



# General Operating Manual for cx-tec valves

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## Manufacturer:

müller co-ax ag  
Gottfried-Müller-Str. 1  
74670 Forchtenberg

Tel. : 011 49 79 47 / 828 - 0  
Fax 011 49 79 47 / 828 - 11  
Email [info@co-ax.com](mailto:info@co-ax.com)  
Website [www.co-ax.com](http://www.co-ax.com)

## Distributor:

co-ax valves inc.  
1518 Grundy's Lane  
Bristol, PA 19007-1521

Tel. : +1 215-757-3725  
Fax +1 215-757-4060  
Email [info@cx-tec.us](mailto:info@cx-tec.us)  
Website [www.cx-tec.us](http://www.cx-tec.us)

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# 1 General

In order to ensure successful and safe operation of the cx-tec valves manufactured by müller co-ax ag (the “cx-tec valves”), the entire Operating Manual must be read and understood prior to installation and commissioning. Special attention must be placed on the safety instructions.

 **WARNING** | Before using our cx-tec valves, read and observe the safety regulations.

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

This Operating Manual covers the areas of installation/commissioning, maintenance, repair, storage, packaging, transport and disposal.

The operator is responsible for adhering to local safety regulations also with regard to the assembly personnel employed. When using the cx-tec valves, the operator or those responsible for the design of the plant must ensure that valid national regulations are adhered to.

The manufacturer reserves all rights to make technical changes and improvements at any time. The use of this Operating Manual and the direct handling of cx-tec valves requires that the user be qualified as described in chapter 1.1.

## 1.1 Target group

The Operating Manual is directed at persons who are entrusted with the installation planning, installation, commissioning or maintenance/repair and have qualifications in accordance with their activities and functions and who, based on their technical training, their knowledge and experience and their knowledge of the applicable standards, are able to evaluate the work assigned to them and recognize possible hazards.

This also includes the knowledge of applicable accident prevention regulations, generally recognized safety regulations, and country-specific standards and regulations.

### 1.1.1 Personnel qualification

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

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

## 1.2 Documentary structure

The standard Operating Manual for our cx-tec valves consist of two main modules:

### 1.2.1 The “General Operating Manual”

This contains important basic information and safety instructions for the safe handling of all cx-tec valves.

### 1.2.2 The “Data sheets”

These contain supplementary additional information and technical data necessary for the individual specific cx-tec valve types. Use the data sheets only in connection with the Operating Manual. In particular, observe the safety instructions in the Operating Manual!

## 1.3 Safekeeping

Access to the entire Operating Manual must be guaranteed at all times at the place of operation of the cx-tec valves.

## 2 Product description

### 2.1 Important information concerning the cx-tec valves

#### 2.1.1 Purpose

The type of medium (chemical, abrasive and corrosive effect) must agree with the order. The limit values of medium pressure and temperature set forth in the data sheet must be adhered to. Any other or additional use is not in accordance with that intended.

It must be ensured that in this pipe system the usual flow rates (e.g. 4 m/s for liquids) in continuous operation are not exceeded and abnormal operating conditions such as vibrations, water hammers, temperature shocks, cavitations, wet steam with a high water content and more than insignificant portions of solids in the medium - particularly abrasive ones - are cleared with the manufacturer.

The area of operation of the cx-tec valves is the responsibility of the plant planner. Observe special cx-tec valve markings.

#### 2.1.2 Precautionary measures

When using the cx-tec valves, observe the currently applicable laws (e.g. national regulations) and the recognized rules of engineering, i.e. DIN standards, DVGW information and working sheets, VDI guidelines, VDMA standard sheets, etc.

On systems subject to supervision, adhere to the applicable laws and regulations, e.g. code of commerce, accident prevention regulations, boiler regulations, regulations concerning high gas pressure lines, regulations concerning combustible liquids and the technical regulatory works VDE, TAB, TRD, TRG, TRbF, TRGL, TRAC, AD information sheets, etc.

The general equipment and safety regulations for pipeline and plant construction and the local safety and accident prevention regulations apply in addition.

It is imperative to comply with the Operating Manual with regard to all work on the cx-tec valves and whenever handling the cx-tec valves.



Failure to observe the Operating Manual can result in serious injuries or damage to property (e.g. due to mechanical, chemical or electrical effects).

#### 2.1.3 Conformity

The cx-tec valves have been built according to the state of the art and in accordance with the guideline 2014/68/EU concerning pressure devices.

## 2.2 Technical data

The housing materials and sealing materials are selected in accordance with the operating conditions specified by the customer with the order. These operating conditions have a major effect on the service life of the cx-tec valves for instance due to abrasion, chemical or corrosive attack of the materials. The cx-tec valves have been designed without wear allowance and statically with 1.5 times the safety of the rated pressure at room temperature.






The technical data (also electrical) and the essential permissible limit values, especially of medium pressure and temperature, is included in the data sheet.

### 3 Safety instructions

This chapter contains important general safety instructions. However, the special safety instructions in the remaining chapters must also be observed.

#### 3.1 Presentation

Dangers are identified with a signal word and allocated safety colors according to ANSI Z535 depending on the seriousness and probability:


 <b>DANGER</b>	For immediately threatening danger resulting in serious physical injuries or death.
 <b>WARNING</b>	For a potentially dangerous situation that could lead to serious physical injuries or death.
 <b>CAUTION</b>	For a potentially dangerous situation that could lead to minor physical injuries or damage to property.
 <b>NOTE</b>	For a potentially harmful situation where the product or an item in its vicinity could be damaged.
 <b>IMPORTANT</b>	For application instructions and other useful information.

However, observing other notes and information not specially emphasized is equally indispensable in order to avoid disruptions, which in turn could result in direct or indirect damage to persons or property.

#### 3.2 Product safety

The cx-tec valves comply with the state of the art and the recognized rules of technical safety, but dangers can still arise. Operate the cx-tec valves only in perfect condition taking into account the entire Operating Manual.

The cx-tec valves are only intended for the purpose according to chapter 2.1.1.

 <b>WARNING</b>	Use of material-incompatible media, exceeding the limit values of medium pressure and temperature and mechanical additional loads such as caused by connected pipelines can result in failure of the cx-tec valve material and bursting of the cx-tec valve.
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#### 3.3 Organizational, personnel information

##### 3.3.1 General

Observe the recognized rules of industrial safety. The persons 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, understand the interactions between cx-tec valves and system and recognize possible dangers.

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

They must have passed training or instructions in accordance with the standards of safety engineering in the care and use of appropriate safety and protective working equipment as well as training in first aid, etc. (Refer also TRB 700).

They must have read and understood the entire Operating Manual.

No changes, attachments or conversions must be performed without approval of the manufacturer or supplier.

### **3.3.2 Transport / Installation / Commissioning / Maintenance / Repair**

Only by trained or instructed personnel. For safety reasons, recheck whether all necessary measures for the protection of persons have been taken before commencing the work. cx-tec valves that have come in contact with harmful media must be decontaminated prior to the work.

### **3.3.3 Electrical installation**

Electrical energy hazards must be excluded. Work on electrical equipment of the device must only be performed by an electrician or persons under the guidance and supervision of an electrician in accordance with the rules of engineering.

## **3.4 Product-specific dangers**

Hazards that may arise from the flow medium, the control pressure and moving parts must be prevented through suitable measures.

In addition to this, ensure that the cx-tec valves are employed only where the type of medium, operating pressure and temperatures correspond with the design criteria used as a base for the order and specified on the nameplate. Proper transport and proper storage of the cx-tec valves are assumed as a matter of course.

The following chapters contain a number of product-specific dangers and measures for their avoidance:

### **3.4.1 Use of a medium unsuitable for the cx-tec valves**

The cx-tec valve materials are compatible only with certain media. Effects can arise with fatal consequences with the employment of media which are not compatible with the sealants listed in the data sheets. cx-tec fittings are not suitable for employment in the oxygen sector!



Disregard of this instruction can represent a danger to life and limb!

### **3.4.2 Reduction of required minimum wall thickness through corrosion or abrasion**



Regularly carry out inspections to determine the technically safe condition of the inner wall.

### 3.4.3 Exceeding the permissible pressure with risk of bursting

A cause for such exceeding could be, for instance, so-called closing hammer or cavitation. Closing hammer are pressure peaks, which occur when a pipe is closed by means of a cx-tec valve. The reason for this, expressed in simple terms, is the momentum of the moved medium column impacting on the closing cx-tec valve.

#### **WARNING**

The pressure peaks occurring during closing can reach a multiple of the pressure at rest. The user must select the operating pressure stage of the cx-tec valve so that the pressure peaks occurring in the concrete installation situation do not exceed the maximum permissible operating pressure of the cx-tec valve. With the flow, the static pressure of a liquid media must additionally always be above the vapor pressure of the medium in order to avoid cavitation.

### 3.4.4 cx-tec valve overload

cx-tec valve overloads can be triggered through additional loads such as, for instance, stepping loads, connected pipelines or high ambient temperature.

#### **WARNING**

The cx-tec valve is only intended for the permissible medium pressure load. For this reason, install the cx-tec valve without force and ensure that no additional loads occur due to pipelines or stepping loads.

No welding operations or heat treatments must be performed or mounting holes be provided on the walls subject to pressure. Install the cx-tec valve and the electrical and pneumatic lines so that they cannot be damaged and no moisture-induced short circuit can occur on electrical plug connections.

### 3.4.5 Opening screw connections with pressurized cx-tec valve

Opening screw connections with pressurized cx-tec valve results in the leakage of medium and damages the cx-tec valve.

#### **DANGER**

Opening pressurized cx-tec valves can be fatal!

#### **WARNING**

Prior to any work on the cx-tec valve:  
Depressurize the cx-tec valve and all connected lines. Ensure that the cx-tec valve is electrically de-energized. Allow cx-tec valve and medium to cool down. The temperature must be below the evaporation temperature of the medium in order to prevent scalding. With media that is caustic, combustible, aggressive or toxic, flush the pipe system and ventilate, wear goggles or protective mask with eye protection or take other necessary protective measures.

### 3.4.6 Leakage of dangerous substances

Dangerous substances can leak for instance from relief bores or when disassembling the cx-tec valve.

#### **WARNING**

Collect and dispose of dangerous media (for instance leakages from relief bores or traces of medium remaining during the disassembly of the cx-tec valve) so that persons and the environment are not endangered. Observe all applicable legal requirements.

### 3.4.7 Free cx-tec valve outlet

If nothing is connected to the outlet of a cx-tec valve, the exiting medium could constitute a hazard during the (possibly inadvertent) opening of the cx-tec valve.



In order to avoid any hazardous conditions on the discharge side of the cx-tec valve, the exiting media should go into an appropriate fixture.

### 3.4.8 Drive energy failure

Upon failure of the actuator, the cx-tec valve could change to a condition that is unsafe for the intended operation.



Deliberately select the cx-tec valve function (NC/NO) so that the cx-tec valve assumes the operating condition that is safe for the intended operation in the event of drive energy failure.

### 3.4.9 Paintwork

When carrying out painting operations the cx-tec valve could be accidentally painted. This would impair the heat radiation of the magnet or clog the relief bore.



Effectively cover the cx-tec valves when carrying out work such as concrete, plastering, painting or sandblasting operations in the area of the cx-tec valve, which could adversely affect it.

## 3.5 Emergency information

In the event of fires, use only such extinguishing agents as are suitable for the extinguishing of corresponding electrical systems. Ensure that the extinguishing agent does not result in a dangerous reaction together with a possibly leaking medium.

## 4 Operation

The operation of your specific cx-tec valve is included in the appropriate data sheet.

## 5 Installation / Commissioning



Read and observe the general safety instructions in chapter 3.0 prior to installation or commissioning. Whenever handling the cx-tec valves, always observe the applicable accident prevention regulations.

### 5.1 Measures and considerations prior to installation

Always observe the following when installing the TRB 700:

Compare material, pressure and temperature details of the cx-tec valves with the operating conditions of the pipeline system to verify material resistance and load capacity. Possible water hammer must not exceed the maximum permissible pressure of the cx-tec valve.



**⚠ WARNING**

Water hammer can reach a multiple of the pressure at rest. With the flow, the static pressure of a liquid medium must always be above the vapor pressure of the medium in order to avoid cavitation.

Install the cx-tec valve so that it is well accessible (e.g. connections on drive, sensors and control devices, etc.) for all connection and maintenance operations that might become necessary later on. Otherwise the installation position can be any appropriate position.

Install a suitable dirt trap in front of the cx-tec valve in order to ensure trouble-free cx-tec valve operation.

It is advisable to install hand shut-off valves in front of the dirt trap and behind the cx-tec valve so that maintenance operations can be performed on the dirt trap and the cx-tec valve without having to drain the entire system. If the system is to operate without any interruption, a bypass line should be included when planning the system.

Protect the cx-tec valve from the direct effects of the weather when installing in the open.

Install the cx-tec valve so that no mechanical loads such as pipe stress are exerted on the cx-tec valve during and after the installation. The cx-tec valve must always be loaded only with the intended medium internal pressure, without additional mechanical loads.

**⚠ WARNING**

Additional mechanical loads can result in malfunctioning or overloading and bursting especially of a cx-tec valve under medium pressure.

For force free installation, the connection lines must be axially aligned with the cx-tec valve connections and have the correct distance. Heat expansion of the pipelines must be offset by compensators. The transfer of vibrations must be avoided through flexible vibration compensators if required.

## 5.2 cx-tec valve installation

**⚠ CAUTION**

Before installing the cx-tec valve, inspect for possible transport damage. Damaged cx-tec valves may no longer comply with the safety requirements and must not be installed.

**NOTE**

Before installing the cx-tec valve, check the pipe system for absolute cleanliness in order to prevent traces from the pipe installation or other foreign bodies from being flushed into the cx-tec valve during commissioning. When installing the cx-tec valve on non-conductive pipes, it must be grounded.

Remove protective caps on the connections only immediately prior to the installation without damaging existing sealing surfaces or threads. The sealing surfaces must be in good technical condition.

Use only permissible fasteners (e.g. according to DIN EN 1515-1) and permissible sealing elements (e.g. according to DIN EN 1514).

cx-tec valves and pipelines operated at high (> 50°C) or low temperatures (< 0°C) must be protected against touching through insulation or the danger of possible contact must be pointed out through appropriate warning signs.

In the event of condensate formation or the risk of icing-up in air conditioning, cooling and refrigeration systems, the complete cx-tec valve must be furnished with a suitable diffusion-proof insulation. Icing-up may cause the drive to be blocked.

### 5.2.1 Installation with thread connection

Adhere to the flow direction specified on the cx-tec valve to ensure that the cx-tec valve is able to operate as intended.

Use suitable sealing material.

Install the piping so that the flow of force is not by way of the longitudinal axis of the cx-tec valve.

Following installation, perform leak and operating tests.

### 5.3 Electrical connection

Work on electrical equipment of the cx-tec valve must only be performed by a qualified electrician or by instructed persons under the guidance and supervision of a qualified electrician according to the rules of engineering taking into account DIN EN 60204-1 (electrical equipment of machines), the VDE regulations including the safety regulations, the accident prevention regulations and the Operating Manual.

Connect after unscrewing the respective plug connection. Prior to any electrical work on the cx-tec valve, de-energize all poles and secure appropriately. Connect the cx-tec valve to ground according to local regulations.

No protective measures are specified in the wiring diagrams. These must be additionally provided when connecting the cx-tec valve according to VDE 0100 and the regulations of the respective responsible electrical supply companies.

Whenever installing anything electrical always ensure that only the specified voltage in the correct polarity is connected in order to avoid damage or hazards.

If the cx-tec valve is equipped with additional equipment such as limit switch, etc., always observe the appropriate data sheets and wiring information.

The electrical characteristics and a wiring diagram are included in the data sheet.

### 5.4 Pneumatic connection

With pneumatically controlled cx-tec fittings use processed air (if necessary prefix an air service unit).

Advanced information on the connection of control air can be taken from the data sheet.

It is essential to take care that the actuation of valves does not lead to hammer effects, which can have mechanical damage of the valves as a consequence.

Suitable throttles or similar devices are to be installed. müller co-ax ag recommends the attachments in accordance with the data sheet.

### 5.5 Commissioning



Prior to commissioning, read and observe the safety instructions in chapter 3.0.

Prior to every commissioning of a new system or re-commissioning of 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 fully opened cx-tec valves to remove contamination harmful to the sealing surfaces. The cx-tec valve is in the correct operating position.

Existing protection and guards have been reinstalled or enabled.

## 6 Maintenance

**⚠ WARNING** Prior to any work on the cx-tec valve, read and observe the general safety instructions in chapter 3.0.

**⚠ DANGER** The opening of cx-tec valves under pressure can be fatal!

Our cx-tec valves are largely maintenance-free. For operating safety reasons, however, all cx-tec valves should nevertheless be checked at regular intervals, e.g. external condition, including accessories. In general, cx-tec valves should be operated regularly so as not to impair operation of all moving parts through long periods of disuse.

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

**⚠ CAUTION** The cx-tec valve and connected pipelines can be very cold or very hot due to the temperature of the medium. Cx-tec valves with magnetic drive can also have high temperatures due to the electrical dissipation of the drive.

## 7 Repair

**⚠ WARNING** Prior to any work on the cx-tec valve, read and observe the general safety instructions in chapter 3.0. cx-tec valves, which come in contact with health-threatening media at the customer, must be decontaminated prior to any repair.

**⚠ DANGER** Disassembling cx-tec valves under pressure can be fatal!

**⚠ CAUTION** The cx-tec valve and connected pipelines can be very cold or very hot due to the temperature of the medium. cx-tec valves with magnetic drive can also have high temperatures due to the heat dissipation of the solenoid.

**⚠ WARNING** Before carrying out any work on the cx-tec valve, ensure the following:  
The cx-tec valve and all connected pipes must be depressurized.  
Allow system and medium to cool down. The temperature must also be below the evaporation temperature of the medium in order to prevent scalding.  
Ensure that the cx-tec valve is de-energized and inadvertent movements of the drive are excluded. Please consider that the cx-tec valve spring is loaded (serious injuries are possible).  
With media that are caustic, combustible, aggressive or toxic, flush and ventilate the pipeline system, wear goggles or protective mask with eye protection and take other necessary protective measures.  
Traces of medium remaining in the cx-tec valve during the disassembly must be collected and disposed so that persons and the environment are not endangered.  
Adhere to all applicable legal requirements. cx-tec valves that have come in contact with health-threatening media must be decontaminated prior to the work.

The cx-tec valve must be returned to the manufacturer for repair work. After consultation and approval by the manufacturer, such work can be performed on-site in exceptional cases by qualified and specially trained personnel. On no account may the cx-tec valves be removed without prior approval by the manufacturer.

When disassembling the cx-tec valve, observe the generally applicable installation guidelines and the TRB 700. Assembly and disassembly operation shall only be conducted by qualified personnel (see chapter 3.3) according to the manufacturer's instructions. Use new replacement parts after every parts removal/conversion. Use only original cx-tec replacement parts from the manufacturer.

**⚠ CAUTION**

Prior to re-commissioning, read and observe chapter 5.5 concerning Commissioning. Subject the cx-tec valves to a strength and leak test according to DIN EN 12266 after each repair and prior to commissioning.

## 8 Storage

During storage, protect the cx-tec valves from external effects and dirt. Avoid the formation of condensate through ventilation, desiccant or heating. Protect the connection openings to prevent entry of dirt.

Store the cx-tec valves so that their functionality is maintained even after prolonged storage. To this end, the guidelines for the storage of elastomers (DIN 7716) must also be observed in particular:

The storage room should be dry, dust-free and moderately ventilated. Storage temperature frost-free up to +25°C. Existing stocks should be used up first in order to achieve the shortest possible storage times. Store replacement parts so that elastomers are not exposed to sunlight or UV light from other sources.

## 9 Packaging

**⚠ WARNING**

cx-tec valves that have come in contact with health-threatening media at the customer must be decontaminated prior to packaging.

Pack the cx-tec valves so that any coatings or accessories such as plug-in devices and sensors cannot be damaged through subsequent transport. Protect connection openings to prevent the entry of dirt. Use the packing material in accordance with the applicable regulations and observe country-specific regulations.

## 10 Transport

**⚠ WARNING**

cx-tec valves that have come in contact with a health-threatening media must be decontaminated prior to the transport. Whenever handling the cx-tec valves, always observe the valid accident prevention regulations.

cx-tec valves that can no longer be moved by hand must be transported with lifting equipment suitable for the weight to be moved.

Transport the cx-tec valves by using eyebolts if available. Do not hook up lifting equipment to accessories. When using suspension belts, these must be placed around the cx-tec valve body, providing edge protection and ensuring even weight distribution.

Transport temperature -20°C to +65°C.

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

Protect existing sealing surfaces on the connections from damage.

Do not damage the corrosion protection layer.

## 11 Disposal



cx-tec valves that have come in contact with health-threatening media must be decontaminated prior to disposal.

Observe all applicable legal requirements for appropriate disposal in order to protect the environment.

## 12 Replacement parts

If replacement parts are required, please contact the distributor or manufacturer.

## 13 Manufacturer and Distributor

Manufacturer:

müller co-ax ag  
Gottfried-Müller-Str. 1  
74670 Forchtenberg

Tel. : 011 49 79 47 / 828 - 0  
Fax 011 49 79 47 / 828 - 11  
Email [info@co-ax.com](mailto:info@co-ax.com)  
Website [www.co-ax.com](http://www.co-ax.com)

Distributor:

co-ax valves inc.  
1518 Grundy's Lane  
Bristol, PA 19007-1521

Tel. : +1 215-757-3725  
Fax +1 215-757-4060  
Email [info@cx-tec.us](mailto:info@cx-tec.us)  
Website [www.cx-tec.us](http://www.cx-tec.us)

## 14 Inquiries

For inquiries in regards to cx-tec valves, please specify the following:

- Order code and / or fabrication number
- Type designation
- Maximum system pressure
- Inlet pressure
- Outlet pressure
- Media
- Media temperature
- Flow rate
- Installation sketch and actual operating conditions.