General operating manual for cx-tec valves

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Manufacturer:

müller co-ax gmbh
Friedrich-Müller-Straße 1
74670 Forchtenberg
Germany

Tel. +49 (0) 79 47 / 82 8 - 0
Fax +49 (0) 79 47 / 82 8 - 11
Email info@co-ax.de
Website www.co-ax.de

Distributor:

cx-tec gmbh
Gottfried-Müller-Straße 1
74670 Forchtenberg
Germany

Tel. +49 (0) 79 47 / 94 10 - 90 0
Fax +49 (0) 79 47 / 94 10 - 95 0
Email info@cx-tec.de
Website www.cx-tec.de

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1 General

To ensure the successful and safe use of the cx-tec valves, manufactured by Müller co-ax gmbh (the "cx-tec valves") the entire operating manual must have been read and understood before installation and commissioning. Furthermore, particular attention is to be paid to the safety instructions.

⚠ WARNING	Read and observe the safety instructions before using the cx-tec valves.

Should any difficulties arise which cannot be resolved with the aid of the operating manual, please contact the supplier or manufacturer.

This operating manual covers the following areas: installation/commissioning, maintenance, servicing, storage, packaging, transport and disposal. The operating manual has been compiled in accordance with the regulations of Directive 2014/68/EU on pressure equipment.

The operating company is also responsible for ensuring that personnel tasked with installation comply with local security regulations. When using the cx-tec valve, the operating company or the party responsible for the design of the system must ensure that prevailing national regulations are complied with.

At all times, the manufacturer reserves the right to make technical changes and improvements. In order to use this operating manual and directly handle the cx-etc valves, users must fulfill the qualification requirements described in section 1.1.

1.1 Target group

The operating manual is intended for persons who are entrusted with the installation planning, installation, commissioning or maintenance/servicing and who possess the corresponding qualifications for their duties and roles, i.e. who, on the basis of their technical training, knowledge and experience, as well as their knowledge of the relevant standards, are able to assess the tasks they are assigned and recognize possible dangers.

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

1.1.1 Qualification of personnel

Transport, assembly, commissioning, maintenance, and repair are only to be carried out by trained or instructed personnel.

Electrical installations: Any work on the electrical equipment of the device is only to be carried out by a qualified electrician or by instructed persons under the guidance and supervision of a qualified electrician in accordance with good technical practices.

1.2 Structure of the documentation

The operating manual for our cx-tec valves generally consists of two main modules:

1.2.1 the “General operating manual"

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

1.2.2 the "Data sheets "

These contain the necessary additional information and technical data for the corresponding specific cx-tec valve types. The data sheets are only to be used in combination with the general operating manual. In particular, the safety instructions in the general operating manual must be observed!

1.3 Storage

Access to the full operating manual must be guaranteed at all times at the operation site of the cx-tec valve.

2 Product description

2.1 Important information on the cx-tec valve

2.1.1 Intended use

After installation in a pipeline system (e.g. between flanges, couplings, or screw connections) and after the actuator is connected to the control system, the valves are intended exclusively for shutting off, conveying, or regulating the flow of media within the permitted pressure and temperature limits.
It must be ensured that the usual flow rates (e.g. 4 m/s for liquids) are not exceeded in this pipeline system during continuous operation and abnormal operating conditions, such as vibrations, water hammer, erosion (e.g. due to wet steam), cavitation and larger than negligible amounts of solids in the medium – particularly abrasive ones – are clarified with the manufacturer.
The nature of the medium agreed upon during placement of the order (chemical, abrasive and corrosive effects),as well as the threshold values of medium pressure and temperature in accordance with the data sheet must be complied with. Any other or additional use shall be considered improper.
The valve's scope of application is the responsibility of the designer of the installation. Special markings on the valve must be observed.

2.1.2 Precautionary measures

For the use of the cx-tec valves, prevailing laws (e.g. EU directives and national regulations) and good technical practices must be observed, e.g. DIN standards, DVGW fact sheets and worksheets, VDI directives, VDMA standard sheets, etc.

In the case of systems requiring monitoring, the relevant laws and regulations are to be observed, e.g. trade regulations, accident prevention regulations, steam boiler regulations, regulations on high-pressure gas lines, regulations for flammable liquids, as well as the technical standards VDE, TAB, TRD, TRG, TRbF, TRGL, TRAC, AD fact sheets, etc.

Furthermore, general installation and safety regulations for pipeline and installation construction apply, as do local safety and accident prevention regulations.
During all work on the cx-tec valve and any handling of the cx-tec valve, the instructions in the operating manual must always be complied with.

⚠ WARNING	Failure to comply with the operating manual may result in serious injuries or material damages (e.g. due to mechanical, chemical or electrical effects).

2.1.3 Conformity

Cx-tec valves are state of the art and comply with Directive 2014/68/EU on pressure equipment.

2.2 Technical data

The materials of the housing and the seals are selected according to the operating conditions specified by the customer when placing the order. These operating conditions significantly influence the service life of the cx-tec valve, e.g. due to abrasion, chemical reactions with, or corrosive effects on the materials. The cx-tec valves are designed without a wear allowance and structurally with a 1.5x safety margin against nominal pressure at room temperature.

For the technical data (also electrical data) and the primary permissible limit values, in particular for media pressure and temperature, please consult the data sheet.

3 Safety instructions

This section contains important general safety instructions. In addition, the special safety instructions in the other sections must also be complied with.

3.1 Representation

Hazards are identified by a signal word and assigned safety colors according to ANSI Z535 depending on their severity and probability of occurrence:

⚠ DANGER	For an imminently hazardous situation that will result in serious bodily injury or even death.
⚠ WARNING	For a potentially hazardous situation that could result in serious bodily injury or even death.
⚠ CAUTION	For a potentially hazardous situation which could result in minor bodily injury or material damages.
⚠ NOTICE	For a possibly harmful situation which could result in damage to the product or an object in its vicinity.
⚠ IMPORTANT	For usage instructions and other useful information.

Note that it is equally essential to observe all other instructions and information that are not specially highlighted in order to avoid malfunctions, which could in turn directly or indirectly cause injury to persons or material damages.

3.2 Product safety

The cx-tec valves correspond to the state of the art and the recognized technical safety regulations. Nevertheless, dangers may arise. The cx-tec valves are only to be operated when in perfect condition, in compliance with the entire operating manual.

The cx-tec valves are only intended for the purpose described in section 2.1.1.

⚠ WARNING	Use of media incompatible with the material, exceeding the limit values for medium pressure and temperature, as well as additional mechanical stresses, e.g. from connected pipelines, may lead to failure in the cx-tec valve material and bursting of the cx-tec valve.

3.3 Organizational matters, personnel

3.3.1 General

The recognized rules for occupational health and safety must be observed. Persons who are entrusted with installation planning, installation, commissioning or maintenance/servicing must possess the corresponding qualifications for their duties and roles.

They must, based on their technical training, knowledge and experience, as well as their knowledge of the relevant standards, be able to assess the tasks they are assigned, the mutual interactions between the cx-tec valve and installation, and recognize possible hazards.

They must also possess knowledge of the relevant accident prevention regulations, generally accepted safety rules, EU directives, and country-specific standards and regulations, as well as all operational, regional and in-house regulations and requirements.

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

They must have read and understood the entire operating manual.

No modifications, additions or conversions are permitted to be made without the approval of the manufacturer or supplier.

3.3.2 Transport / Installation / Commissioning / Maintenance / Repair

These are only to be performed by trained or instructed personnel. For reasons of safety, a final check is to be performed before work commences to ensure that all necessary measures have been taken for the protection of persons. Cx-tec valves that have come into contact with media hazardous to health must be decontaminated prior to work.

3.3.3 Electrical installation

Hazards due to electrical energy are to be eliminated. Any work on the electrical equipment of the device is only to be carried out by a qualified electrician or by instructed persons under the guidance and supervision of a qualified electrician in accordance with good technical practices.

3.4 Product-specific hazards

Hazards which may arise due to the media conveyed, the control pressure, and from moving parts are to be prevented by taking appropriate measures.

Furthermore, it must be ensured that the cx-tec valves are only operated in situations where the type of medium, operating pressure, and temperatures correspond to the design criteria used as the basis for the order and which are specified on the nameplate. Proper transport and storage of the cx-tec valve are also to be ensured.

The following sections list a number of product-specific hazards and measures for preventing them:

3.4.1 Using a medium that is unsuitable for the cx-tec valve

The cx-tec valve materials are only compatible 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!

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

3.4.2 Wall thickness falling below minimum value due to corrosion or abrasion

⚠ WARNING	Regular inspections are required to verify the safety and proper condition of the inner walls.

3.4.3 Exceedance of permissible pressure with danger of bursting

Reasons for excessive pressure include water hammer effects (impact when closing) and cavitation. A water hammer causes pressure peaks which result when a pipe is shut off using a cx-tec valve. Put simply, the reason for this is the force with which the column of media being conveyed impacts the closing cx-tec valve.

⚠ WARNING	Pressure peaks which occur during the closing of the valve may reach several times the pressure at rest. Users must select the operating pressure rating of the cx-tec valve such that the pressure peaks which occur in a specific installation situation do not exceed the maximum permissible operating pressure of the cx-tec valve. For the flow, the static pressure of a liquid medium must also always exceed the vapor pressure of the medium in order to prevent cavitation.

3.4.4 Excessive stress on the cx-tec valve

Cx-tec valves may be subjected to excessive stress when they experience additional stresses, such as being stepped on, from other connected pipes, or high ambient temperatures.

⚠ WARNING	The cx-tec valve is only designed for use at the permissible medium pressure load. Hence, install the cx-tec valve such that no stress forces are acting on it and ensure that no additional stresses occur, e.g. from pipelines or being stepped on.

Furthermore, no welding or heat treatment is to be carried out on pressure-bearing walls, and no holes are to be drilled for attachments. Install the cx-tec valve and the electrical and pneumatic lines in such a manner that they cannot be damaged and such that no moisture-induced short circuit can occur at electrical plug connections.

3.4.5 Opening of screw connections when cx-tec valve is under pressure

Opening screw connections when cx-tec valves are under pressure leads to medium leakage and damage to the cx-tec valve.

⚠ DANGER	Opening cx-tec valves under pressure is life-threatening!
⚠ WARNING	Before performing any work on the cx-tec valve: The cx-tec valve and all lines which are connected must be depressurized. Ensure that the cx-tec valve is electrically de-energized. Allow the cx-tec valve and medium to cool down. Allow the medium to cool until it is below its vaporization temperature to prevent scalding. In the case of media which is e.g. corrosive, flammable, aggressive or toxic, flush and ventilate the piping system, wear protective goggles or a protective mask with eye protection, or take other necessary protective measures.

3.4.6 Leakage of hazardous substances

Hazardous substances may escape e.g. at relief holes or when dismantling the cx-tec valve.

⚠ WARNING	Hazardous media (e.g. Leakage at relief holes or medium residue in the cx-tec valve when disassembling it) must be collected and disposed of in such a manner that poses no danger to persons or the environment. Statutory regulations are to be complied with.

3.4.7 Exposed cx-tec valve outlet

When nothing is connected to the outlet of the cx-tec valve, the medium that exits the opening when the cx-tec valve is (unintentionally) opened may pose a hazard.

⚠ WARNING	To rule out hazards at the outlet of the cx-tec valve, the cx-tec valve outlet should be diverted in a controlled manner, or sealed in a pressure-tight fashion with a blind plug/blind flange.

3.4.8 Failure of actuator power

In the event the actuator is no longer supplied with energy, the cx-tec valve may enter a state that is unsafe for its intended purpose.

⚠ CAUTION	Pay attention to selecting the correct cx-tec valve function (NC/NO) such that the cx-tec valve enters an operational state that is safe for the intended purpose should the actuator no longer be supplied with energy.

3.4.9 Painting work

When performing painting work, the cx-tec valve could also be painted over, thereby affecting the heat radiation of the magnet or clogging the relief hole.

⚠ NOTICE	Cover up the cx-tec valves effectively if work is to be done in the area around the cx-tec valves which could lead to dirt/soiling, e.g. involving cement, bricklaying, painting work, or sandblasting.

3.5 Information for emergencies

In case of fire, use only extinguishing agents suitable for extinguishing the relevant electrical equipment. Ensure that the extinguishing agent does not cause a dangerous reaction with any medium that escapes.

4 Mode of operation

For information on the mode of operation of your specific cx-tec valve, please refer to the relevant data sheet.

5 Installation / commissioning

⚠ WARNING

Read and observe the general safety instructions in section 3.0 before installation or commissioning. Always comply with prevailing accident prevention regulations when handling the cx-tec valves.

5.1 Measures and considerations before installation

For installation, observe the TRB 700 *(Technical Rules for the Operation of Pressure Vessels)* as well as the following:

Compare the material, pressure and temperature specifications of the cx-tec valves with the operating conditions of the piping system to verify the material resistance and load capacity. Any pressure surges that occur must not exceed the maximum permissible pressure of the cx-tec valve.

⚠ WARNING

Pressure peaks may reach several times the pressure at rest. For the flow, the static pressure of a liquid medium must also always exceed the vapor pressure of the medium in order to prevent cavitation.

Install the cx-tec valve such that it is easily accessible for any necessary connection and maintenance tasks in the future (e.g. connections to actuator, sensors, and control units, replacement of cartridge valves etc.). Otherwise, the orientation of installation can be chosen at will.

Suitable dirt traps should be installed upstream of the cx-tec valve to ensure trouble-free operation of the cx-tec valve.

The installation of hand-operated shut-off cx-tec valves upstream of the dirt trap and downstream of the cx-tec valve is recommended. This allows maintenance work to be carried out on the dirt trap and the cx-tec valve without needing to drain the entire system.

If the plant is to remain in operation without any interruption, provide for a bypass line at the design stage of the installation.

If it is installed outdoors, protect the cx-tec valve against the direct influence of the weather.

Install the cx-tec valve in a manner such that no mechanical loads are exerted on the cx-tec valve during and after installation. The cx-tec valve is only to be subjected to the intended internal medium pressure, without any additional mechanical stress.

⚠ WARNING

Additional mechanical stresses can lead to malfunctions or to excessive stress and bursting, especially in the cx-tec valve subjected to the media pressure.

For installation free of stress forces, the connecting lines must be axially aligned with the connections of the cx-tec valve and have the correct clearance. Thermal expansion of the piping must be compensated for with the use of expansion joints. The transmission of vibrations must be prevented with the use of flexible vibration compensators where necessary.

5.2 Installation of the cx-tec valve

⚠ CAUTION	Before installation, inspect the cx-tec valve for any transport damage. Damaged cx-tec valves may no longer meet the safety requirements, and therefore are not to be installed.
⚠ NOTICE	Before installing the cx-tec valve, ensure that the pipe system is absolutely clean to prevent any residue from the assembly of the pipe or other foreign objects from being flushed into the valve during commissioning. If it is not possible to establish a safe conductive connection (low-resistance) to the connecting parts when installing the valve, the valve must be included in the equipotential bonding. Do not remove protective caps from the connections until immediately before installation. Remove them without damaging any sealing surfaces or screw threads which may be present. The sealing surfaces must be in a technically flawless condition.

Only permissible connecting elements (e.g. in accordance with DIN EN 1515-1) and permissible sealing elements (e.g. in accordance with DIN EN 1514) are to be used.

Ensure that the insulation of the actuator, including the connecting cables and lines, are installed properly. The connecting cables and lines must be suitable and approved for the corresponding temperature range and intended purpose.

5.2.1 Installation with threaded connection

Pay attention to the direction of flow specified on the cx-tec valve so that the cx-tec valve can fulfill its intended function.

Use a suitable sealant.

The piping will need to be installed in such a way that the flow of forces does not take place along the longitudinal axis of the cx-tec valve.

After installation, check for leakage and proper functioning.

5.3 Electrical connection

Any work on the electrical equipment of the cx-tec valve is only to be carried out by a qualified electrician or by instructed persons under the guidance and supervision of a qualified electrician in accordance with good technical practices and in compliance with DIN EN 60204-1 (Electrical equipment of machines), VDE regulations, including the safety regulations, accident prevention regulations, and operating manual.

The electrical cables are to be laid in a permanent fashion and protected from external influences. Cable bushings are not considered as strain relief. Hence, the customer will need to provide appropriate strain relief for the connecting cables.
The electrical connection is established after unscrewing the respective plug connection. Before carrying out any electrical work on the cx-tec valve, disconnect all poles from the power supply and secure it accordingly. Ground the cx-tec valve in accordance with local regulations.

No protective measures are specified in the connection diagrams. When connecting the cx-tec valve, these must be provided for additionally in accordance with VDE 0100 and the regulations of the responsible power supply company.

When connecting any electrical equipment, always ensure that only the specified voltage is applied and in the correct polarity in order to prevent damage or hazards.

If the valve is equipped with additional devices such as limit switches or explosion protection etc., always observe the associated / additional instructions, corresponding data sheets, and/or connection values.

5.4 Connecting pneumatics / hydraulics

In the case of pneumatically actuated cx-tec valves, use conditioned air (if necessary, connect an air treatment unit upstream).

For further information on connecting control air or control hydraulics, please consult the data sheet.

It is essential to ensure that the actuation of the valves does not lead to closures which may result in mechanical damage to the valves.
Suitable flow control valves or similar devices are to be used. Cx-tec gmbh recommends the attachments in accordance with the data sheet.

5.5 Protection against burns / frostbite

Valves and pipelines which are operated at high (> 50 °C) or low temperatures (< 0 °C) must be suitably protected against contact, or the dangers of possible contact must be indicated through appropriate labeling. In the case of electromagnetically actuated valves, the contact protection must not impair the cooling of the valve due to the risk of overheating. If there is a risk of condensation or ice formation in air-conditioning, cooling and refrigeration systems, professional, diffusion-tight insulation of the entire valve is necessary. Should ice form, there is a risk that the actuator will stall.
Electromagnetically actuated valves must not be insulated due to the risk of overheating. In this case, only protection against dripping and splashing water is required, which must not impair the cooling of the valve.

5.6 Commissioning

⚠ WARNING	Read and observe the safety instructions in section 3.0 before commissioning.

Before commissioning the cx-tec valve, the customer is obliged to check the operating parameters such as nominal size, pressure rating, medium, operating temperature and trigger pressure.
Before each commissioning of a new installation or the recommissioning of an installation after repairs or modifications, ensure the following:
The TRB 700 is observed. All installation and assembly tasks have been completed properly. Commissioning is performed exclusively by qualified personnel as described in section 3.3.
The piping system has been thoroughly flushed with the valves fully open to ensure that any contaminants harmful to the sealing surfaces have been removed. The valve is in the correct functional position.
Any existing protective devices have been reinstalled or put into operation.

6 Maintenance / servicing

⚠ WARNING	Before carrying out any work on the cx-tec valve, the general safety instructions in section 3.0 must be read and observed.
⚠ DANGER	Opening cx-tec valves under pressure is life-threatening!

Our cx-tec valves are largely maintenance-free. For reasons of operational safety, the leakage holes on valves must be checked for leaks. Also check the external condition of the valve including accessories and connections. Cx-tec valves should generally be actuated regularly to ensure that the proper functioning of all moving parts has not been affected by long downtimes.

Maintenance and servicing intervals are to be determined by the operating company in accordance with the operating conditions (see also TRB 700).

⚠ CAUTION	The cx-tec valve and the pipes connected may be very cold or very hot due to the temperature of the medium. Cx-tec valves with magnetic actuator may also exhibit high temperatures due to the electrical power dissipation of the actuator. This constitutes an injury risk. See section *5.5 Burns / frostbite.*

7 Servicing

⚠ WARNING	Before carrying out any work on the cx-tec valve, the general safety instructions in section 3.0 must be read and observed. Cx-tec valves which have come into contact with media hazardous to health at the customer's site must be decontaminated prior to repair.
⚠ DANGER	Opening cx-tec valves under pressure is life-threatening!
⚠ CAUTION	The cx-tec valve and the pipes connected may be very cold or very hot due to the temperature of the medium. Cx-tec valves with magnetic actuator may also exhibit high temperatures due to the electrical power dissipation of the actuator. This constitutes an injury risk. See section *5.5 Burns / frostbite.*
⚠ WARNING	Ensure the following before performing any work on the cx-tec valve: The cx-tec valve and all lines which are connected must be depressurized. Allow the valve and medium to cool down. Allow the medium to cool until it is below its vaporization temperature to prevent scalding. Ensure that the actuator is in a de-energized state and that unintentional movements of the actuator cannot take place. Bear in mind that the cx-tec valve still contains strongly preloaded springs (possibility of serious injuries). In the case of media which is e.g. corrosive, flammable, aggressive or toxic, flush and ventilate the piping system, wear protective goggles or a protective mask with eye protection, or take other necessary protective measures. Medium residue in the cx-tec valve when disassembling it must be collected and disposed of in such a manner that poses no danger to persons or the environment. Statutory regulations are to be complied with. Cx-tec valves which have come into contact with media that is hazardous to health must be decontaminated before work can commence.

The cx-tec valve must be returned to the manufacturer for servicing tasks. After consultation with and approval from the manufacturer, such work may – in exceptional cases – be carried out on site by qualified and specially trained personnel. The cx-tec valves must not be dismantled without the prior approval of the manufacturer.

When dismantling the cx-tec valve, observe the generally applicable assembly guidelines and the TRB 700. Assembly and disassembly work is only be carried out by qualified personnel (see section 3.3) in accordance with the manufacturer's instructions. Always use new spare parts after the dismantling/conversion of parts. Use only original spare parts from the manufacturer cx-tec gmbh.

⚠ CAUTION	Before recommissioning, read and observe section 5.5 Commissioning. After servicing, the cx-tec valves must undergo a strength and leak test in accordance with DIN EN 12266 before being put back into operation.

8 Storage

During storage, protect the cx-tec valves against external influences and contamination. Avoid the formation of condensed water through sufficient ventilation, using desiccant, or installing heating. Protect connection openings against the ingress of dirt.

The cx-tec valves must be stored in such a way that their proper function is maintained even after prolonged storage. In particular, the guidelines for the storage of elastomers (DIN 7716) are also to be observed:

The storage room should be dry, dust-free and moderately ventilated. Storage temperatures are to be frost-free and not exceed +25°C. Existing inventory should be used up first in order to achieve the shortest possible storage times. Store spare parts so that no sunlight or UV light from other sources can reach elastomers.

9 Packaging

⚠ WARNING	Cx-tec valves which have come into contact with media hazardous to health at the customer's premises must be decontaminated prior to packaging.

Pack the cx-tec valves in such a way that any coatings or accessories such as plugs, regulators and sensors cannot be damaged by subsequent transport. Protect connection openings against the ingress of dirt. Choose a packaging class in accordance with applicable regulations and observe country-specific regulations.

10 Transport

⚠ WARNING	Cx-tec valves which have come into contact with media hazardous to health at the customer's premises must be decontaminated prior to transport. Always comply with prevailing accident prevention regulations when handling the cx-tec valves.

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

Transport cx-tec valves properly on this equipment using eyebolts or eyelets. Do not attach lifting gear to accessories. When using retaining straps, lay them around the cx-tec valve body, provide edge protection, and ensure an even weight distribution.

Transport temperature: -20°C to +65°C.

Protect valves against external forces (impact, shock, vibration, etc.).

Protect any sealing surfaces at the connections against damage.

Be sure not to damage the anti-corrosion coating.

11 Disposal

⚠ WARNING | Cx-tec valves which have come into contact with media hazardous to health at the customer's premises must be decontaminated prior to disposal.

For proper, environmentally friendly disposal, observe all applicable statutory regulations.

12 Replacement Parts

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

13 Manufacturer and Distributor

Manufacturer:

müller co-ax gmbh
Friedrich-Müller-Straße 1
74670 Forchtenberg
Germany

Tel. +49 (0) 79 47 / 82 8 - 0
Fax +49 (0) 79 47 / 82 8 - 11
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74670 Forchtenberg
Germany

Tel. +49 (0) 79 47 / 94 10 - 90 0
Fax +49 (0) 79 47 / 94 10 - 95 0
Email info@cx-tec.de
Website www.cx-tec.de

14 Inquiries

For all inquiries related to cx-tec valves, please provide the following information:

- Article or order number
- Type designation
- Pressure level
- Medium pressure before and after cx-tec valve
- Medium flowing through
- Medium temperature
- Flow rate in m^3/h
- Installation sketch and/or actual operating conditions