



TechGroup

# Instruction Manual

## Diaphragm Pump Series MP<sup>®</sup>

### Version MP30





**Dear customer,**

we have made up this operating manual in such a way that all necessary information about the product can be found and understood quickly and easily.

Should you still have any question, please do not hesitate to contact **M&C** directly or go through your appointed dealer. Respective contact addresses are to be found in the annexe to this operating manual.

Please also contact our homepage [www.mc-techgroup.com](http://www.mc-techgroup.com) for further information about our products. There, you can read or download the data sheets and operating manuals of all **M&C** products as well as further information in German, English and French.

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

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## 1 GENERAL INFORMATION

The product described in this operating manual has been examined before delivery and left our works in perfect condition related to safety regulations. In order to keep this condition and to guarantee a safe operation, it is important to heed the notes and prescriptions made in this operating manual. Furthermore, attention must be paid to appropriate transportation, correct storage, as well as professional installation and maintenance work.

All necessary information a skilled staff will need for appropriate use of this product are given in this operating manual.

## 2 DECLARATION OF CONFORMITY



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

### EMV-Instruction

The requirements of the EC directive 2004/108/EC "Electromagnetic compatibility" are met.

### Low Voltage Directive

The requirement of the EC directive 2006/95/EC "Low Voltage Directive" are met.  
The compliance with this EC 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

**Please take care of the following basic 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 pump 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

If the equipment fails, please contact **M&C** directly or else go through your **M&C** authorised dealer. We offer a one year warranty as of the day of delivery as per our normal terms and conditions of sale, and assuming technically correct operation of the unit. Consumables are hereby excluded. The terms of the warranty cover repair at the factory at no cost or the replacement at no cost of the equipment free ex user location. Reshipments must be send in a sufficient and proper protective packaging.

## 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.



**CARE!**

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

**CARE!**

Without the warning triangle means that a material damage may occur in case the respective safety measures are not met.

**ATTENTION!**

This means that an unintentional situation or an unintentional status may occur in case the respective note is not respected.



**NOTE!**

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

**SKILLED STAFF**

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

## 6 INTRODUCTION

The **MP30** diaphragm pump is suitable for 100% oil-free transport of corrosive gases. It has been dimensioned and designed specifically for use in the analytical sector. The pump is gas-tight and maintenance-free.

## 7 APPLICATIONS

The transported gas remains analytically pure due to the absolutely lubricant-free operating pump. A special diaphragm and valve system ensures freedom from maintenance and a long useful life. The pump is available for 230V or 115V mains voltage as well as with motor in an explosion-proof design. The **MP30** has a delivery capacity of 7.5l/min at atmospheric pressure. The output on the pressure side is limited to maximum 2.5 bar absolute..

Application examples are:

- Transport of gases and vapours with a temperature of +5°C... + 40°C
- Maximum allowable working pressure, final vacuum and delivery capacity according to technical data
- Prior to use in unknown pumping media, the compatibility of the materials of the pump head, diaphragm and valves with the medium must be verified.

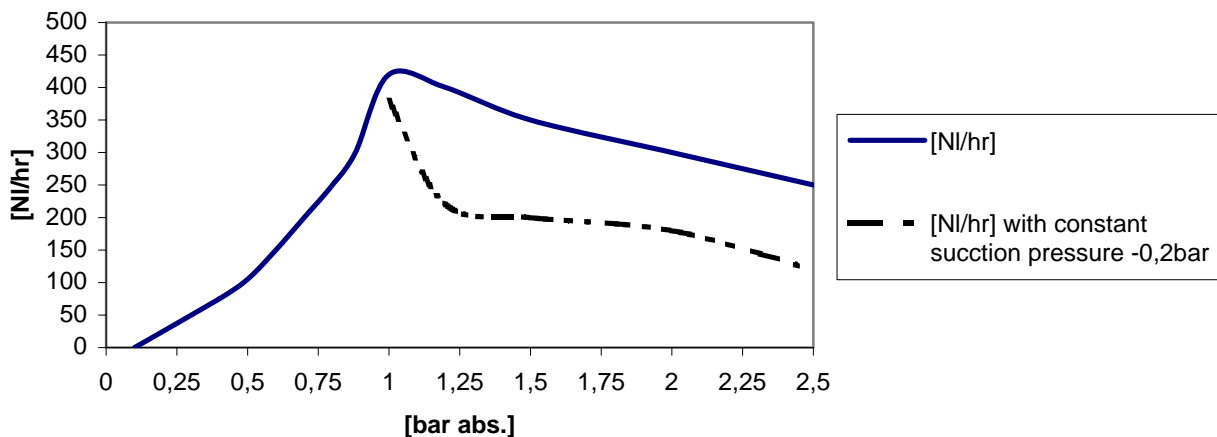


Figure 1 Delivery capacity MP30



**NOTE!**

Diaphragm pumps of the MP30 type series are not suitable for transporting liquids.

## 7.1 AMBIENT CONDITIONS

The following ambient conditions must be maintained during operation:

- Ambient temperature range in operation: +5°C .... + 40°C.
- The pumps must be protected from water and dust.
- Sufficient ventilation must be provided during operation.
- The pump type **MP30** must not be used in areas subject to explosion hazards or for transporting a potentially explosive medium. The pumps have the degree of protection IP54 as standard.

## 7.2 SAFETY

The following must be observed concerning safety when using **MP30** diaphragm pumps:

**The pump must only be used for the intended purpose (see 7.).**

**The pumps must not be used in areas subject to explosion hazards or for transporting a potentially explosive medium.**

**When transporting toxic media, system-specific and safety-relevant regulations must be observed (MAC values).**

**The transported medium must be safely discharged.**

**When connecting other components to the pump, the pneumatic conditions must be observed (see 8.).**



**WARNING!**

**When connecting the pump top the electrical system, the relevant safety requirements must be observed.**

**The standard internal thermal safety cut-out protects the pump against overload. The pump automatically restarts after cooling down. Hazardous situations constituted by this must be prevented by suitable measures.**

**The compatibility of the pump materials with the medium to be transported must be verified prior to use of the pump and the safety requirements for the media to be used observed.**



**8 TECHNICAL DATA**

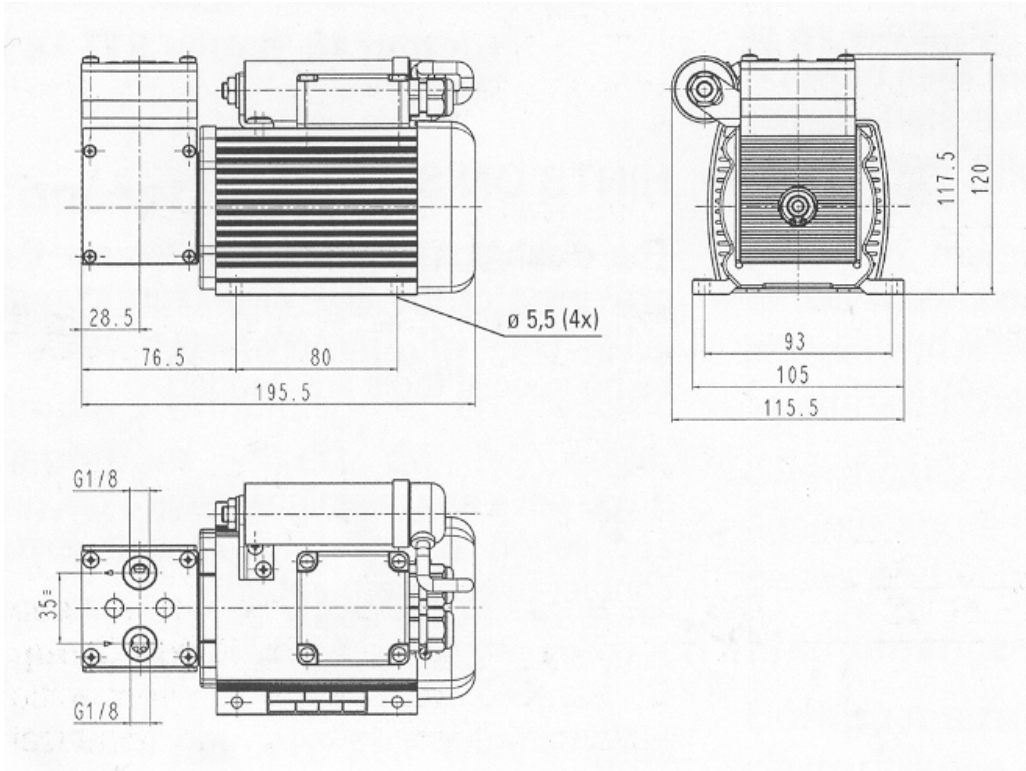
<b>Diaphragm pump</b>	<b>MP30 /230V</b>	<b>MP30 /115V</b>
Part No.	<b>02 P 1500</b>	<b>02 P 1500a</b>
Voltage supply	230V 50Hz ± 10%	115V 60Hz ± 10%
Power input	70W	
Power consumption	0,45A	0,7A
Degree of protection	IP 54 - DIN 40050	
Delivery capacity max.	<b>7.5 l/min*</b>	
Operating pressure	0.14 to max. 2.5 bar abs.	
Gas temperature	+5°C to +40°C	
Ambient temperature	+5°C to +40°C	
Storage temperature	-15°C to +60°C	
Gas connections	G1/8" i DIN ISO 228/1	
Electrical equipment standard	EN 61010, part 1	
Medium contacted parts Pump head Diaphragms Valves	PVDF, SS316Ti CR, PTFE coated FFPM	
Weight	3,1kg	3,3kg

Material designations according to ISO 1629 and 1043.1

\* Litre in standard condition

## 9 DIMENSIONS

The dimensions of the **MP30** are shown below:



**Figure 2** Dimensions (mm) MP30

## 10 RECEIPT AND STORAGE

- Carefully remove the diaphragm pump and any accessories from the transport packaging immediately upon receipt and check the delivery against the delivery note.
- Check the contents for possible transport damage and immediately notify the transport insurer of any damage.



**NOTE!**

**The diaphragm pump should be stored in a protected, frost-free room.**

## 11 INSTALLATION INFORMATION

The safety rules and regulations for the prevention of accidents must be observed during installation and also subsequent operation. The information in Chapter 3, "Safety" must be observed.

The safety requirements applicable to the respective media to be transported must be observed.



**NOTE!**

In order to prevent a disturbing accumulation of heat, the pumps should be installed away from sources of heat and freely ventilated.

For installation outdoors, the pump must be installed in a protective housing frost-free in winter and sufficiently ventilated in summer. Direct exposure to sunlight must be avoided.



**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 fixing dimensions are shown in Figures 2 and 3.
- The pumps must be installed in such a way that the impeller is able to draw in sufficient cooling air.
- The pumps should be installed at the highest point in the system and/or with the pump head pointing downward to prevent an accumulation of condensate – this will extend the useful life of the pump.

## 11.2 ELECTRICAL

Electrical installation must take place in compliance with the safety regulations. Before connecting the pump, safe isolation from the supply must be ensured.

- The protective conductor must be connected to the pump motor.
- A device for disconnecting the pump from the electrical system must be provided in the electrical installation (according to EN 60335-1).
- The supply circuit should be provided with a fuse with a rating corresponding to the current consumption (over-current protection, current consumption, see technical data).



**WARNING!**

The supply voltage must be compared with the voltage shown on the rating plate. A voltage deviation of about  $\pm 10\%$  is admissible.



The pumps must be mounted so that contact with live parts (e.g. electrical connection, possibly motor windings) is excluded.

### 11.3 PNEUMATIC



**NOTE!**

**Components to be connected to the pump must conform to the pneumatic data of the pump.**

- Remove safety stoppers from threaded gas connections (thread size G1/8”).
- Accessories such as threaded hose couplings must be screwed into the threaded connection with sealing tape (the use of sealing tape is unnecessary when using **M&C** couplings).
- Connect suction and pressure pipe.



**NOTE!**

**Do not interchange hose connections for sample gas inlet and outlet; the connections are appropriately marked.**

**After connecting all pipes, they must be checked for tightness.**

When connecting the hoses to optional threaded hose couplings, the following should be noted:



**NOTE!**

**The tightness of the connection can only be ensured when the connecting hose has a straight terminating edge (use of a hose cutter).**

- Loosen the swivel nut of the clamping ring by turning anticlockwise; it must be ensured that the nut is carefully removed from the coupling, so that the clamping ring lying loosely in the clamping ring is not lost.
- Slide the swivel nut on to the connecting hose.
- Slide the clamping ring with the thicker part pointing towards the nut on to the connecting hose.
- Fit the hose on to the supporting nipple in the coupling;
- Tighten the swivel nut hand-tight.

The hose is not connected non-slip and pressure-proof.

**Optional threaded couplings for DN 4/6 or DN 6/8 can be obtained through M&C**

- Route the suction and pressure pipe so that no condensate can flow into the pump.

## 12 COMMISSIONING

Prior to commissioning, system and process-specific safety measures must be observed.

For the media to be transported, the respective safety requirements and measures must be taken into account.

Prior to using a medium, the compatibility of the materials of the pump head, diaphragm and valves with the medium must be verified (for materials, see technical data).

The following steps must be carried out for commissioning:

- The pumps must not start against pressure or vacuum. When the pump is switched on, the normal atmospheric pressure must prevail in the pipes. This applies similarly during operation following a brief interruption of power.
- The maximum allowable working pressure (see technical data) must not be exceeded.
- Restriction or regulation of the gas flow should only take place in the suction-sided pipe in order to avoid exceeding the maximum allowable working pressure.
- If restriction or regulation of the gas flow takes place on the pressure side, it must be ensured that the maximum allowable working pressure of the pump is not exceeded.
- With the pump stationary, normal atmospheric pressure must be established in the pipes.
- Diaphragms and valve plates are the only wearing parts of the pumps. Wear is usually noticeable by a considerable reduction in pneumatic power. Replacement must take place as described in chapter 14ff.
- Ambient conditions, see technical data.
- For pumps used as vacuum pump and compressor:  
Pressure and vacuum cannot be produced simultaneously.

**The pumps must not be used in areas subject to explosion hazards or for transporting a potentially explosive medium.**

**The transported medium must be safely discharged.**

**When connecting other components to the pump, the pneumatic conditions must be observed (see 6.).**



**WARNING!**

**When connecting the pump to the electrical system, the relevant safety requirements must be observed.**

**The standard internal thermal safety cut-out protects the pump against overload. The pump automatically restarts after cooling down. Hazardous situations constituted by this must be prevented by suitable measures.**

**For the transport of aggressive or toxic media, the system-specific safety requirements must be observed. Purging with air or inert gas under atmospheric conditions is recommended prior to decommissioning.**

### 13 DECOMMISSIONING



**NOTE!**

The site of installation of the diaphragm pump must remain frost-free also during the time when the unit is switched off.

No further particular measures are required for decommissioning.



**WARNING!**

When transporting aggressive media, purging the pump with inert gas under atmospheric conditions is recommended prior to decommissioning. If there is no risk of explosion, air can also be used for this purpose.



Aggressive media residues possible. For disassembly, repair or cleaning of the pump, safety goggles and suitable protective clothing must be worn!

### 14 MAINTENANCE

Before carrying out maintenance work, the system and process-specific safety measures must be observed!



**WARNING**

Dangerous voltage. Before working on the diaphragm pump, the same must be safely isolated from the supply and disconnection from the supply verified!



Aggressive or toxic media residues possible. For disassembly, repair or cleaning of the pump, safety goggles and suitable protective clothing must be worn. Wearing parts must be disposed of in a proper manner!



Diaphragms and valve plates are the only wearing parts of the pumps and can be easily replaced.



**NOTE!**

It is recommended to replace valve plates, diaphragms and sealing rings simultaneously to maintain the life expectancy of the pump.

For the maintenance or repair of the pump, the following tools are parts are required:

- 2 valve plates, 2 sealing rings and 1 diaphragm according to spare parts list.
- Cross-tip screwdriver No.2.
- Cross-tip screwdriver No.1.
- Felt-tip pen.

### 14.1 REPLACING DIAPHRAGMS, VALVE PLATES AND SEALING RINGS

Figure 4 shows a sectional drawing of the pump head.

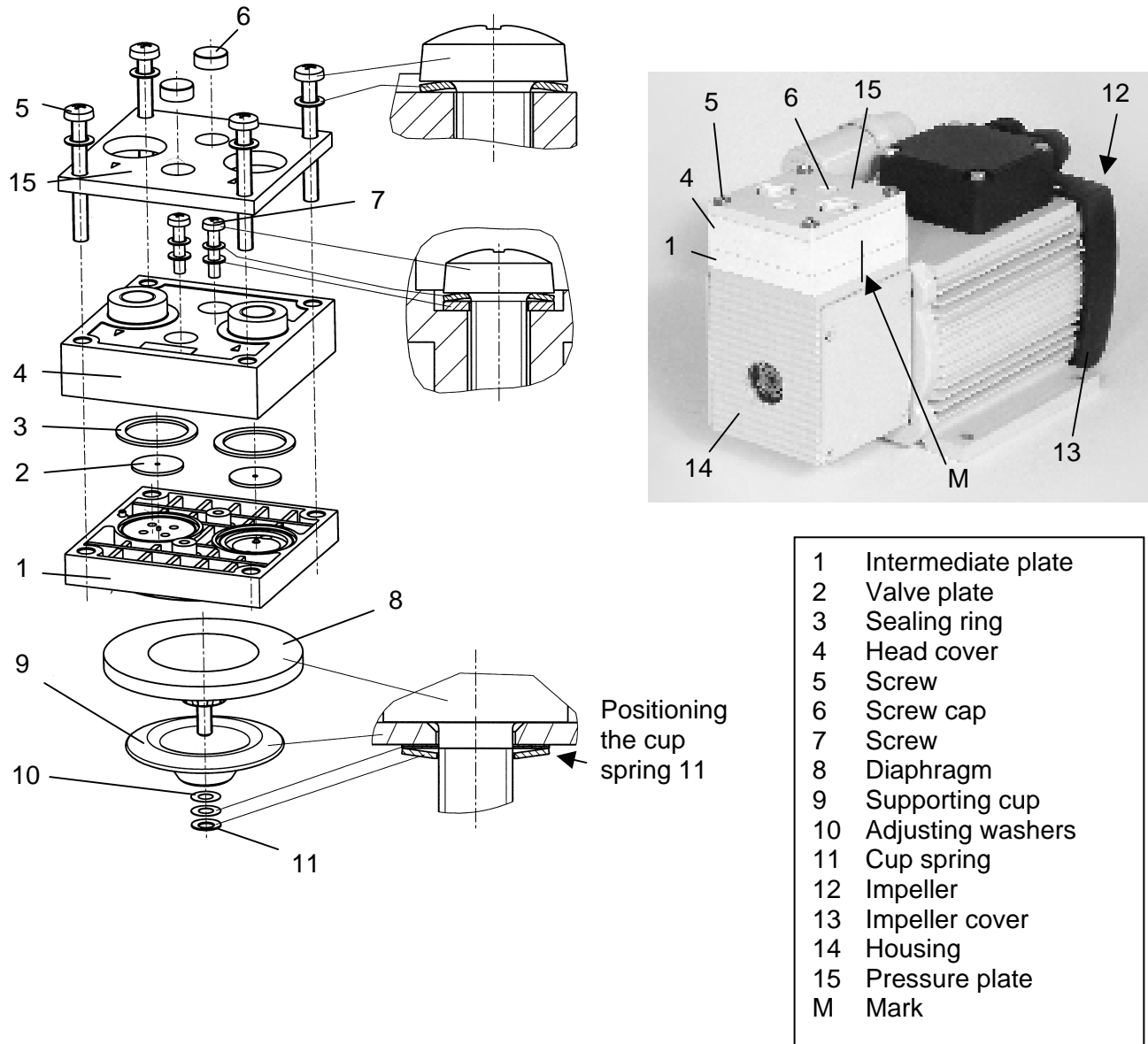


Figure 3 Section drawing of pump head MP30

#### Replacing the diaphragm:

- Mark position of pressure plate **15**, head cover **4**, intermediate plate **1** and housing **14** by making a continuous line with a felt-tip pen.
- Loosen four head screws **5**.
- Remove pressure plate **15**, head cover **4** and intermediate plate **1** from pump housing.
- Loosen four fixing screws in impeller cover **13** and remove.
- Bring diaphragm **8** into top position by turning impeller **12**;
- Unscrew diaphragm on side edges anticlockwise.

- Remove support cup **9**, adjusting washers **10** and cup spring **11** from thread bolt of diaphragm and clean if necessary.

Fitting the new diaphragm takes place in reverse order.



**NOTE!**

**The edge of the cup spring must point towards the diaphragm.**

#### **Replacing valve plates and sealing rings:**

- Loosen screws **7** and separate head cover **4** from intermediate plate **1**.
- Remove valve plates **2** and sealing rings **3** from intermediate plate.
- Inspect valve seat, intermediate plate or ribbed cover for cleanliness and damage and replace if necessary.
- Fit new valve plates **2** (suction and pressure side or top and bottom side are identical); check for correct position by lightly moving the valve seat.
- Fit sealing rings **3** in intermediate plate **1**.
- Join head cover **4** and intermediate plate **1** together (felt-tip pen mark must be in alignment) and check centred seat through lateral movement.
- Fix head cover **4** and intermediate plate **1** in place with screws **7**.

#### **Fitting pump head:**

- Place intermediate plate **1** and head cover **4** according to felt-tip pen mark **M** on pump housing.
- Also place pressure plate **15** in position (mark) and lightly tighten crosswise with screws **5** and cup springs.
- Check pump for smooth operation by turning impeller **12**.
- Tighten screws **5** crosswise until cup springs rest flat against pressure plate.

## **15 CLEANING**

When replacing the valve plates and diaphragms, all parts must be checked for fouling before assembling the valve head and cleaned if necessary. If available, the parts should carefully be blown out with compressed air.



## 16 TROUBLESHOOTING

Before carrying out any work on the pump, it must be safely isolated from the supply and disconnection from the supply verified. The following instructions for troubleshooting are hierarchically structured, i.e. to be used in the specified order.

Problem/Indication	Possible cause	Check/Remedy
Pump does not transport	No system voltage available.	Check system voltage. Check mains cable for tightness.
	Connections or pipes are blocked.	Clear blockage.
	An external valve is closed or a filter is clogged.	Open valve or clean fouled/clogged filter.
	Liquid (condensate) has collected in the pump head.	Purge pump with inert gas for several minutes. If there is no risk of explosion, air can also be used for this purpose. Install pump at the highest point in the system.
	<b>MP30:</b> Thermal safety cut-out has operated due to overheating.	Disconnect pump from the supply, allow to cool down and remedy cause of overheating.
Delivery capacity, pressure or vacuum too low	Diaphragms or valve plates worn.	Replace worn parts (see 14. ff).
Problem/Indication	Possible cause	Check/Remedy
	Initially compare reached pump capacity with technical data in chapter 1.2 or data sheet.	Pump is not designed for this condition.
	Liquid (condensate) has collected in the pump head.	Purge pump with inert gas for several minutes. If there is no risk of explosion, air can also be used for this purpose. Install pump at the highest point in the system.
	Excess pressure is present on the pressure side and on the suction side simultaneously a vacuum or pressure above atmospheric pressure.	Pump is not designed for this condition.
	Pneumatic lines or connecting parts have an insufficient cross-section or are restricted.	To measure capacity values, decouple pump from the system; a pipe with insufficient cross-section or, e.g. a valve installed in the system can alter the measured value considerably.
	Leaks at connections, pipes or pump head. Diaphragms or valve plates are faulty or head parts are fouled.	Steam leaks. Tighten screwed connections. Replace faulty parts. Clean fouled parts or replace.



**NOTE!**

If none of the specified faults can be located, despite the pump not operating correctly, the pump should be returned to M&C for examination.

When sending diaphragm pumps for repair to M&C Customer Service, information about the transported medium is required. Our workshop should be informed in particular about aggressive media. Where pumps have been used for transporting dangerous or highly aggressive gases, these should be cleaned prior to being returned.

## 17 SPARE PARTS

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

### Diaphragm Pump Type MP30 (C) consumable parts, (S) spare parts

		V/E/T	Recommended quantity MP30 being in operation (f.d. = for demand)		
			1	2	3
90P1500	Diaphragm 8	C	1	2	3
90P1510	Set sealing ring 3 (2 pc., Kalrez®)	C	1	2	3
90P1505	Set valve plate 2 (2 pc.)	C	2	4	6
<b>PVDF male connectors with G-thread (ISO 1010031)</b>					
05V1045	Straight connector DN 4/6-G1/8" material: PVDF	S	-	-	2
05V1050	Straight connector DN 6/8-G1/8" material: PVDF	S	-	-	2
05V6600	Ferrule DN 4/6 PVDF	S	2	2	4
05V6602	Ferrule DN 6/8 PVDF	S	2	2	4
05V6605	Union nut DN 4/6 PVDF	S	2	2	4
05V6607	Union nut DN 6/8 PVDF	S	2	2	4

## 18 APPENDIX



More product documentation is available on our Internet catalogue:  
[www.mc-techgroup.com](http://www.mc-techgroup.com)