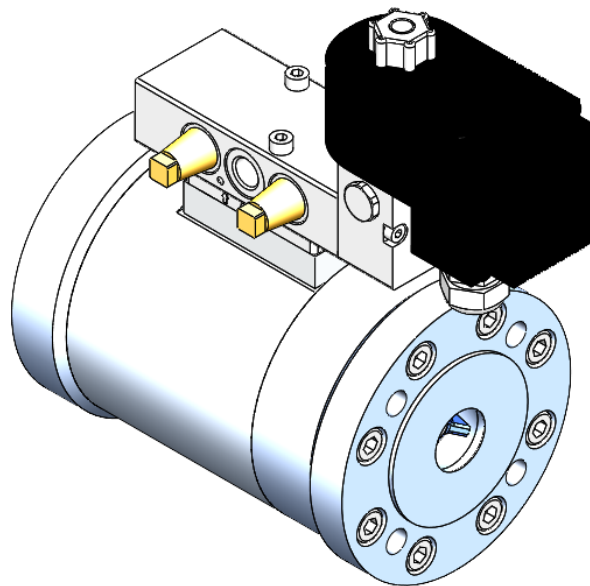

Operating and maintenance instructions

*for products as a piece of equipment with a safety function:
Automatic valves for gaseous fuels
5-FCF valve series*



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1 General

1.1 Scope

This extension to the general operating instructions applies to the 5-FCF valve series, for the nominal sizes DN 25, DN 50, DN 80 and DN 100, in the NC and NO versions with one or two limit switches or without limit switches.

It supplements the *"General installation and operating instructions for fittings."* The general operating and assembly instructions remain unchanged as long as they are not excluded or replaced by these instructions. The instructions and notes in these and the general operating instructions must be followed in order to guarantee the error-free function of our products. The *"Extension module for valves with non-electrical explosion protection"* operating instructions also apply to explosion-protected devices and other operating instructions for add-on parts, e.g. pilot valves, limit switches, etc., if necessary. Non-compliance with the operating instructions voids the warranty and the legal liability for the devices.

1.2 EU-Type examination

The aforementioned valves have been subjected to EU-Type examination (Module B) - type as per Directive 2014/68/EU. Inspection based on: DIN EN 16678:2016-02, DIN EN 161:2013-04 (based on), DIN 16304:2013-05 (based on)

The **products are certified as a piece of equipment with safety function as automatic valves for gaseous fuels**. The valve must not be structurally modified.

Certificate No.: **Z-IS-TAF-MUC-21-12-2652116-16110837**

1.3 Valve designs

Valve type	Function	Limit switch indication	Material used	Pilot valve	Exhaust throttle	Control air pressure
5-FCF 25 NO	blow-off valve open without control energy	without limit switch	aluminum or steel	see chapter 5.6	no	4,5 – 8,0 bar
5-FCF 25 NO 1E		closed or open	aluminum or steel		no	4,5 – 8,0 bar
5-FCF 25 NO 2E		closed and open	aluminum or steel		no	4,5 – 8,0 bar
5-FCF 25 NC	blow-off valve closed without control energy, Class A	without limit switch	aluminum or steel		yes	4,5 – 8,0 bar
5-FCF 25 NC 1E		closed or open	aluminum or steel		yes	4,5 – 8,0 bar
5-FCF 25 NC 2E		closed and open	aluminum or steel		yes	4,5 – 8,0 bar
5-FCF 50 NO	blow-off valve open without control energy	without limit switch	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 50 NO 1E		closed or open	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 50 NO 2E		closed and open	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 50 NC	blow-off valve closed without control energy, Class A	without limit switch	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 50 NC 1E		closed or open	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 50 NC 2E		closed and open	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 80 NO	blow-off valve open without control energy	without limit switch	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 80 NO 1E		closed or open	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 80 NO 2E		closed and open	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 80 NC	blow-off valve closed without control energy, Class A	without limit switch	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 80 NC 1E		closed or open	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 80 NC 2E		closed and open	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 100 NO	blow-off valve open without control energy	without limit switch	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 100 NO 1E		closed or open	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 100 NO 2E		closed and open	aluminum or steel		no	4,0 – 8,0 bar
5-FCF 100 NC	blow-off valve closed without control energy, Class A	without limit switch	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 100 NC 1E		closed or open	aluminum or steel		yes	4,0 – 8,0 bar
5-FCF 100 NC 2E		closed and open	aluminum or steel		yes	4,0 – 8,0 bar

1.4 Product description

The type-tested 5-FCF valve series is only available as a 2/2-way version. Depending on the application, they are available with either normally closed (NC = normally closed) or normally open (NO = normally open) switch positions and designated on the nameplate. When control air and control voltage are applied to the control valve, the valves switch to the operating position. When the control voltage is deactivated or the compressed air is switched off, the valves switch back to the home position.

1.5 Characteristics

Type:	2/2-way valve, designed as an - automatic shut-off valve (5-FCF ... NC types) - automatic blow-off valve (5-FCF ... NO types)
Series:	5-FCF
Versions:	See section 1.3
Medium:	fuel gases of the 1st, 2nd and 3rd gas family as well as neutral, non-aggressive gases
Class:	A (according to DIN EN 16678, types 5-FCF ... NC) - (according to DIN EN 16304, types 5-FCF ... NO)
Group:	2
Nominal width, connection:	PN 16 or PN 40 flange connection Nominal widths see section 1.3
Perm. operating overpressure:	16 bar
Perm. ambient temperature:	-10 °C to +80 °C
Drive:	pneumatic
Control pressure range:	See section 1.3
Electrical data:	Depending on the control valve, see section 5.6
Mounting position:	Arbitrary

1.6 Intended use

The valves are designed solely to shut off or transmit fuel gases of the 1st, 2nd and 3rd gas families as well as neutral, non-aggressive gases within the approved pressure and temperature range after installation in piping and after being connected pneumatically and electrically. The valve design must not be modified by add-on parts and accessories. The valve's scope of application is the responsibility of the installation operator. Special labels on the valve must be observed and must not be obscured (e.g. nameplate, flow direction, serial no., etc.)

CAUTION!

The customer himself/herself is responsible that all applicable provisions, regulations, standard specifications and laws, which apply for his/her operational conditions and his/her location, are observed.

2 Setup / Version

The actuator of the externally controlled 5-FCF valves comprises a cylinder with a pneumatically driven piston. The piston is connected to the valve actuator (the head tube). The valves are designed as 2/2-way valves with the NC (normally closed) or NO (normally open) basic functions. The actuator is controlled via a flange-mounted pilot valve.

Figure 1: Sample setup of an FCF 50 NC 1E with sectional plane through the control air and leakage holes

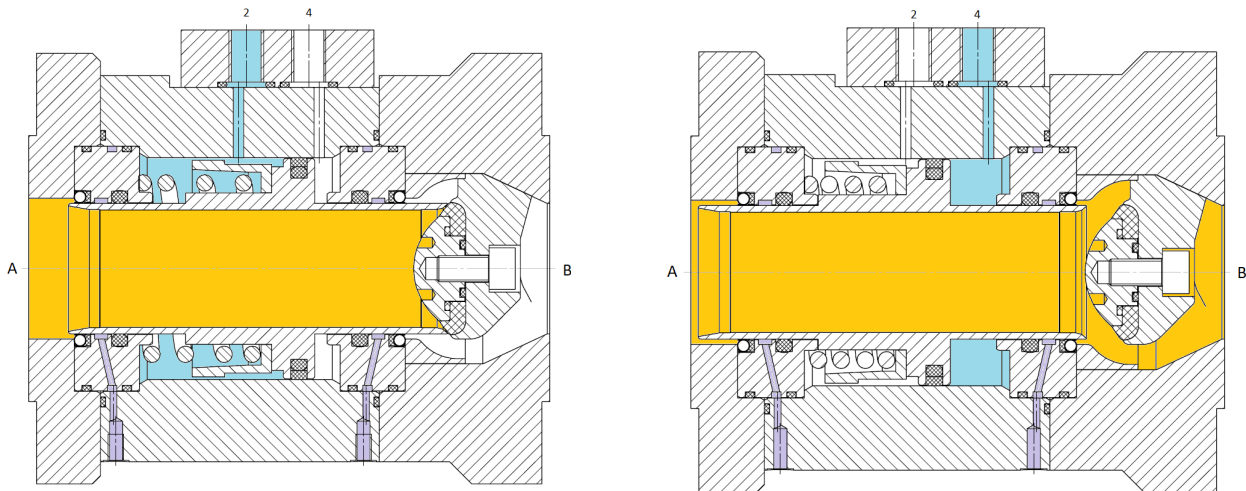
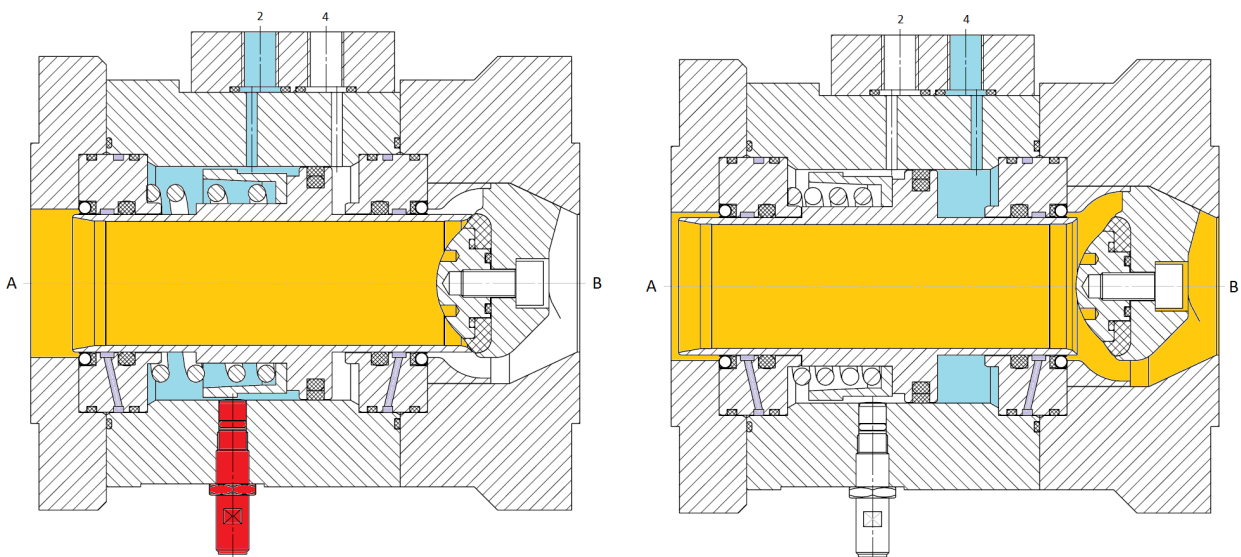


Figure 2: Sample setup of an FCF 50 NC 1E with sectional plane through the control air and leakage holes



Steuermedium
Durchflussmedium
Leckage Bohrung
aktiver Endschalter

Control medium
Flow medium
Leakage hole
Active limit switch

3 Function

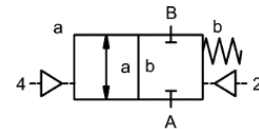
3.1 Control air pressure

- A spring presses the valve into the home position when there is no control air (pressureless state).
- Pressurization of control connection [2] => Basic position of valve => Piston force plus spring force
- Pressurization of control port [4] => Basic position of valve => Piston force plus spring force

3.2 NC 2/2-way version

In the home position, the head tube presses against the valve seat.
The valve is closed.

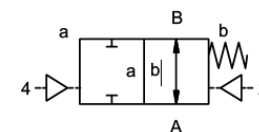
In the operating position, the piston presses against a stop.
The valve is open.



3.3 NO 2/2-way version

In the home position, the piston presses against a stop.
The valve is open.

In the operating position, the head tube presses against the valve seat.
The valve is closed.



4 Valve designation (Example)

5-	with mounted 5/2 control valve
FCF	valve series
25	nominal width in mm
NC	Initial position normally closed
1 E	1 mounted limit switch

5 - FCF 25 NC 1E

4.1 Nameplate (Example)

manufacturer
müller co-ax gmbh
Friedrich-Müller-Straße 1
74676 Forchtenberg • Germany

müller co-ax • Germany
www.co-ax.com

logo Dungs®

designations Dungs®

128-EAN Barcode

flow direction

valve description / type

nominal width

connection

control pressure

pressure range

max. permissible pressure

Certificate number

URL Dungs®

EAC marking

EPV 16100 NC Namur 24 VDC AL	P/N 295970
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Made in Germany

1PDK295970S0123456

A

→

B

560242

SN22-123456

Tamb/Ts -10/80 °C

5-FCF 100 NC

DN 100

PN 16

PSt 4-8 bar

0-16 bar

PS 16 bar

560242

SN22-123456

Tamb/Ts -10/80 °C

Z-1S-TAF-MUC-21-12-2652116-16110837

www.dungs.com

EAC

CE 0036

article No. Dungs®

article No.

serial No.

permissible ambient and medium temperature

QR Code

circuit symbol

CE marking /
number notified body

5 Installation

5.1 Qualification of personnel

Only trained personnel may assemble/ disassemble, commission and maintain the device!

5.2 Assembly

Assembly and installation must be in accordance with valid installation standards. The instructions in the general and additional installation and operating instructions must be observed.

Valves are to be assembled in such a way that

- no external forces act on the valve.
- they are protected from external mechanical influences (e. g. impact)
- effective equipotential bonding is available to prevent electrostatic charging.
- the nameplate is easily recognizable.
- the valve can be inspected from all sides where necessary in order to be able to carry out necessary inspections and checks.

Pneumatic connection

- All available control connections must be connected and actuated.
- No explosive atmosphere may be used to control the valve.

5.3 Mounting position

The mounting position is arbitrary, but the pilot valve should preferably be positioned pointing upwards. Make sure that the exhaust air throttles are freely accessible. The nameplate must be easily recognizable.

5.4 Tightening torques

Tightening torques for flange connections of the **FCF** valve series in the steel and aluminum version

Type	Pressure level	Thread	Tightening torque
FCF 25	PN 16	M 12	61 Nm
FCF 25	PN 40	M 12	61 Nm
FCF 50	PN 16	M 16	147 Nm
FCF 50	PN 40	M 16	147 Nm
FCF 80	PN 16	M 16	147 Nm
FCF 80	PN 40	M 16	147 Nm
FCF 100	PN 16	M 16	147 Nm
FCF 100	PN 40	M 20	297 Nm

5.5 Installation of valve with a flanged-on pilot valve

The pilot valve is mounted on the valve and directly connected to the control inputs of the valve. The pilot valve receives the required control medium via a supply line. If no feedback for the control medium has been installed, the medium is discharged to the environment. The pilot valve is electromagnetically actuated by default.

5.6 Pilot valve

The control valve is usually supplied with silencers only, deliberately without exhaust air restrictors. For version-specific reasons, however, an additional *GRLA-1/4-B-F-SA* type throttle check valve made by FESTO can be used for the NC versions. This throttle check valve is then installed on port 5 of the control valve in addition to the silencer. This special throttle check valve is equipped with a minimum leakage. Even with the throttle fully screwed in, the NC valve cannot be blocked pneumatically and moves reliably to the home position when required. See also chapter 6.4. - For the NO variant, no exhaust air throttles may be installed for functional reasons!

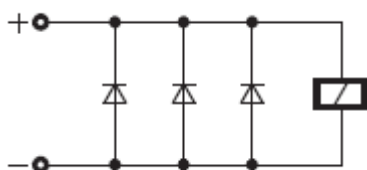
The customer is responsible for the wiring and proper connection of the power supply. Only the factory fitted and approved Norgren (IMI HERION) 5/2 way pilot valve with the provided solenoid coils may be used.

Control valve manufacturer:	Norgren (IMI HERION)		
Type:	9710505.xxxx.xxxxx		
Perm. operating overpressure:	2.5 to 8.0 bar		
Solenoid operation (optional):	2050.0000	4200.02400	4201.23050
Rated voltage:	$\geq 8 \text{ V}^{1)}$	DC 24 V	AC 230 V
Rated power:	-- ¹⁾	0.8 W	1.3 VA
Protection type:	Labeling as per ATEX 2014/34/EU		
Protection class:	IP66		
Additional labeling:	ATEX, connection diagram		

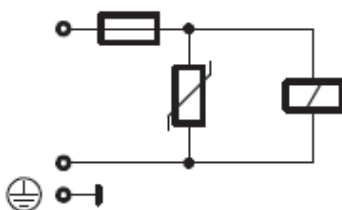
Circuit diagram for "intrinsically safe version"

Rated voltage: $\geq 8 \text{ VDC}$

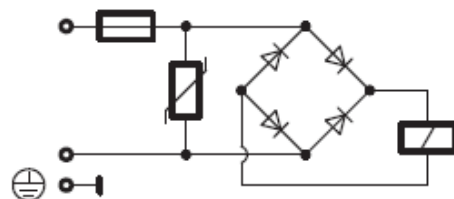
Rated current: $\geq 33 \text{ mA}$



Circuit diagram for **24 VDC** control voltage
(Pilot without M20 x 1.5 cable gland)



Circuit diagram for **230 VAC** control voltage
(Pilot without M20 x 1.5 cable gland)



5.7 Potential equalization (grounding)

All connections for equipotential bonding provided on the valve must be connected. See also the "*Electrical connection*" general operating instructions. Equipotential bonding, only via the piping, is not permitted.

6 Commissioning

The valve may only be commissioned if it:

- Has been assembled and connected in the plant according to regulations.
- Has been checked for correct status with regard to installation and connection conditions.

CAUTION!

Before commissioning, the plant operator must arrange an inspection that is in accordance with the national regulations for inspections before commissioning.

6.1 Operation

Make sure that no external forces, shocks or impacts act on the valve during operation. See also chapter 5.2 (Assembly).

6.2 Control pressure

The pneumatic control air pressure on the pilot valve can be found in the table in chapter 1.3. The control pressure connection on the control valve is marked with a 1. The valves operate with unlubricated and lubricated air. We recommend a maintenance unit and the following air quality class:

DIN ISO 8573-1 compressed air, compressed air quality class 5/4/3

Class 5: maximum particle size 40 μm ,
maximum particle quantity: 10 mg/m^3

Class 4: maximum pressure dew point: 3 $^{\circ}\text{C}$

Class 3: maximum oil content: 1 mg / m^3

Note:

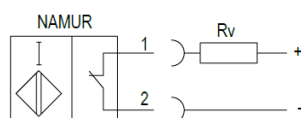
When the control air is switched off, the spring automatically returns the valve to the home position.

6.3 Limit switch

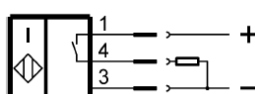
Depending on the version, the valves are also supplied with inductive limit switches which indicate either the valve position "closed" or "open" (see chapter 1.3).

Limit switches are used in three versions:

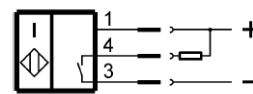
version: NAMUR



version: PNP / closer



version: NPN / closer



6.4 Version with exhaust air throttle (only possible with NC version)

For version-specific reasons, an additional GRLA-1/4-B-F-SA type throttle check valve made by FESTO can be used for the NC versions. This throttle check valve is then installed on port 5 of the control valve in addition to the silencer. This special throttle check valve is equipped with a minimum leakage. Even with the throttle fully screwed in, the NC valve cannot be blocked pneumatically and moves reliably to the home position and closes when required. When commissioning, the opening time must be set on the NC valve to prevent pressure surges in the system. - For the NO variant, no exhaust air throttles may be installed for functional reasons!

Recommended procedure for setting the exhaust air throttle (depressurized)

- Provide sufficient control air - see table chapter 1.3
- Screw in the throttle screw completely
- Switch the valve and check the switching speed

If the switching speed is too slow, unscrew the adjusting screw until the switching speed is approx. 1-2 seconds

- Only then pressurize the system and perform a final check of the switching speed



Note:

This exhaust air throttle is equipped with a minimum leakage. Even with the throttle fully screwed in, the valve cannot be blocked pneumatically and closes reliably when required.

6.5 Filtration

A strainer with a < 1.0 mm mesh size must be installed at the inlet of the valve! The strainer must be accessible for cleaning or replacement without removing the valve.

6.6 Duty cycle

The valves are designed for a 100 % duty cycle.

7 Maintenance

The valves from the FCF series are maintenance-free. However, we recommend conducting regular functional and leak checks at the following inspection intervals:

Valve type	Interval by switching cycles		Interval by time (if the switching cycles have not been reached)
	First inspection after no. of switching cycles	Subsequent inspections for each no. of switching cycles	
FCF25 – FCF50	300.000	150.000	at least 1x in 12 months
FCF80 – FCF100	200.000	100.000	at least 1x in 12 months

The recommendation is based on optimum operating conditions, i.e. operation at room temperature, good filtration, of the medium, etc. In the case of heavier loads, e.g. high switching cycles, the test intervals must be adjusted accordingly at the operator's discretion.

Performing the functional check:

A minimum of three switching procedures after which the valve must safely return to the home position in each case.

NC version = valve must close safely in the home position after the switching procedure

NO version = valve must open safely in the home position after the switching procedure

The shut-off behavior must still be adequate after this.

⇒ In the event of an error, replace the valve and notify the manufacturer.

Performing the leak test:

Perform a visual inspection for possible external leaks. Use leak detection spray.

⇒ In the event of an error, replace the valve and notify the manufacturer.

You can expect a service life of approx. 5 years under optimal operating conditions, i.e. operation at room temperature, good filtration of the medium, etc. The service life may decrease accordingly if the valves are subjected to greater stress, e.g. abrasive media, extremely frequent switching.

8 Disassembly

In general, only the complete valve can be replaced. **The manufacturer must repair the valve.** Ideally, replacement valves are available for this purpose in good time. The operator is responsible for proper removal and installation. Removal and replacement of the valve may only take place in a voltage- and pressure-free state.

Attention:

- Before removing the valve, relieve the pressure in the pressurized lines and drain them as far as possible.
- Safety precautions must be taken for the remaining medium in the valve when it comes to hazardous or environmentally critical media.
- Replace the flange gaskets when reassembling the valve into the pipeline.

9 EU Declaration of Conformity

EU Declaration of Conformity

The Manufacturer:



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

hereby declares that the products within the scope of

**Products as a piece of equipment with a safety function:
Automatic valves for gaseous fuels**

Type 5-FCF

In the 0 - 16 bar pressure ranges,
with the nominal widths 25 mm, 50 mm, 80 mm and 100 mm

comply with the essential safety requirements of

Directive 2014/68/EU

of the European Parliament and of the Council of 15 May 2014 according to Annex I for equipment with safety function
according to Article 4(1) (d) in conjunction with

DIN EN 16678:2016-02, DIN EN 161:2013-04 (based on), DIN 16304:2013-05 (based on).

The manufacturer bears sole responsibility for the issuing of this declaration of conformity.

Category IV – Module B (EU type examination) + Module D (CONFORMITY WITH THE TYPE BASED ON QUALITY ASSURANCE WITH REGARD TO THE PRODUCTION PROCESS):

EU-Type examination (Module B) - type as per Directive 2014/68/EU.

Valve types Blow-off valve: 5-FCF 25 NO / 1E / 2E, 5-FCF 50 NO / 1E / 2E, 5-FCF 80 NO / 1E / 2E, 5-FCF 100 NO / 1E / 2E
Shut-off valve: 5-FCF 25 NC / 1E / 2E - Class A, 5-FCF 50 NC / 1E / 2E - Class A, 5-FCF 80 NC / 1E / 2E - Class A,
5-FCF 100 NC / 1E / 2E - Class A

Inspection based on: DIN EN 16678:2016-02, DIN EN 161:2013-04 (based on), DIN 16304:2013-05 (based on)

EU-Type Certificate No.: Z-IS-TAF-MUC-21-12-2652116-16110837

Notified body involved: TÜV SÜD Industrie Service GmbH
Westendstraße 199
80686 Munich
GERMANY

ID No. 0036



(Harmonized) Standards Applied:

DIN EN ISO 6708; based on AD 2000 rules and regulations; DIN EN 12516; DIN EN 12266; DIN 3230; DIN CEN/TR 764-6; DIN EN IEC/IEEE 82079-1, VDI 2230

The QM system of müller co-ax gmbh is also certified in accordance with:

- DIN EN ISO 9001:2015 (Certificate No. 12 100 20296/03 TMS)
- PED 2014/68/EU Annex III
 - Module A2 (Certificate No. Z-IS-AN1-KAR-19-11-2715043-28172333)
 - Module D (Certificate No. DGR-0036-QS-911-19)
 - Module H and H1 (Certificate No. DGR-0036-QS-912-19)
- ATEX RL 2014/34/EU (Certificate No. EPS 21 ATEX Q 029)
- IECEx (QAR Ref. No.: DE/EPS/QAR21.0008/01)

Place / Date: Forchtenberg, February 3, 2022

Signature of Manufacturer: Martin Bogert

Identification of Signatory: Director, Quality Management