

General Operating Manual for **FMX**[®] Valves

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Table of contents

1	General	3
1.1	Target group	3
1.1.1	Personnel qualification	3
1.2	Structure of the documentation	3
1.2.1	the "General operating manual"	3
1.2.2	the "data sheets"	3
1.3	Safekeeping	4
2	Product description	4
2.1	Important notes on the FMX® valve	4
2.1.1	Intended purpose.....	4
2.1.2	Precautionary measures	4
2.1.3	Conformity	4
2.2	Technical data	5
3	Safety regulations	5
3.1	Representation.....	5
3.2	Product Safety.....	5
3.3	Organisational and personnel matters	6
3.3.1	General information	6
3.3.2	Transport / Assembly / Commissioning / Maintenance / Repair.....	6
3.3.3	Electrical installation	6
3.4	Product-specific hazards.....	6
3.4.1	Using a Medium Unsuitable for the FMX® Valve	6
3.4.2	Lower than required minimum wall thickness due to corrosion or abrasion	6
3.4.3	Exceeding the permissible pressure with risk of bursting	7
3.4.4	Overloading the FMX® Valve	7
3.4.5	Opening screw connections when the FMX® valve is under pressure.....	7
3.4.6	Leakage of hazardous substances.....	7
3.4.7	Free output of the FMX® valve.....	8
3.4.8	Failure of the drive energy	8
3.5	Emergency information	8
4	Functionality	8
5	Installation / Commissioning	8
5.1	Measures and considerations before installation.....	8
5.2	Installing the FMX® valve	9
5.2.1	Installation	9
5.3	Electrical connection	9
5.4	Pneumatic connection.....	10
5.5	Commissioning.....	10
6	Maintenance	10
7	Repair	11
8	Storage	12
9	Packaging	12
10	Transport	12
11	Disposal	12
12	Spare parts	12
13	Further inquiries	13

1 General

To ensure successful and safe use of the **FMX**[®] valves manufactured by müller co-ax ag, the entire operating manual must be read and understood before installation and commissioning. Special attention must be paid to the safety instructions.



Before using our **FMX**[®] valves, the safety instructions must be read and observed.

Should difficulties arise which cannot be solved with the help of the operating instructions, please contact the supplier or manufacturer.

These operating instructions cover the areas of installation/commissioning, maintenance, repair, storage, packaging, transport and disposal. The operating instructions have been prepared in accordance with the provisions of Directive 2014/68/EU on pressure equipment.

The operator is also responsible for compliance with local safety regulations on the part of the installation personnel involved. When using the **FMX**[®] valve, the operator or the person responsible for designing the system must ensure that valid national regulations are observed.

The manufacturer reserves all rights of technical changes and improvements at any time. The use of these operating instructions and the direct handling of the **FMX**[®] valves requires the user's qualification as described in chapter 1.1.

1.1 Target group

The operating instructions are intended for persons who are entrusted with installation planning, installation, commissioning or maintenance/repair and who possess qualifications corresponding to their activities and functions, i.e. who, on the basis of their technical training, their knowledge and experience, as well as their knowledge of the relevant standards, are able to assess the work assigned to them and recognize possible hazards.

This also includes knowledge of relevant accident prevention regulations, generally recognised safety rules, EC directives and country-specific standards and regulations.

1.1.1 Personnel qualification

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

1.2 Structure of the documentation

The standard operating manual for our **FMX**[®] valves consists of two main modules:

1.2.1 the "General operating manual"

It contains important basic information and safety instructions for the safe handling of all **FMX**[®] valves.

1.2.2 the "data sheets"

They contain the additional information and technical data required for the individual **FMX**[®] valve types. The data sheets are only to be used in conjunction with the General Operating Instructions. In particular, the safety instructions in the General Operating Instructions must be observed!

1.3 Safekeeping

Access to the entire operating manual must be guaranteed at all times at the location where the **FMX**[®] fitting is used.

2 Product description

2.1 Important notes on the **FMX**[®] valve

2.1.1 Intended purpose

The **FMX**[®] valves are intended for installation in pipelines in accordance with EC Directive 2014/68/EU on pressure equipment.

The type of medium agreed upon in the order (chemical, abrasive and corrosive influence), as well as the limit values of medium pressure and temperature according to the data sheet must be observed. Any other or more extensive use is not in accordance with the intended purpose.

It must be ensured that the usual flow rates in continuous operation are not exceeded in this pipeline system and that abnormal operating conditions such as vibrations, water hammer, erosion (e.g. due to wet steam), cavitation and more than minor proportions of solid matter in the medium - in particular abrasive particles - have been clarified with the manufacturer.

The field of application of the **FMX**[®] valve is the responsibility of the plant designer. Special markings of the **FMX**[®] valve must be observed.

2.1.2 Precautionary measures

When using the **FMX**[®] valves, the currently valid laws (e.g. EC Directive and national regulations) and the recognised rules of technology must be observed, e.g. DIN standards, DVGW memoranda and worksheets, VDI guidelines, VDMA standard sheets, etc.

The relevant laws and regulations must be observed for systems subject to monitoring, e.g. industrial code, accident prevention regulations, steam boiler ordinance, ordinance on high-pressure gas lines, ordinance for flammable liquids, as well as the technical regulations VDE, TAB, TRD, TRG, TRbF, TRGL, TRAC, AD-Merkblätter, etc.

In addition, the general installation and safety regulations for pipeline and plant construction as well as the local safety and accident prevention regulations apply.

The operating instructions must be observed for all work on the **FMX**[®] valve and for all handling of the **FMX**[®] valve.



Non-observance of the operating instructions can result in serious injuries or damage to property (e.g. due to mechanical, chemical or electrical influences).

2.1.3 Conformity

The **FMX**[®] valves are built according to the state of the art and in accordance with Directive 2014/68/EU on pressure equipment.

2.2 Technical data

The **FMX**[®] fittings are designed without wear surcharge and statically with 1.5-fold safety against nominal pressure at room temperature

Please refer to the data sheet for the technical data (also electrical) and the essential permissible limit values, in particular for medium pressure and temperature.

3 Safety regulations

This chapter contains important general safety instructions. In addition, the special safety instructions in the other chapters must also be observed.

3.1 Representation

Depending on severity and probability, hazards are identified with a signal word and assigned safety colours according to ANSI Z535. Gefahren werden je nach Schwere und Wahrscheinlichkeit mit einem Signalwort und zugeordneten Sicherheitsfarben nach ANSI Z535 gekennzeichnet:



DANGER

For an imminently imminent danger leading to serious bodily injury or death.



WARNING

For a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

For a potentially hazardous situation that could result in minor bodily injury or property damage.



NOTE

For a potentially hazardous situation which could result in damage to the product or property in its vicinity.



IMPORTANT

For application notes and other useful information.

However, it is equally essential to observe the other notes and information, which are not particularly highlighted, in order to avoid malfunctions which may cause direct or indirect damage to persons or property.

3.2 Product Safety

The **FMX**[®] valves correspond to the state of the art and the recognised safety regulations, but nevertheless dangers can arise. The **FMX**[®] valves may only be operated in perfect condition and in compliance with the entire operating manual.

The **FMX**[®] valves are only intended for the intended use according to chapter 2.1.1.



WARNING

The use of media incompatible with the material, exceeding the limit values of medium pressure and temperature, as well as mechanical additional stresses, e.g. caused by connected pipes, can lead to failure of the **FMX**[®] valve material and bursting of the **FMX**[®] valve.

3.3 Organisational and personnel matters

3.3.1 General information

The recognised rules for occupational safety must be observed. The persons entrusted with installation planning, installation, commissioning, maintenance or repair must have the qualifications corresponding to their activities and functions.

Based on their technical training, their knowledge and experience, as well as their knowledge of the relevant standards, they must be able to assess the work assigned to them, understand the interactions between the **FMX**[®] valve and the plant and recognize possible hazards.

They must also be familiar with relevant accident prevention regulations, generally recognized safety rules, EC directives and country-specific standards and regulations, as well as all operational, regional and internal regulations and requirements.

You require training or instruction in the care and use of appropriate safety and industrial safety equipment in accordance with safety engineering standards, as well as first aid training, etc. (see also TRB 700).

They must have read and understood the entire operating manual.

No changes, additions or conversions may be made without the manufacturer's or supplier's approval.

3.3.2 Transport / Assembly / Commissioning / Maintenance / Repair

Only by trained or instructed personnel. For safety reasons, it must be checked once again before starting work whether all necessary measures have been taken to protect persons. **FMX**[®] valves that have come into contact with media that are hazardous to health must be decontaminated before work begins.

3.3.3 Electrical installation

Hazards due to electrical energy must be excluded. Work on the electrical equipment of the device may only be carried out by a qualified electrician or by instructed persons under the direction and supervision of a qualified electrician in accordance with the rules of technology.

3.4 Product-specific hazards

Any hazards which could be caused by the process medium, control pressure or moving parts must be prevented by means of appropriate measures.

Proper transport and storage of the **FMX**[®] valve are assumed.

The following chapters contain a series of product-specific hazards and measures to avoid them:

3.4.1 Using a Medium Unsuitable for the **FMX**[®] Valve

The materials of the **FMX**[®] valve are only compatible with certain media. The use of media which are not compatible with the sealing materials listed in the data sheets can have fatal consequences. **FMX**[®] valves are not suitable for use in the oxygen range!



Failure to comply with this regulation can endanger life and limb!

3.4.2 Lower than required minimum wall thickness due to corrosion or abrasion



Regular inspections shall be carried out to determine the safety condition of the inner wall.

3.4.3 Exceeding the permissible pressure with risk of bursting

One cause for this exceedance could be, for example, so-called closing blows or cavitation. Closing strokes are pressure peaks that occur when a pipeline is closed with a **FMX**[®] valve. To put it simply, this is caused by the force with which the moving medium column collides with the closing **FMX**[®] valve.

WARNING

The pressure peaks occurring during capping can reach a multiple of the resting pressure. The user must select the operating pressure stage of the **FMX**[®] valve so that the pressure peaks occurring in the specific installation situation do not exceed the maximum permissible operating pressure of the **FMX**[®] valve.

In addition, the static pressure of a liquid medium must be higher than the vapour pressure of the medium to avoid cavitation.

3.4.4 Overloading the **FMX**[®] Valve

Overloading of the **FMX**[®] valve can be caused by additional stresses, e.g. step strain, connected pipelines or high ambient temperature.

WARNING

The **FMX**[®] valve is only intended for the permissible medium pressure load.

Therefore, install the **FMX**[®] valve free of forces and ensure that no additional stresses occur, e.g. due to pipelines or step loads.

No welding work or heat treatments may be carried out on the pressure-bearing walls, nor may any fixing holes be drilled. Install the **FMX**[®] valve and the electrical and pneumatic lines in such a way that they cannot be damaged and no short-circuits due to moisture can occur at electrical plug connections.

3.4.5 Opening screw connections when the **FMX**[®] valve is under pressure

The opening of screw connections when the **FMX**[®] valve is under pressure leads to medium leakage and damage to the **FMX**[®] valve.

DANGER

There is a danger to life when opening pressurised **FMX**[®] valves!

WARNING

Before any work on the **FMX**[®] valve:

The **FMX**[®] valve and all connected lines must be depressurized. Make sure that the **FMX**[®] valve is de-energized. Allow the **FMX**[®] valve and medium to cool. The evaporation temperature of the medium must also be undershot to prevent scalding. In the case of media that are corrosive, flammable, aggressive or toxic, for example, flush and ventilate the pipeline system, wear protective goggles or protective mask with eye protection, or take other necessary protective measures.

3.4.6 Leakage of hazardous substances

Hazardous substances can escape from the pipeline when the **FMX**[®] valve is dismantled.

WARNING

Hazardous media (e.g. residual media remaining in the **FMX**[®] valve during disassembly) must be collected and disposed of in such a way that there is no danger to persons or the environment. Legal regulations must be observed.

3.4.7 Free output of the FMX® valve

If nothing is connected to the output of an FMX® valve, the medium escaping when the FMX® valve is opened (possibly unintentionally) could pose a hazard.

 **WARNING**

The FMX® valve outlet should be discharged in a controlled manner to prevent hazards at the FMX® valve outlet.

3.4.8 Failure of the drive energy

The FMX® valve could be switched over to an unsafe state for the application if the actuator energy fails.

 **CAUTION**

Select the FMX® valve function (NC/NO) deliberately so that the FMX® valve switches to the safe operating state for the intended purpose in the event of failure of the actuator energy.

3.5 Emergency information

In case of fire, only use extinguishing agents that are suitable for extinguishing corresponding electrical systems. Ensure that the extinguishing agent does not cause any dangerous reaction with any escaping medium.

4 Functionality

Please refer to the corresponding data sheet for the function of your specific FMX® valve.

5 Installation / Commissioning

 **WARNING**

Before installation or commissioning, the general safety instructions in chapter 3.0 must be read and observed. Always observe the applicable accident prevention regulations when handling the FMX® valves.

5.1 Measures and considerations before installation

During installation, observe the TRB 700 and additionally the following:

Compare the material, pressure and temperature specifications of the FMX® valves with the operating conditions of the piping system to check material resistance and load capacity. Pressure surges must not exceed the maximum allowable pressure of the FMX® valve.

 **WARNING**

Pressure surges can reach a multiple of the resting pressure. In addition, the static pressure of a liquid medium must always be higher than the vapour pressure of the medium in order to avoid cavitation.

Install the FMX® valve in such a way that it is easily accessible for all connection and maintenance work that may be necessary later (e.g. connections to actuator, sensors and control units, etc.). Otherwise, the installation position is arbitrary.

Suitable strainers should be installed upstream of the FMX® valve to ensure trouble-free operation of the FMX® valve.

It is recommended to install manual shut-off valves upstream of the strainer and downstream of the FMX® valve so that maintenance work can be performed on the strainer and the FMX® valve without draining the entire system.

If the plant is to remain in operation uninterrupted, a bypass pipe must be installed when the plant is designed.

If installed outdoors, protect the **FMX**[®] valve against direct weather influences.

Install the **FMX**[®] valve so that no mechanical loads are exerted on the **FMX**[®] valve during and after installation. The **FMX**[®] valve may only be loaded with the intended internal medium pressure, without any additional mechanical stress.

WARNING

Additional mechanical stresses can lead to malfunctions or to overloading and bursting, especially of the **FMX**[®] valve which is under medium pressure.

For force-free installation, the connecting cables must be axially aligned with the connections of the **FMX**[®] valve and have the correct distance. Thermal expansion of the pipes must be compensated by compensators. If necessary, the transmission of vibrations must be avoided by flexible vibration compensators.

5.2 Installing the **FMX**[®] valve

CAUTION

Before installation, check the **FMX**[®] valve for possible transport damage. Damaged **FMX**[®] valves may no longer meet the safety requirements and must therefore not be installed.

NOTE

Before installing the **FMX**[®] valve, check the pipe system for absolute cleanliness to prevent residues from pipe assembly or other foreign bodies from being flushed into the **FMX**[®] valve during commissioning. When installing the **FMX**[®] valve in non-conductive pipes, the **FMX**[®] valve must be included in the equipotential bonding. Only remove protective caps from the connections directly before installation, without damaging existing sealing surfaces or threads. The sealing surfaces must be technically perfect.

Only permissible connecting elements (e.g. according to DIN EN 1515-1) and permissible sealing elements (e.g. according to DIN EN 1514) may be used.

FMX[®] valves and pipelines which are operated at high (> 50 °C) or low (< 0 °C) temperatures must be protected from contact by insulation, or warning signs must be provided to indicate the danger of possible contact.

In the event of condensation or icing hazard in air conditioning, cooling and refrigeration systems, professional, diffusion-tight insulation of the complete **FMX**[®] valve is required. In the event of icing, there is a risk of the actuator being blocked.

5.2.1 Installation

Keep to the flow direction indicated on the **FMX**[®] valve so that the **FMX**[®] valve can perform its intended function.

Use a suitable sealant.

The piping must be carried out in such a way that the force flow does not follow over the longitudinal axis of the **FMX**[®] valve.

After installation, carry out a tightness and function check.

5.3 Electrical connection

Work on the electrical equipment of the **FMX**[®] valve may only be carried out by a qualified electrician or by instructed persons under the direction and supervision of a qualified electrician in accordance with the rules of technology and in compliance with DIN EN 60204-1 (Electrical equipment of machines), the VDE

regulations including the safety regulations, the accident prevention regulations and the operating instructions.

The electrical connection is made after unscrewing the respective plug connection. Before carrying out any electrical work on the **FMX**[®] valve, disconnect all poles from the power supply and secure accordingly. Ground the **FMX**[®] valve in accordance with local regulations.

No protective measures are specified in the connection diagrams. When connecting the **FMX**[®] valve, these measures must be additionally provided in accordance with VDE 0100 and the regulations of the relevant utility company.

If the **FMX**[®] valve is equipped with additional equipment such as limit switches etc., the corresponding data sheets or connection values must always be observed..

Please refer to the data sheet for the electrical parameters or a connection diagram.

5.4 Pneumatic connection

For pneumatically actuated **FMX**[®] valve, use conditioned air (connect air maintenance unit upstream if necessary).

For further information on the connection of control air, please refer to the data sheet.

It is essential to ensure that the actuation of the valves does not lead to closing strokes, which could result in mechanical damage to the valves.

Suitable throttles or similar devices must be used. müller co-ax ag recommends the mounting parts according to the data sheet.

5.5 Commissioning



WARNING

Before commissioning, the safety regulations in chapter 3.0 must be read and observed.

Before each commissioning of a new system or before restarting a system after repairs or conversions, ensure the following:

TRB 700 is observed. All installation and assembly work has been properly completed.

Commissioning only by qualified personnel according to chapter 3.3.

The pipe system has been thoroughly flushed with the **FMX**[®] valve fully open to remove any harmful impurities from the sealing surfaces. The **FMX**[®] valve is in the correct functional position.

Existing protective devices have been reinstalled or put into operation.

6 Maintenance



WARNING

Before carrying out any work on the **FMX**[®] valve, the general safety instructions in Chapter 3.0 must be read and observed.



DANGER

There is a danger to life when opening pressurised **FMX**[®] valves!

Our **FMX**[®] valves are largely maintenance-free. However, for operational safety reasons, all **FMX**[®] valves should still be checked regularly, e.g. external condition, including accessories. **FMX**[®] valves should general-

ly be operated regularly to ensure that the smooth running of all moving parts is not impaired by long downtimes.

Maintenance and service intervals must be determined by the operator in accordance with the operating conditions (see also TRB 700).

 **CAUTION**

The **FMX**[®] valve and the connected pipes can be very cold or very hot due to the medium temperature.

7 Repair

 **WARNING**

Before carrying out any work on the **FMX**[®] valve, the general safety instructions in Chapter 3.0 must be read and observed. **FMX**[®] valves that have come into contact with hazardous media must be decontaminated before repair.

 **DANGER**

There is a danger to life when opening pressurised **FMX**[®] valves!

 **CAUTION**

The **FMX**[®] valve and the connected pipes can be very cold or very hot due to the medium temperature. **FMX**[®] valves with magnetic actuators can also have high temperatures due to the electrical power loss of the actuator.

 **WARNING**

Before carrying out any work on the **FMX**[®] valve, ensure the following:

The **FMX**[®] fitting and all connected lines must be depressurized.

Allow the system and medium to cool down. The evaporation temperature of the medium must also be undercut to prevent scalding.

Make sure that the drive is in the de-energized state and that unintentional movements of the drive are excluded. Bear in mind that the **FMX**[®] valve still contains highly prestressed springs (heavy lashing possible).

In the case of media which are corrosive, flammable, aggressive or toxic, flush and ventilate the piping system, wear protective goggles or protective mask with eye protection or take other necessary protective measures.

Any residual medium remaining in the **FMX**[®] valve during disassembly must be collected and disposed of in such a way that there is no danger to persons or the environment. Legal regulations must be observed.

FMX[®] valves that come into contact with media that are hazardous to health must be decontaminated before work is carried out.

When dismantling the **FMX**[®] valve, observe the generally applicable installation guidelines and TRB 700. Assembly and disassembly work only by qualified personnel (see chapter 3.3) according to the manufacturer's instructions. Always use new spare parts after disassembly/conversion of parts. Only original **FMX**[®] spare parts from the manufacturer may be used.

 **CAUTION**

Before recommissioning, chapter 5.5 Commissioning must be read and observed. The **FMX**[®] valves must be subjected to a strength and tightness test in accordance with DIN EN 12266 prior to commissioning after repair.

8 Storage

During storage, protect the **FMX**[®] valves against external influences and contamination. Avoid the formation of condensation water through ventilation, desiccants or heating. Protect connection openings from the ingress of dirt.

The **FMX**[®] valves must be stored in such a way that they remain in perfect working order even after prolonged storage. In particular, the guidelines for the storage of elastomers (DIN 7716) must be observed:

The storage room should be dry, dust-free and moderately ventilated. Storage temperature frost-free up to +25°C. Existing stocks should first be used up in order to achieve the shortest possible storage times. Store spare parts in such a way that no sunlight or UV light from other sources can reach elastomers.

9 Packaging



WARNING

FMX[®] valves that have come into contact with media hazardous to the customer's health must be decontaminated before packaging.

Pack the **FMX**[®] valves in such a way that any existing coatings or accessories such as plugs and socket-outlets and sensors cannot be damaged by subsequent transport. Protect connection openings from dirt. Use packaging class in accordance with applicable regulations and observe country-specific regulations.

10 Transport



WARNING

FMX[®] valves that have come into contact with hazardous media must be decontaminated before transport. Always observe the applicable accident prevention regulations when handling **FMX**[®] valves.

Transport temperature -20°C to +65°C.

Protect against external force (impact, shock, vibration, etc.).

Protect existing sealing surfaces at the connections from damage.

Do not damage corrosion protection layer.

11 Disposal



WARNING

FMX[®] valves that have been exposed to hazardous media must be decontaminated before disposal.

The legal regulations must be observed for proper, environmentally friendly disposal.

12 Spare parts

If spare parts are required, please contact the supplier or manufacturer.

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13 Further inquiries

Please indicate the following when contacting us about **FMX®** valves:

- Article or order number
- Type designation
- Pressure stage
- Medium pressure before and after the **FMX®** valve
- Flow medium
- Medium temperature
- Flow rate in m³/h
- Installation sketch or actual operating conditions