

Analytical Diaphragm Pump Series MP®

MP06

Instruction Manual

Version 1.01.00



**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.

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

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With the release of this version all older manual versions will no longer be valid. The German instruction manual is the original instruction manual. In case of arbitration only the German wording shall be valid and binding.

MP* is a registered trade mark.

Version: 1.01.00

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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



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

EMC-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

Follow these 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 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.

CAUTION!

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.

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, 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 INTRODUCTION

Due to the implementation of resistant materials the pump type **MP06** can be used in a wide range of applications with aggressive and corrosive gases.

7 DESCRIPTION

The pump head and all wetted parts of the diaphragm pump type **MP06** are made of PTFE respectively FKM. This grants a high resistance against aggressive and corrosive components in the sample.

The pump works 100 % lubricant free which means that the sample remains analytical unaffected.

The special diaphragm and valve system guarantees a high level of reliability and a minimum of maintenance.

The pumps are available in 230 V 50 Hz.

The maximum flow capacity of the **MP06** is 5.5 l/min.

The range of the sample temperature during operation is between -20 °C [-4 °F] and maximum $+80\text{ °C}$ [176 °F].



NOTE!

The diaphragm pump series MP06 is not allowed for liquid medium. Maximum temperature for medium during operating: -20 °C [-4 °F] to $+80\text{ °C}$ [176 °F]. Before use please check the compatibility of the material.

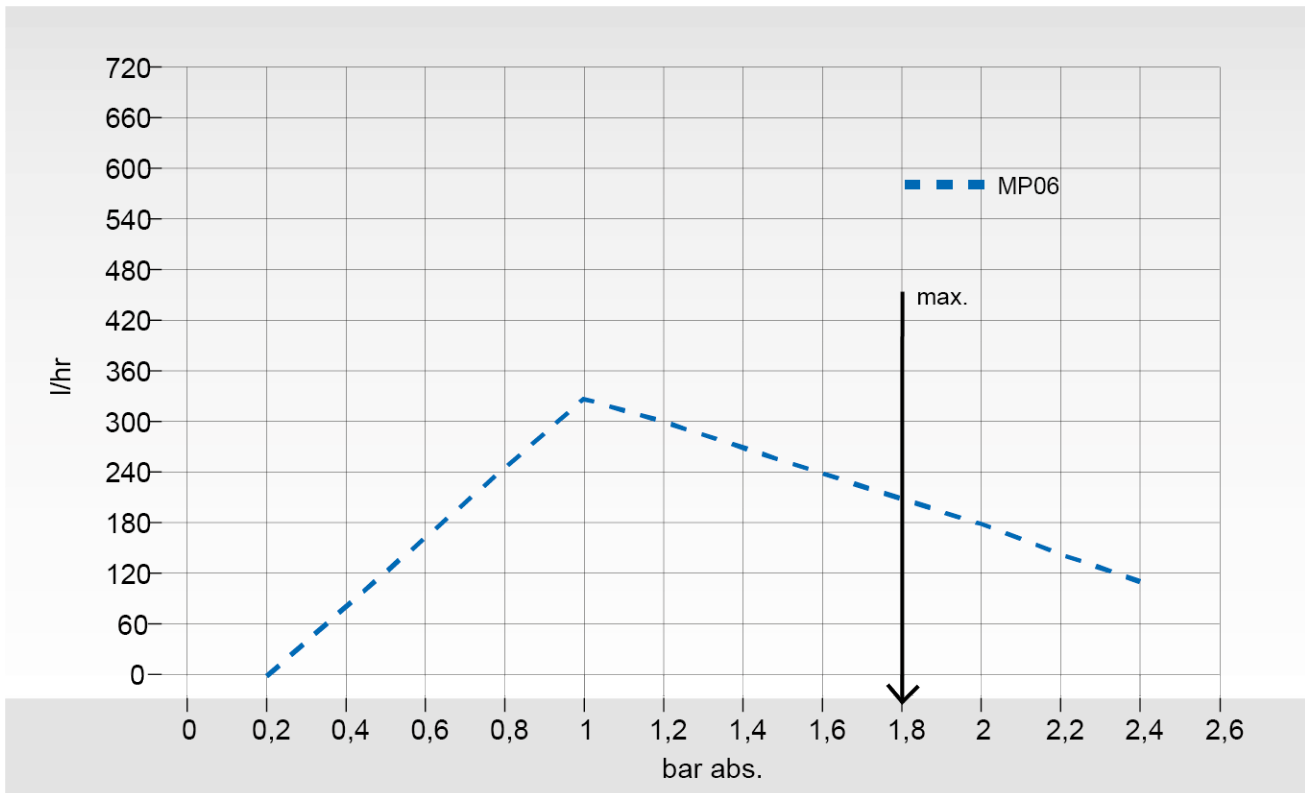


Figure 1 Performance characteristics MP06

7.1 AMBIENT CONDITIONS

During operation the following ambient conditions must be kept:

- Ambient temperature during operating: -10 °C [14 °F] to + 40 °C [104 °F].
- The pump must be protected against the effects of dust and water.

During operating an adequate supply of air for cooling must be provided.

7.2 SAFETY

The protection class of the **MP06** is IP54. In case a high content of water and/or dust loading in the ambience, measures have to be taken to protect the pump before starting-up.



Aggressive medium is possible.



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

The pumps may only be used for their intended purpose.



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

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

Specific safety instructions concerning sample must be observed.

8 TECHNICAL DATA

Pump series MP	Version MP06	
Part-No.	03P1000	03P1000a
Power supply	230 V 50 Hz, 70 VA	115 V 60 Hz, 70 VA
Capacity max. without pressure	5.5 l/min	
Operating pressure max.	0.25 to 1.8 bar abs.	
Sample temperature	-20 to +80 °C [-4 to 176 °F]	
Ambient temperature	-10 to +40°C [14 to 104 °F]	
Storage temperature	-15 to +60 °C [5 to 140 °F]	
Operation mode	100 % continuous duty, start of the pump only without pressure!	
Protection	IP54 EN 60529	
Weight	2.4 kg [≈ 5.3 lb]	
Gas connections	G1/8" i DIN ISO 228T1	
Material of sample wetted parts	PTFE, FKM	

9 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!

10 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 in chapter 2.2 must be observed.



NOTE!

The pump must only be used in the conditions specified in the technical data. The pump should be installed away from heat sources and freely ventilated to prevent any accumulation of heat.

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.



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.

10.1 MECHANICAL INSTALLATION

- The mounting dimensions are given in figure 2.
- The pump is provided for assembly and therefore it has to be fastened with screws.
- Install the pump so that the fan can draw in sufficient cooling air.
- Mounting the pump at the highest place in system and/or with pump head downside so that condensate can not be assembled inside the head.

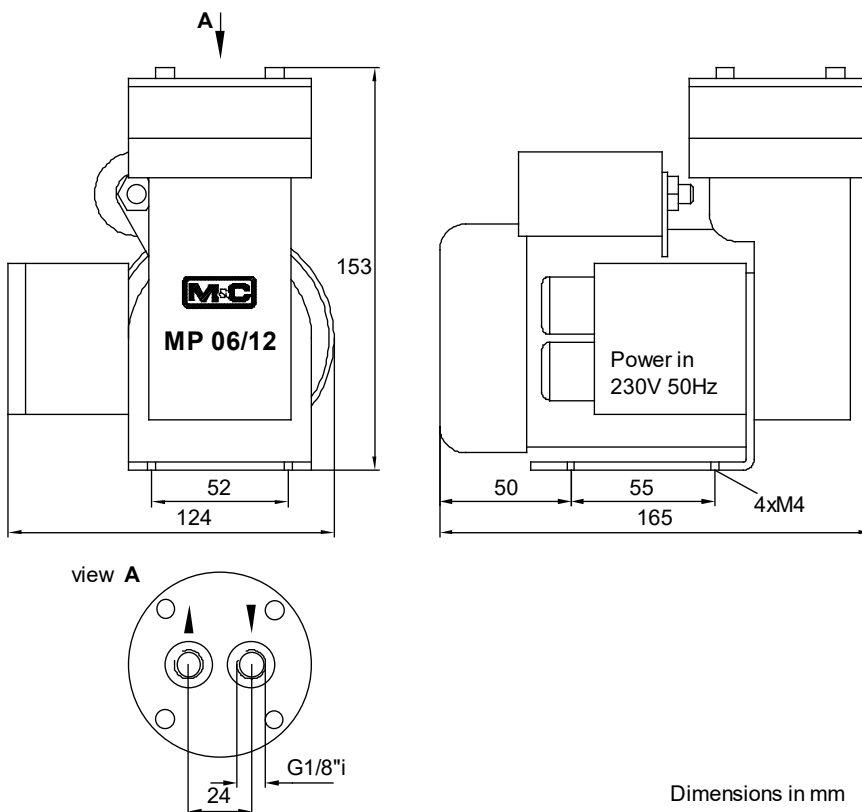


Figure 2 Dimensions (mm) MP06

10.2 ELECTRICAL INSTALLATION

The MP06 is equipped with a mains cable with a plug as standard.

When making the electrical installation the safety regulations must be observed. In particular make sure that the power supply is isolated before trying to connect the pump.



WARNING!

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!

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)

A protective motor switch is not necessary because the pump is equipped with a thermal switch.



For electrical details see technical data.

- In case the standard mains cable with plug should not be used, a wiring plan is in the cover of the junction box.
- The pump must be installed so that contact with live parts (connections, possibly windings) is impossible.

10.3 PNEUMATIC INSTALLATION

- Remove the protection plugs from the connection threads (thread size G1/8" i).
- Accessories like hose connections are screwed into the connection threads by sealing tape (using **M&C** connectors sealing tape is not necessary).
- Connect the suction and pressure lines.
- Arrange the suction and pressure lines so that condensate cannot run into the pump.



NOTE!

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

The pump should not be close to heat sources and freely ventilated to prevent any accumulation of heat.

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.

11 SUPPLY LINE CONNECTIONS

11.1 HOSE-/TUBE CONNECTIONS

The gas inlet and outlet hoses/tubes are connected on the top of the pump. Standard G 1/8" threaded joints are available for the connection of the gas sample lines.



NOTE!

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!

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



NOTE!

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

- 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 loosely into the nut.
- Push the sleeve nut over the connection hose/tube.
- Push the clamping ring onto the connection hose/tube with the thicker bulge pointing to the nut.
- Push the hose/tube onto the supporting nipple in the threaded joint.
- 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 for DN 4/6 or DN 6/8 are available optionally from M&C.

12 COMMISSIONING

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 technical data).

The following steps should be carried out 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 restarts after the power has been cut off for a short period.
- The maximum permissible operating pressure (see technical data) 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 14 Maintenance.
- Ambient conditions: see technical data chapter 8 Technical data.

13 CLOSING DOWN

If the pump is putting out of action for a short time, no particular measures need to be taken.
If the pump is out of action for a longer time, please purge it with Nitrogen.



NOTE!

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



WARNING!

Aggressive medium is possible.



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

14 MAINTENANCE

Before maintenance is carried out, it is necessary that the specific safety procedures pertaining to the system and operational process are observed!



WARNING!

Dangerous voltage.

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



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



WARNING!

Aggressive medium is possible.

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



Parts and tools required:

- Valve plates, sealing rings (2 each pump head) and diaphragm
- Hexagon socket screw key 3



NOTE!

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

Change the diaphragm, valve plates and sealing rings in the following sequence:

14.1 CHANGING THE DIAPHRAGM, VALVES AND SEALINGS



Figure 3 Pump head with hexagon screws

- Loosen the 4 hexagon screws;
- Remove the 2 parts of the pump head.

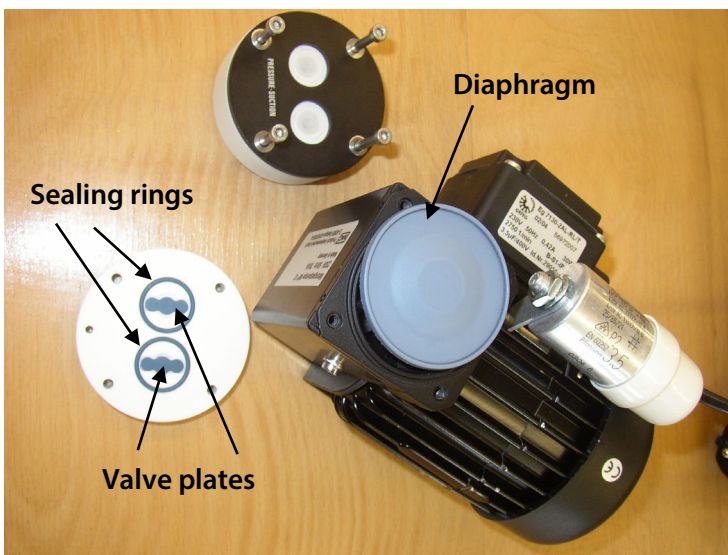


Figure 4 Dismounted pump head

- Unscrew the diaphragm by hand out of the tapping hole of the rod (counter-clockwise);
- Screw the new diaphragm into the rod hand-tight;
- Change the sealing rings and valve plates;
- Put on the basic part of the pump head and control that the bulge of the diaphragm fits to the groove of the pump head;
- Put on the upper part of the pump head so that its pin fits into the hole in the basic part of the pump head;
- Fix the 4 hexagon screws constantly over cross;

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 possible clean the parts with compressed air.



WARNING!

Aggressive medium possible.



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

15 TROUBLE SHOOTING

Before working on the pump, disconnect the pump from the power supply, ensure and check that it is voltage free. The following troubleshooting instructions are hierarchical, i.e. practical to use in the order given.

Problem/indication	Possible cause	Action/Check
Pump does not operate	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 worn out.	Change worn out diaphragm or/and valves.
	First compare the achieved pump capacity with the technical data in chapter 8 or the data sheet.	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-sections of pneumatic lines or connected components are too small, or they are restricted.	To measure the capacity values, disconnect the pump from the system; even a tube with a too small cross-section or, for example, a valve installed in the system can change the measured value considerably.
	Leaks at the connections, the lines or at the pump head. Diaphragms or valve plates are defective or head parts dirty.	Seal leaks, tighten the screw connections, replace defective parts, clean or replace dirty parts.



NOTE!

If you are unable to find any of the defects listed although the pump is not working properly, return the pump to M&C for inspection.

If you send your diaphragm pump to M&C Customer Service for repair, please indicate the pumped medium.

In particular, our workshop must be informed about aggressive pumped media. If you have pumped dangerous or highly aggressive gases with the pump, clean your pump before shipping.

16 SPARE PART LIST

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

Diaphragm sample pump

Type MP06

(C) Consumable parts, (R) Recommended spare parts, (S) spare parts

		C/R/S	recommended quantity being in operation [years]		
			1	2	3
91P1000	Diaphragm type MTF26, material: FPM, PTFE	R	1	2	3
91P1005*	Valve plate type VTF26, material: FKM	R	1	2	3
91P1010*	O-ring type OTF26, material: FKM	R	1	2	3
91P1015	Pump head, upper part, material: PTFE	S	-	-	1
91P1020	Pump head, basic part, material: PTFE	S	-	-	1
91P1025	Con-rod with bearing	S	-	-	1
91P1030	Counter weight eccentric	S	-	-	1
PVDF Straight male connectors with G-thread (ISO 1010031)					
05V1045	Straight male connector, DN 4/6-G1/8" male, material: PVDF	S	-	-	2
05V1050	Straight male connector, DN 6/8-G1/8" male, material: PVDF	S	-	-	2
05V1055	Straight male connector, DN10/12-G1/8" male, material: PVDF	S	-	-	2
05V6600	Ferrule DN 4/6 PVDF	S	2	2	4
05V6602	Ferrule DN 6/8 PVDF	S	2	2	4
05V6604	Ferrule DN 10/12 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
05V6609	Union nut DN 10/12 PVDF	S	2	2	4

* The valve plate (Part No. 91P1005) and the O-ring (Part No. 91P1010) each require 2 pieces.

17 APPENDIX



Further product documentation can be seen and downloaded from our home page:

www.mc-techgroup.com