hexagon head screws on the bottom plate of the pump head and remove the complete heating device from the pump head.

Replace the diaphragm, O-rings and valve plates:

1. Mark the position between housing **A** diaphragm **B** and pressure plate **C**;
2. Loosen the 6 hexagon screws **D** and remove the pressure ring **E**;
3. Loosen the valve body **F** and **G**;
4. Loosen the 4 hexagon screws **H** and remove the pressure plate **C** and the diaphragm head **B**;
5. Unscrew the diaphragm **K** by hand out of the tapping hole of the rod **L** (counter-clockwise);
6. Loosen the 4 screws **M** and remove the cover **N**;
7. Screw the new diaphragm **K** into the rod **L** hand-tight;
8. Turn the flywheel **P** until the rod **L** is in a central Position. Control that the bulge of the diaphragm **K** fits to the groove of housing **A**;
9. Fix the diaphragm head **B** and the pressure plate **C** according to the mark;
10. Fix the 4 hexagon screws **H** constantly over cross until the plate springs **R** are flat;
11. Turn the flywheel **P** and check whether it works proper;
12. Mount the cover **N**;
13. Change the 0-ring **S** at the valve body **F** on the pressure side;
14. Change the valve plate **T**. Check whether the protection ring **U** is in the right position and the 6 layers of the valve plate **T** point to the top;
15. Screw in the valve bodies **F** and tighten them in a moderate way;
16. Change the 0-ring S on the sucking side;
17. Remove the valve plate **T** and change it with a new one. Check whether the protection ring **U** is in the right position and the 6 layers of the valve plate **T** point to the bottom;
18. Screw in the valve bodies **G** and tighten them in a moderate way;
19. Put on the pressure ring **E** and tighten the 6 hexagon screws.

14.2 CLEANING

- When changing valve plates and diaphragm, inspect all parts for dirt before assembling the pump head and clean them if necessary.
- As far as possible clean the parts with a dry cloth. Solvents should not be used as they can attack the plastics and synthetic rubber parts. If a compressed air line is available, blow the parts out with it.

Warning

Aggressive medium is possible.

Wear protective glasses and proper protective clothing during disassambly, repair or cleaning!

For recommended spare parts please see chapter 17.

15 TROUBLE SHOOTING

Before working on the pump isolate the power supply securely, then check that the lines are not live. The following tips for fault-finding are best employed in the sequence shown.

Problem/indication	Possible cause	Action/Check
Pump produces no flow	No main supply.	Check power supply. Check plug for correct fit.
	Connections or lines are blocked.	Remove blockade.
	An external valve is closed or a filter is blocked.	Open valve or clean blocked/dirty filter.
	Liquid (condensate) has collected in the pump head.	Let the pump for a few minutes pumping air.
Flow, pressure or vacuum too low	Diaphragm or valves are weared out.	Change diaphragm or/and valves.
	Compare the actual performance with the figures in the technical data.	The pump is not designed for this condition.
	There is pressure on the pressure side and at the same time vacuum or a pressure above atmospheric on the suction side.	The pump is not designed for this condition.
	The cross-section of pneumatic lines or connected components is too small, or they are restricted.	To measure the performance, disconnect the pump from the system (smaller diameter tubing or a valve can significantly affect performance).
	A leak at a connector, in a line or in the pump head.	Insulate the leak, tighten the screws, clean or exchange dirty parts.

Note

If the pump does not operate properly and you can not find any of the above-mentioned faults, send it back to M&C.
If you send the pump for repair, please include information about the medium it was handling.
In particular, if it was handling aggressive substances our engineers must be informed.
If you have been handling dangerous or highly aggressive gases please clean the pump before despatch.

16 PROPER DISPOSAL OF THE DEVICE

At the end of the life cycle of our products, it is important to take care of the appropriate disposal of obsolete electrical and non-electrical devices. To help protect our environment, please follow the rules and regulations of your country regarding recycling and waste management.

17 SPARE PARTS LIST

The replacement interval for spare parts and consumables depends on the specific operating condition of the pump. The quantities recommended in the following table are based on experience. Your replacement intervals will be based on your operating conditions.

Diaphragm sample pump
Type MP26-H1
(C) consumable parts, (R) recommended spare parts, (S) spare parts

			Recommended quantity Being in operation [years]		
		C/R/S	1	2	3
90P5000	Diaphragm material: PTFE	C	1	2	3
90P5010	O-ring 25	C	1	2	3
90P5005	Valve plate1 pc., Material: PTFE (required 2 pc.)	C	2	4	6
90P5025	Valve body type C/D 1/4” i, PTFE 1 pc. (required 2 pc)	R	2	2	2
90P5015	Heater cartridge 230 V,50 Hz, 100 W	R	2	2	2
90P5016	Heater cartridge 115 V,60 Hz, 100 W	R	2	2	2
90P5020	Thermostat 0 to 180 °C [32 to 356 °F], with low temp. alarm and over temp. limiter	R	1	1	1

18 APPENDIX

Further product documentation can be seen and downloaded from our home page: www.mc-techgroup.com