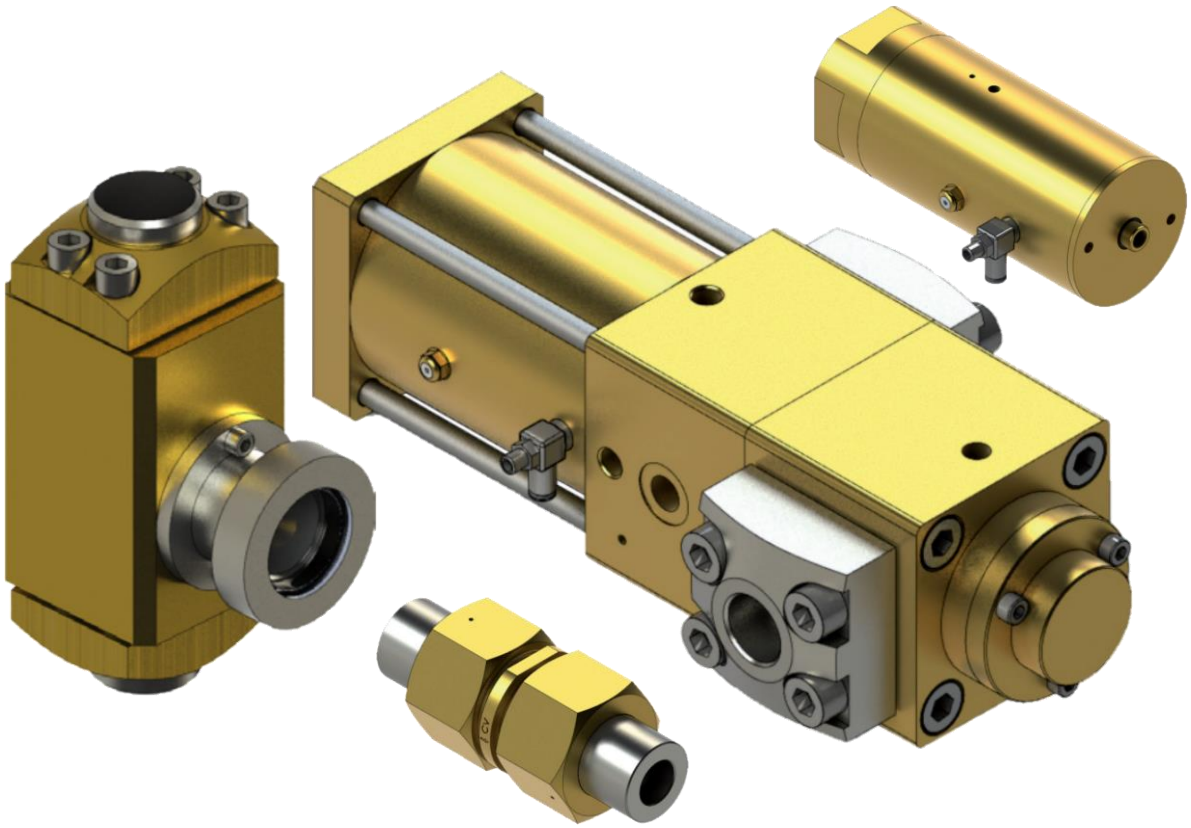
OPERATING MANUAL



MPG / DBV

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1. Introduction

1.1 General Indications

In order to ensure a successful and safe operation of our valves the entire Operating Manual must have been read through and understood prior to installation and commissioning.

Should difficulties or questions arise that cannot be solved with the help of the Operating Manual, please contact the supplier/manufacturer.

This Operating Manual was compiled in accordance with the regulations of guideline 2014/68/EU and covers the areas of: installation/commissioning, maintenance, repair, storage, packaging, transport and disposal.

The operator is responsible for adhering to local safety regulations. When using the valve outside the Federal Republic of Germany, the operator must ensure that valid national regulations are adhered to.

The manufacturer reserves all rights of technical changes and improvements at any time.

Caution

The disregard of the caution and warning notices may lead to hazards, which in turn may cause the warranty to become invalid.

Notes

Please keep this instruction manual in a safe place for future reference.

1.2 Target group

This Operating Manual is directed to people who are entrusted with the installation planning, installation, commissioning or maintenance/repair and have qualifications in accordance with their activities and functions. This also includes the knowledge of applicable accident prevention regulations, generally recognized safety regulations, EU guidelines and country-specific standards and regulations.

1.3 Manufacturer's contact address

Should difficulties or questions arise that cannot be solved with the help of the Operating Manual, please contact the manufacturer.

Our technical team and customer service officers are pleased to assist you with any question you may have.

m-tech gmbh
Teslastr. 6
74670 Forchtenberg
Germany
Phone: +49 7947 939-0
Telefax. +49 7947 939-010
E-mail: info@m-tech-gmbh.com
Website: www.m-tech-gmbh.com

1.4 Personnel qualification

Transport, installation, commissioning, maintenance or repair must only be performed by trained or instructed personnel.

Work on electrical equipment of the device must only be performed by a qualified electrician or instructed people under the guidance and supervision of a qualified electrician according to the rules of engineering.

1.5 Safekeeping

Access to the entire Operating Manual must be guaranteed at all times at the place of operation of the valve in order to be able to look at it any time**.**

2. Safety instructions

2.1. Product safety

Operate the valves and accessories only in perfect condition taking into account the entire Operating Manual.

Caution

Use of material-incompatible media, exceeding the limit values of medium pressure and temperature and mechanical additional loads can result in failure of the valve material and bursting of the valve.

Use of material-incompatible media, exceeding the limit values of medium pressure and temperature and mechanical additional loads can result in failure of the valve material and bursting of the valve.

2.2. Personnel selection and qualification; general obligations

2.2.1. General

The people entrusted with the installation planning, installation, commissioning, maintenance or repair must be qualified in accordance with their activities and functions.

Based on their technical training, their knowledge and experience and their knowledge of the applicable standards, the personnel must be able to evaluate the work entrusted to them and recognize possible dangers.

They must also have knowledge of applicable accident prevention regulations, generally recognized safety regulation, EG guidelines and country-specific standards and regulations and all application-based regional and company-internal regulations and requirements.

A personnel that has to be trained, instructed or taught is only allowed to work at the fitting under the supervision of an experienced person. This is also valid for personnel that are in general professional training.

The legal minimum age for the people working with the system has to be observed

2.2.2. Transport / installation / commissioning / maintenance / repair

Only by trained or instructed personnel. For safety reasons, recheck whether all necessary measures for the protection of workers have been taken before commencing the work.

2.2.3. Electrical installation

Work on electrical equipment of the device can only be performed by an electrician or people under the guidance and supervision of an electrician in accordance with the rules of engineering

3. Product description

Attention

The MPG 03, MPG 08, MPG 12 and DBV 20 are not used for media with solid particles recommended.

3.1. Functional principle MPG 03

MPG 03 series valves are shut-off and control valves specially designed for use with gases. The MPG 03 PR has a preferred flow direction (inlet axial, outlet radial). All other valves of the series do not have a mandatory flow direction, which has the advantage that the medium to be controlled can be connected to any port of the valve.

Due to the specially designed internal components of the valve, the medium has an optimal flow and thus a high Kv value.

MPG 03 NC and NO

The valves of type MPG 03 NC (normally closed) and MPG 03 NO (normally open) are "classic" 2/2-way valves that are operated pneumatically under remote control.

By applying the control air to the valve, it is opened or closed against the spring force (depending on the type of valve).

MPG 03 PR

Valves type MPG 03 PR are position controlled valves. By means of an electronic positioner as well as position feedback, which detects the actual position of the valve, the stroke of the valve can be adjusted between 0-100% via a standard signal (0-10V, 0-20mA, 4-20mA).

MPG 03 HD

Type MPG 03 HD valves are manually operated valves. Opening and closing of this valve type is done manually with a handwheel.

3.2. Functional principle MPG 08

Type MPG 08 HD valves are manually operated valves. Opening and closing of this valve type is performed manually with a handwheel. In these valves, the inlet and outlet are on one axis. There is no preferred flow direction.

3.3. Functional principle MPG 12

MPG 12 series valves are shut-off and control valves specially designed for use with gases.

MPG 12 series shut-off valves use pressure-balanced valves. The MPG 12 NC / NO / HD valves do not have a mandatory flow direction, which has the advantage that the controllable medium can be connected to any port of the valve. The MPG 12 PR has a preferred flow direction (against the valve seat in the direction of the valve drive). On the MPG 12 FI / CV / FICV valves, the preferred flow direction is marked with an arrow.

Due to the specially designed internal components of the valve, the medium has an optimum flow and thus a high Kv value.

MPG 12 NC and NO

The MPG 12 NC (Normally Closed) and MPG 12 NO (Normally Open) valves are "classic" 2/2-way valves that are operated under remote control. By applying the control air to the valve, it is opened or closed against the spring force (depending on the type of valve)

MPG 12 PR and HD

Valves of the MPG 12 PR type are position-controlled valves. By means of an electronic positioner as well as position feedback, which detects the actual position of the valve, the stroke of the valve can be adjusted between 0-100% via a standard signal (0-10V, 0-20mA, 4-20mA).

MPG 12 HD type valves are manually operated valves. Opening or closing of this valve type is done manually with a handwheel.

MPG 12 FI, CV and FI-CV

The types MPG 12 FI (filter) and MPG 12 CV (check valve) are valves specially designed for the use of gases.

The check valve type MPG 12 CV closes itself in case of a flow against the operating direction and thus prevents a backflow of the medium.

Caution

Do not use the MPG 12 CV as the sole shut-off valve in applications with flammable gases!

With the MPG 12 FI type filter, the medium flows through a filter insert. This filters out any impurities in the medium. The filter insert is available in different purity levels (15µm 63µm and 100µm) and is exchangeable.

The MPG 12 FI-CV is a combination of the MPG 12 CV check valve and the MPG 12 FI filter.

Due to the specially designed internal components of the valves, the medium has an optimal flow and therefore a high Kv value.

MPG 12 RV

MPG 12 RV pressure relief valves are pressure relief valves (safety component) specially designed for the use of gases.

If the preset opening pressure is exceeded, the pressure relief valve opens and thus relieves the pressurized area.

3.4. Functional principle DBV 20 and RDK 40

The DBV20 type vacuum safety valve is a relief valve specially designed for use with gases to protect vacuum pumps.

The DBV 20 consists of a solid body and a sleeve that lifts off a seal in the event of a pressure surge. This relieves the overpressure by venting and protects the pump connected to the side outlet.

The optional RDK 40 residual pressure flap provides extended protection for the vacuum pump. It consists of a top cover that lifts in the event of even the smallest pressure surges, even before the sleeve of the DBV 20 moves in front of the pump connection.

3.5. Information concerning the valve

3.5.1. Purpose

The valves and accessories are intended for installation in gas pipelines.

The type of medium/gas agreed with the order and the limit values according to the data sheet must be adhered. Any other or additional use has to be agreed with the producer/supplier.

3.5.2. Precautionary measures

When using the valves, observe the currently applicable laws and the recognized rules of engineering (i.e. EN-regulations, guidelines and national regulations). The general equipment and safety regulations for pipeline and system construction and the local safety and accident prevention regulations apply, too. The operating manual is required whenever handling or doing any work on the valve.

3.5.3. Conformity

The valves and the accessories of the construction series MPG 03, MPG 08 and MPG 12 have been built according to the state of technology and in accordance with the guideline 97/23/EG concerning pressure devices.

3.5.4. Marking of the valve

The valves are provided with a nameplate containing the necessary information according to the pressure device guideline 97/23/EG.

3.5.5. Technical Data

Technical Data and tolerable limit can be extracted of the corresponding data sheet.

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4. Installation / Commissioning

4.1. Measures and considerations prior to installation

Compare material, pressure and temperature details of the fitting with the operating conditions of the system to very material resistance and load capacity.

Install the fitting so that it is well accessible for all connection and maintenance and repair operations that might become necessary later on.

Install a suitable dirt trap (filter / particle trap) in front of the valve in order to ensure trouble-free valve operation.

4.2. Installation

Before installing the fittings, inspect for possible transport damage.

Before installing the valve, check the pipe system for absolute cleanliness in order to prevent that traces from the pipe installation or other foreign bodies are flushed into the valve during commissioning.

Fittings and pipelines operated at high (> 50°C) or low temperatures (< 0°C) must be pointed out through appropriate warning signs.

Protect pipelines leading to outside against penetration of water and foreign bodies

4.2.1. Installation of an armature with weld connection

Welding work can only be performed by qualified welders according to the corresponding national regulations.

It is only permitted to weld pipes that are identical concerning material and connection diameter of the connection adapter of the armature.

Connecting the pipeline with the fitting, observe that the connection is executed free of tension and avoiding distortion. The welded piping should not apply any force on the fitting and its connection flanges.

Only the o-ring attached to the delivery is to be used as seal of the connection flange on the fitting.

Inspect the weldment joints concerning their tightness.

4.2.2. Installation of an armature with threaded connection

The pipe thread has to be fitted to the threaded connection of the fitting.

Use suitable sealing material (e.g. sealing tape suitable for oxygen).

Ensure that the connection of the pipe with the fitting is executed without tension and avoiding distortion.

Carry out leak and operating tests after installation.

For MPG 03, use the M5 for MPG 08 and MPG 12 the M10 threaded hole to connect the valves to the common equipotential bonding.

4.2.3. Electrical connection

Work on electrical equipment can only be performed by a qualified electrician or by instructed people under the guidance and supervision of a qualified electrician according to the rules of engineering taking into account DIN EN 60204-1.

Prior to any electrical work on the valve, de-energize all poles and secure appropriately against restart. Ensure that the provided tension corresponds to the working voltage of the pilot valve.

Ensure correct polarity whenever connecting with direct-current.

If the valve is equipped with specific additional devices (e.g. limit switches), their technical data and electrical connection values are specified in the corresponding data sheets.

4.2.4. Pneumatic connection

Use filtered, dry and oil-free air for pneumatically activated valves as actuating air.

The actuating air pressure has to be exactly as indicated in the data sheet (if necessary, adjust the actuating air with a corresponding pressure reducer).

4.3. Commissioning

Prior to commissioning, read and observe the safety instructions.

Prior to every commissioning of a new system or re-commissioning of a system after maintenance or repair, ensure the following:

- All work at the system has been properly completed
- Commissioning only by qualified personnel according to chapter 3.2.1

The pipe system has to be flushed thoroughly prior to commissioning to remove foreign objects.

Protection devices and guards removed before work execution must be reinstalled afterwards.

5. Armature application in explosive area

To eliminate dangers of an ignition source applying the armature in explosive areas, the following details have to be observed:

Only armatures are allowed to be applied which are consistent with the directive 2014/34/EU and which are tagged with the following label:

CE  II 2G Ex h IIC T4 Gb

The valve series has been evaluated and tested by m-tech using the following harmonized standards for explosive atmospheres.

EN ISO 80079-36:2016	Explosive atmospheres Part 36: Non-electrical equipment for use in potentially explosive atmospheres - Basic concepts and requirements
EN ISO 80079-37:2016	Explosive atmospheres Part 37: Non-electrical equipment for use in potentially explosive atmospheres - Protection by design safety "c", ignition source monitoring "b", liquid encapsulation "k".

5.1. Lubricant

Only use lubricants / grease pastes that are permitted for oxygen boards.

The company m-tech prescribes for your products the following lubricant:

gleitmo 599 high intensity lubricant for oxygen boards

Manufacturer: **Fuchs Lubritech GmbH**

Werner-Heisenberg-Straße 1

67661 Kaiserslautern

Tel +49 (0) 6301 3206-0

5.2. Sealings / o-rings

The permanent application temperature of the sealing materials has to be 20K higher than the max. surface temperature of the armature.

The used sealing materials have to be permanently resistant against the applied media.

It is recommended to use only original spare parts of the producer.

5.3. Installation

To avoid residual currents through the armature, all conductive parts of the armature have to be linked into the total potential compensation of the system.

5.4. Installation / Outdoor application

To protect the armature against eventual ignition sources caused by lightning strokes, it has to be integrated into the local lightning protection installation when applied outdoor.

6. Maintenance

Prior to any work on the fitting, read and observe the safety instructions.

Ensure prior to work that the pipeline is completely free of pressure

Caution

Working on fittings under pressure can be fatal!

The valve and connected pipelines can be very cold or very hot due to the temperature of the medium.

The magnet of the pilot valve can also have high temperatures due to the electrical dissipation of the drive.

- The MPG high-pressure valves are mounted as modular valves. This enables an easy dismounting of the MPG valves.
- It is recommended to provision spare valves to avoid a production loss in case of a defective valve.
- At the valves, only the visual control is permitted to be executed independently.
- Without the prior permission of m-tech, no dismounting of the valves / modules mounted at the system is allowed to be executed independently.
- For safety reasons, only qualified and specially by m-tech trained personnel are allowed to maintain or repair the valves / modules mounted into the system
- In case of defect, return the valve to m-tech for repair and use a spare cartridge in the meantime.

Attention

All components brought into contact with gases have to be kept free of oil and grease.

6.1. High pressure valves of type MPG 03, MPG 08 & MPG 12

Maintenance Work	Activity	Interval
Visual control	see point 6.1.1	Annually
First complete maintenance	see point 6.1.2	After 5 years or 50000 switching cycles*
Following complete maintenances	see pointt 6.1.3	At least after further 5 years / 50000 activation cycles* or earlier, if recommended by m-tech

* 1 switching cycle corresponds to one opening and one closure of the valve

6.1.1. Visual control High pressure valves Type MPG 03, MPG 08 & MPG 12

During the visual inspection, check the following points:

- Is the valve complete or are parts such as bolts or pneumatic connections missing?
- Is the valve tight to the outside?
- To detect leaks, spray the pressurized valve with leak detection spray.
- Is the valve functional?
- Check whether gas can flow over the seat even though the valve is closed.
- Move the valve and check for any blockages.
- Is the valve externally clean?
- Remove dust and dirt regularly, otherwise it may clog the leakage holes and pilot air ports.
- Is the nameplate on the valve visible and legible?
- Are particles present in the system?
- Observe point 6.3 of these instructions.
- Observe the separate maintenance intervals for filters and particle traps.

6.1.2. First complete maintenance

All maintenances are executed by m-tech in our company or directly on site.

A complete maintenance includes the following actions

- Complete disassembly and maintenance of the valve (exchange of all seals).
- Training of the local people as far as easy possible maintenance works are concerned (on request of customer).
- Assessment of the state of the valve by m-tech.
- Determination of the period for further maintenances.
- Detailed registration of the relevant data in a separate "Maintenance-Inspection-Sheet" containing all further recommendations to be followed (with a copy for the customer).

6.1.3. Following complete maintenance

On occasion of the first maintenance to be executed on the spot after 5 years or 50000 switching cycles, the next maintenance date will be determined by m-tech.

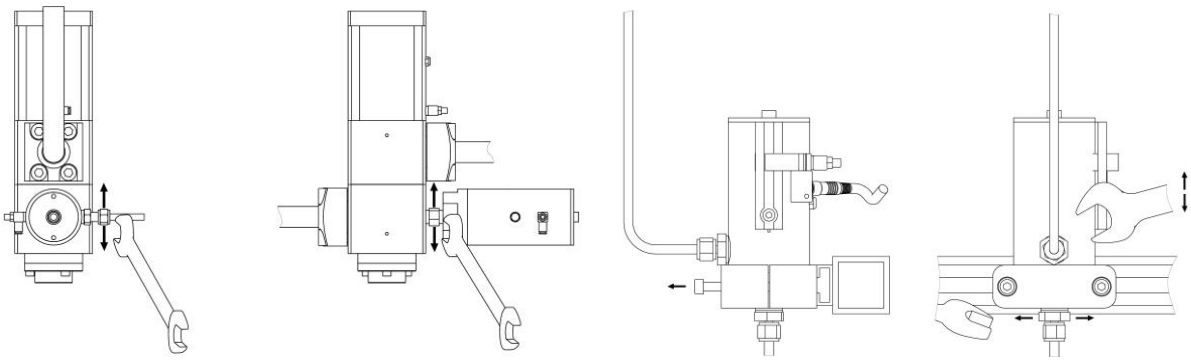
It is highly recommended that the customer observes the given maintenance dates.

6.2. Replacement instructions high pressure valves

6.2.1. Type MPG 03

Type: NC/NO/PR/HD

- Execute all necessary measures in order to ensure that there is no more pressure at the inlet and outlet of the valve that has to be replaced.
- Close the shut off faucet supplying actuating air.
- Remove the pneumatic tube at the valve cylinder of the MPG valve - the inox throttle should not be removed.
- Unfasten the screwing connection of the connected high pressure tubes by means of a hexagon key and remove the high pressure tubes.

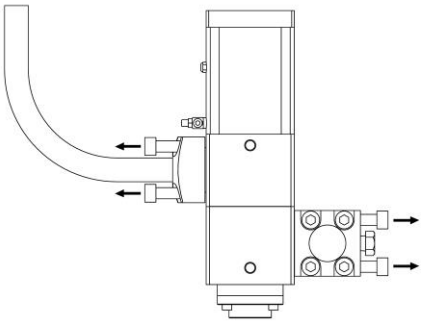


- Unfasten the fixing bolts at the valve support and remove the valve.
- Replace the dismounted valve by the new spare valve. Fasten the new valve with the fixing bolts at the support.
- Reconnect the high pressure tubes and fasten the screwing connection with a hexagon key.
- Reconnect the pneumatic tube to the valve.
- Open the actuating air supply shut off faucet and check the pressure of the actuating air. The actuating air pressure for the MPG valves has to be minimum **6 bar** (ideally 7 bar).
- Put the valve slowly and carefully under service pressure.
- Check the valve concerning tightness and function.

6.2.2. Type MPG 08 and MPG 12

Type: NC/NO/HD/PR/RV

- Execute all necessary measures in order to ensure that there is no more pressure at the inlet and outlet of the valve that has to be replaced.
- Close the shut off faucet supplying actuating air.
- Remove the pneumatic tube at the valve cylinder of the MPG valve - the throttle should not be removed.
- Remove the 4 cylinder bolts (M10) of the connection adapter at the inlet of the valve that is to be replaced in a well-balanced way and diagonal sequence with means of a hexagon screw key wrench size 8 mm.
- Remove the 4 fastening bolts (M10) of the valve in a well-balanced way and diagonal sequence with means of a hexagon screw key wrench size 8 mm.



- Replace the dismounted valve by the new spare valve.
- Fasten the valve with the 4 cylinder bolts (M10) to the module row or the fixing device in a well-balanced and diagonal sequence by means of a hexagon screw key wrench size 8 mm - with a torque of 40 Nm.
- Connect the connection adapter to the valve inlet with the 4 fastening bolts (M10 mm) in a well-balanced and diagonal sequence with a hexagon screw key wrench size 8 mm - with a torque of 40 Nm.
- Reconnect the pneumatic tube to the valve.
- Open the actuating air supply shut off faucet and check the pressure of the actuating air. The actuating air pressure for the MPG valves has to be of exactly 7 bar.

- Put the valve slowly and carefully under service pressure.
- Check tightness and function of the valve

6.2.3. Type DBV 20

- Execute all necessary measures in order to ensure that there is no more pressure at the inlet and outlet of the valve that has to be replaced.
- Remove the 4 fastening bolts of the valve (flange on the “C” side.) in a well-balanced way and diagonal sequence with a hexagon screw key wrench size 8 mm.
- Remove clamp from the “B“ side.
- Replace the dismounted valve by the new spare valve.
- Fasten the valve with the 4 cylinder bolts (M10) to the flange in a well-balanced and diagonal sequence with a hexagon screw key wrench size 8 mm - with a torque of 30 Nm.
- Reattach clamp to the, “B“ side.
- Check the valves tightness.

6.3. Filter and Particle traps

- Their purpose is to prevent the penetration of foreign objects and therefore minimize the probability of damaging the valves or other components of the gas filling system.
- To get the highest operational safety and efficiency of the filters, before commissioning, the supplying pipeline should be cleaned and purged thoroughly from the part of the customer to prevent foreign objects of any kind (particles, shavings, welding beads etc.) from getting into the system.
- Ordinarily, the filters do not require special maintenances. However, they should be inspected in certain intervals concerning pollution.
- Our recommendation of inspection intervals for the filters:

Maintenance work	Activity	Intervall
1. inspection	See point 6.3.1&2	8 days after the first commisioning
2. inspection	See point 6.3.1&2	3 months after the first commisioning
3. inspection	See point 6.3.1&2	6 months after the first commisioning
Further Inspections	See point 6.3.1&2	Every 6 months

6.3.1. Dismounting of filters

- Dismount the filter housing from the piping system by loosening the union nut with an open-end wrench SW60 mm and SW54 mm.
- Remove the filter cartridge and pour it out by gently tapping the cartridge on a piece of white paper.

Dismounting

- Dismount the filter body of the tubing unfastening the backhold nut with a hexagon key wrench size 60 mm and wrench size 52 mm.
- Take the filter cartridge out and empty it tapping slightly the cartridge on a piece of white paper.

Foreign objects

- Safekeeping of found foreign objects for subsequent examination.

Cleaning

- Purging of filter cartridge with oil-free compressed air.

Remounting

- Inspection of o-rings concerning wear and tear and exchange if necessary.
- Lubricate and remount carefully the o-rings afterwards and integrate the filter cartridge into the pipeline.

Attention

Watch the correct flow direction (arrow imprinted)!

- Put on the backhold nut and fasten it strongly by hand with a hexagon key wrench size 60 mm and wrench size 54 mm.

6.3.2. Inspection of filters

Examination of found foreign objects concerning:

- Quantity
- Material
- Origin

Preventive measures:

Based on the knowledge of the foreign bodies examination, appropriate preventive measure are to be taken to avoid henceforth the formation or penetration of foreign objects into the system or to minimize their presence as far as possible.

6.4. Check valves MPG 12 CV

The check valves must be subjected to checks and maintenance as in point 6.1. In case of leakage between the seat and the valve stem, replace the valve completely.

6.5. Relief valves MPG 12 RV (Overpressure valves)

- Relief valves operate as protection for the system concerning surpassing of the settled service pressure. Therefore, they should be handled and adjusted very carefully.
- The cross section of the outlet tube should be chosen as big as possible. However, it should be at least 14 mm.
- Ideally, the outlet tube is to be led out with a slope. Condensate has to be educted without danger.

- The inlet tube has to be as short as possible and correspond at least to the nominal width of the valve.
- The service pressure of the system should be at least 10 % smaller than the opening pressure of the valve to ensure an impeccable closure of the valve after purging.
- For the selection of a relief valve please use the data sheet or contact m-tech.

7. Spare parts

In order to prevent any production loss arising from a necessary repair of a valve, we recommend a provisioning of corresponding spare valves.

The advantage of a provisioning spare valve is the fast and easy way to replace a valve so that a continuous production is assured.

For security reasons, the removal and mounting of valves has to be executed in strict accordance with our corresponding type-specific Replacement Instructions.

If requested, we are prepared to submit to the customer a detailed recommendation regarding type and quantity of spare valves as well as also other spare parts according to the filling system.

M-tech offers suitable sealing kits for every type of valve.

In case of an exchange of the seals, only original spare parts of the producer can be used.

8. Repair

Only m-tech personnel or personnel that was adequately trained by m-tech is allowed to execute repair works at any components or accessories of the valve construction series MPG 03, MPG 08 and MPG 12.

Please return the defective valve to the manufacturer (See adress in point 1.3.)

Prior to commissioning, the system tightness should be examined in accordance with DIN 3230.

9. Storage

During storage, protect the valves from external influence and dirt. Protect the port openings to prevent entry of dirt.

The storage room should be dry, dust-free and moderately ventilated. The storage temperature should remain between 0°C and 25°C.

Store replacement parts so that elastomers are not exposed to sunlight or UV light from other sources.

10. Packaging

The valves must be packed in such a way that the valve itself and any accessories such as limit switches or travel sensors cannot be damaged.

The connection openings must be protected against the ingress of dirt.

11. Transport

Protect the valve while being transported against external force such as impact, shock, vibration, etc.

Protect existing sealing surfaces against damage.

12. Disposal

Dispose waste appropriately and observe the legal regulations protecting the environment.