Electro-Pneumatic Positioner
TZIDC, TZIDC-110, TZIDC-120

For 4 ... 20 mA two-wire technology,
HART, PROFIBUS PA,
FOUNDATION fieldbus

ABB

Electro-Pneumatic Positioner
TZIDC, TZIDC-110, TZIDC-120

Commissioning Instruction

CI/TZIDC/110/120-EN

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Translation of the original instruction

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Contents

1 Safety

1.1 General information and notes for the reader

You must read these instructions carefully prior to installing and commissioning the device.

These instructions are an important part of the product and must be kept for future reference.

These instructions are intended as an overview and do not contain detailed information on all designs for this product or every possible aspect of installation, operation and maintenance.

For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.

The content of these instructions is neither part of any previous or existing agreement, promise or legal relationship nor is it intended to change the same.

This product is built based on state-of-the-art technology and is operationally safe. It has been tested and left the factory in perfect working order from a safety perspective. The information in the manual must be observed and followed in order to maintain this state throughout the period of operation.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions.

Only by observing all of the safety instructions and all safety/warning symbols in these instructions can optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device, be ensured.

Information and symbols directly on the product must be observed. They may not be removed and must be fully legible at all times.

1.2 Intended use

TZIDC, TZIDC-110, TZIDC-120 positioners are electro-pneumatic positioning devices for use with pneumatically controlled actuators.

The device may only be used for the applications listed in these operating instructions and in the data sheet.

- The maximum operating temperature must not be exceeded.
- The permissible operating temperature must not be exceeded.
- The housing protection type must be observed during operation.

1.3 Target groups and qualifications

Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator to do so. The specialist personnel must have read and understood the manual and comply with its instructions.

Prior to using corrosive and abrasive materials for measurement purposes, the operator must check the level of resistance of all parts coming into contact with the materials to be measured. ABB Automation Products GmbH will gladly support you in selecting the materials, but cannot accept any liability in doing so.

The operators must strictly observe the applicable national regulations with regards to installation, function tests, repairs, and maintenance of electrical products.

1.4 Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this instruction, using underqualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

1.5 Plates and symbols

1.5.1 Safety- / warning symbols, note symbols

DANGER – <Serious damage to health / risk to life>

This symbol in conjunction with the signal word "Danger" indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.

DANGER – <Serious damage to health / risk to life>

This symbol in conjunction with the signal word "Danger" indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

WARNING – <Bodily injury>

This symbol in conjunction with the signal word "Warning" indicates a possibly dangerous situation. Failure to observe this safety information may result in death or severe injury.

WARNING – <Bodily injury>

This symbol in conjunction with the signal word "Warning" indicates a potential electrical hazard. Failure to observe this safety information may result in death or severe injury.

CAUTION – <Minor injury>

This symbol in conjunction with the signal word "Caution" indicates a possibly dangerous situation. Failure to observe this safety information may result in minor or moderate injury. This may also be used for property damage warnings.

NOTICE – <Property damage>!

The symbol indicates a potentially damaging situation.

Failure to observe this safety information may result in damage to or destruction of the product and/or other system components.

IMPORTANT (NOTE)

This symbol indicates operator tips, particularly useful information, or important information about the product or its further uses. It does not indicate a dangerous or damaging situation.

1.5.2 Name plate
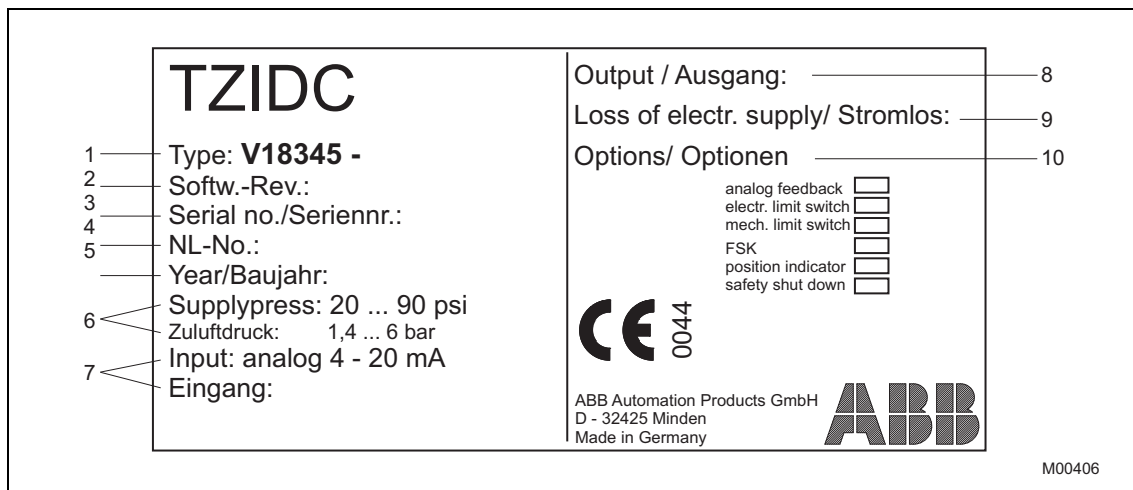
Fig. 1: Name plate

1	Complete model name	6	Supply pressure
2	Software version	7	Input
3	Serial number	8	Output
4	NL number	9	Dead
5	Year	10	Options

1.6 Transport safety information

Check the devices for possible damage that may have occurred during transport. Damages in transit must be recorded on the transport documents. All claims for damages must be claimed without delay against the shipper and before the installation.

1.7 Storage conditions

The unit must be stored in dry and dust-free conditions. The unit is also protected by a dessicant in the packaging.

The storage temperature should be between -40 ... 85 °C (-40 ... 185 °F).

The storage time is basically indefinite. However, the warranty conditions stipulated in the order confirmation of the supplier are valid.

1.8   Installation safety information

⚠ **CAUTION - Risk of injury!**

Incorrect parameter values can cause the valve to move unexpectedly. This can lead to process failures and result in injuries.

Before recommissioning a TZIDC, TZIDC-110, TZIDC-120 positioner that was used at another location, the device must always be reset to factory settings. Never start Autoadjust before restoring factory settings.

*   Only qualified specialists who have been trained for these tasks are authorized to mount and adjust the unit, and to make the electrical connection.
*   When working on the unit always observe the locally valid accident prevention regulations and the regulations concerning the construction of technical installations.

1.9   Safety information for electrical installation

*   The electrical connection may only be made by authorized specialist personnel and in accordance with the electrical circuit diagrams.
*   The electrical connection information in the manual must be observed; otherwise, the type of electrical protection may be adversely affected.
*   Safe isolation of electrical circuits which are dangerous if touched is only guaranteed if the connected devices satisfy the requirements of DIN EN 61140 (VDE 0140 Part 1) (basic requirements for safe isolation).
*   To ensure safe isolation, install supply lines so that they are separate from electrical circuits which are dangerous if touched, or implement additional isolation measures for them.

1.10   Operating safety information

Before switching on the unit make sure that your installation complies with the environmental conditions listed in the chapter "Technical data" or in the data sheet.

If there is a chance that safe operation is no longer possible, take the unit out of operation and secure against unintended startup.

When mounting the unit in areas that may be accessed by unauthorized persons, take the required protective measures.

Prior to installation, check the devices for any damage that may have occurred as a result of improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents. All claims for damages must be submitted to the shipper without delay and before installation.

1.11 Returning devices

Use the original packaging or suitably secure shipping containers if you need to return the device for repair or recalibration purposes. Fill out the return form (see the Appendix) and include this with the device.

According to EC guidelines for hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:

All devices delivered to ABB Automation Products GmbH must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 2 for nearest service location.

1.12 Integrated management system

ABB Automation Products GmbH operates an integrated management system, consisting of:
- Quality management system to ISO 9001:2008
- Environmental management system to ISO 14001:2004
- Occupational health and safety management system to BS OHSAS 18001:2007 and
- Data and information protection management system

Environmental awareness is an important part of our company policy.

Our products and solutions are intended to have a minimal impact on the environment and on people during manufacturing, storage, transport, use, and disposal.

This includes the environmentally-friendly use of natural resources. We conducts an open dialog with the public through our publications.

1.13 Disposal

This product is manufactured from materials that can be reused by specialist recycling companies.

1.13.1 Information on WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product is not subject to WEEE Directive 2002/96/EC or relevant national laws (e.g., ElektroG in Germany).

The product must be disposed of at a specialist recycling facility. Do not use municipal garbage collection points. According to the WEEE Directive 2002/96/EC, only products used in private applications may be disposed of at municipal garbage facilities. Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials.

If it is not possible to dispose of old equipment properly, ABB Service can accept and dispose of returns for a fee.

1.13.2 RoHS Directive 2002/95/EC

With the Electrical and Electronic Equipment Act (ElektroG) in Germany, the European Directives 2002/96/EC (WEEE) and 2002/95/EC (RoHS) are translated into national law. ElektroG defines the products that are subject to regulated collection and disposal or reuse in the event of disposal or at the end of their service life. ElektroG also prohibits the marketing of electrical and electronic equipment that contains certain amounts of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) (also known as hazardous substances with restricted uses).

The products provided by ABB Automation Products GmbH do not fall within the current scope of the directive on waste from electrical and electronic equipment according to ElektroG. If the necessary components are available on the market at the right time, in the future these substances will no longer be used in new product development.

2 Ex relevant safety instructions

Depending on the type of explosion protection, an Ex label is attached to the left of the positioner beside the main name plate. It indicates the level of explosion protection and the device's relevant Ex certificate.

Requirements / preconditions for safe operation of the positioner:

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IMPORTANT (NOTE)

Observe the device's applicable technical data and special conditions in accordance with the relevant certificate.

- Manipulation of the device by users is not permitted. Modifications to the unit may only be performed by the manufacturer or an explosion protection specialist.
- The splash guard cap must be screwed in place to achieve IP 65 / NEMA 4x protection class. Operating the unit without splash guard cap is prohibited.
- The device may only be supplied with instrument air that is free of oil, water, and dust. The use of flammable gas, oxygen, or oxygen-enriched gas is not permitted.
- Exception: The version of the TZIDC that is designed for operation with flammable gas, group IIA, temperature class T1 ((see IMPORTANT (NOTE) in 7 "Ex relevant specifications").

3 Mounting

⚠️ **CAUTION - Risk of injury!**
Incorrect parameter values can cause the valve to move unexpectedly. This can lead to process failures and result in injuries.
Before recommissioning a TZIDC, TZIDC-110, TZIDC-120 positioner that was used at another location, the device must always be reset to factory settings. Never start Autoadjust before restoring factory settings.

3.1 Operating conditions at installation site

ℹ️ **IMPORTANT (NOTE)**
Before installation, check whether the TZIDC, TZIDC-110, TZIDC-120 positioner meets the control and safety requirements for the installation location (actuator or valve).
See the „Specifications" chapter in the operating instructions or on the data sheet.

3.2 Mechanical mount

3.2.1 General information
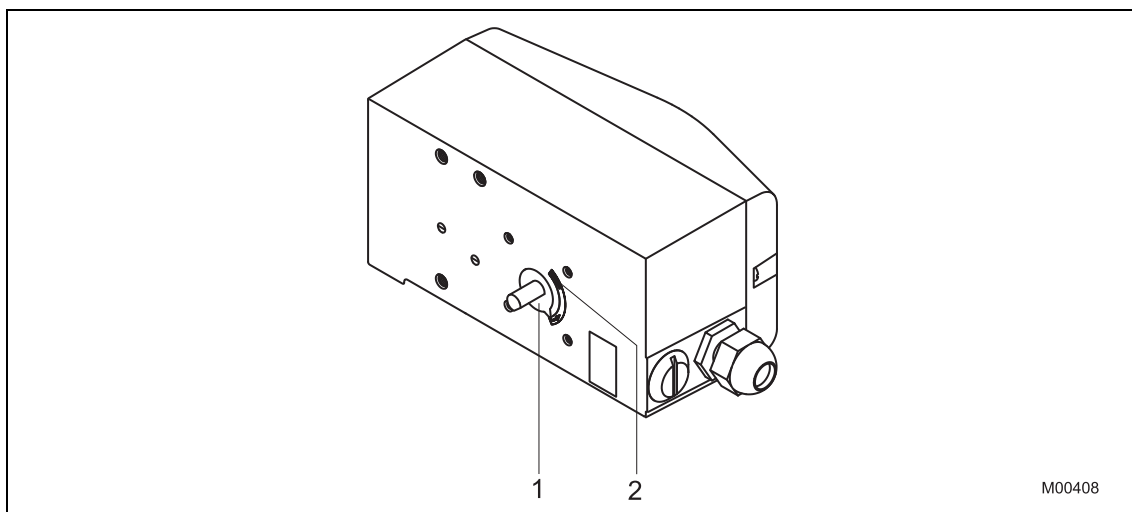
Fig. 2: Operating range

The arrow (1) on the positioner feedback shaft (and the lever) must move through the area marked by the arrows (2).
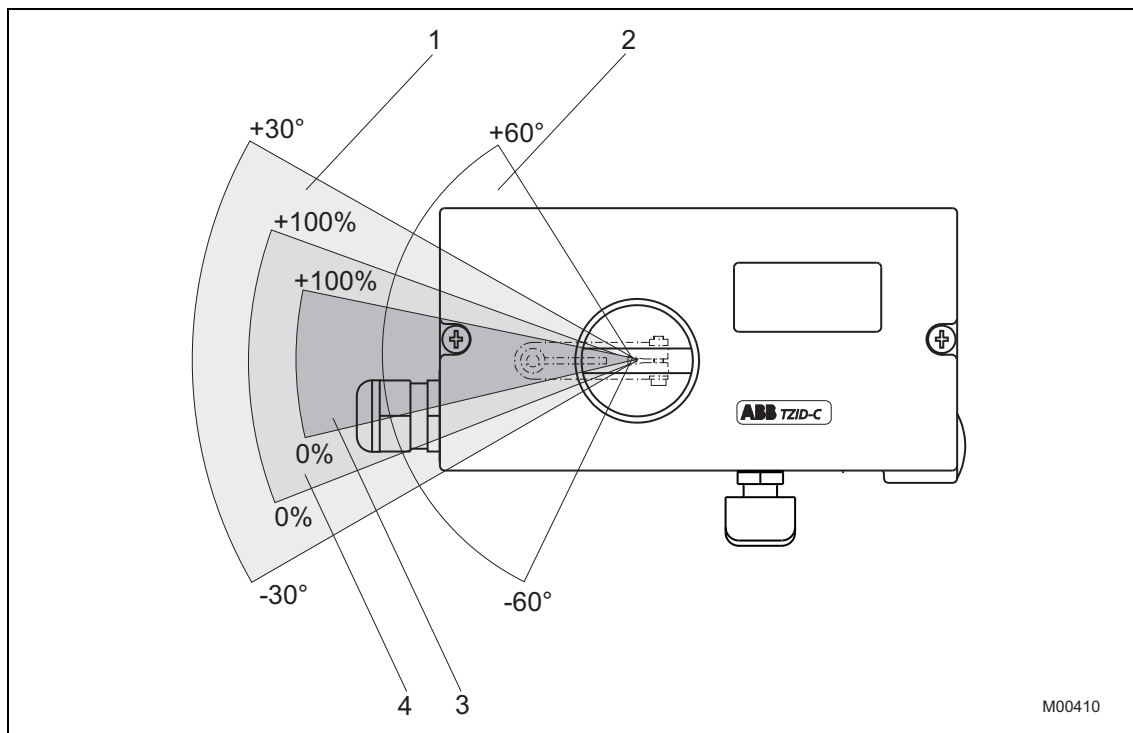
Fig. 3: Positioner range

1	Sensor range for linear actuators	3	Restricted working range
2	Sensor range for part-turn actuators	4	Working range

i IMPORTANT (NOTE)

During installation make sure that the actuator travel or rotation angle for position feedback is implemented correctly.

The maximum rotation angle for position feedback is 60° when installed on linear actuators and 120° on part-turn actuators. The minimum angle is always 25°.

3.2.2 Mounting on linear actuators

For mounting on a linear actuator in accordance with DIN / IEC 534 (lateral mount per NAMUR) a complete mounting kit is available, and consists of the items in the following table:
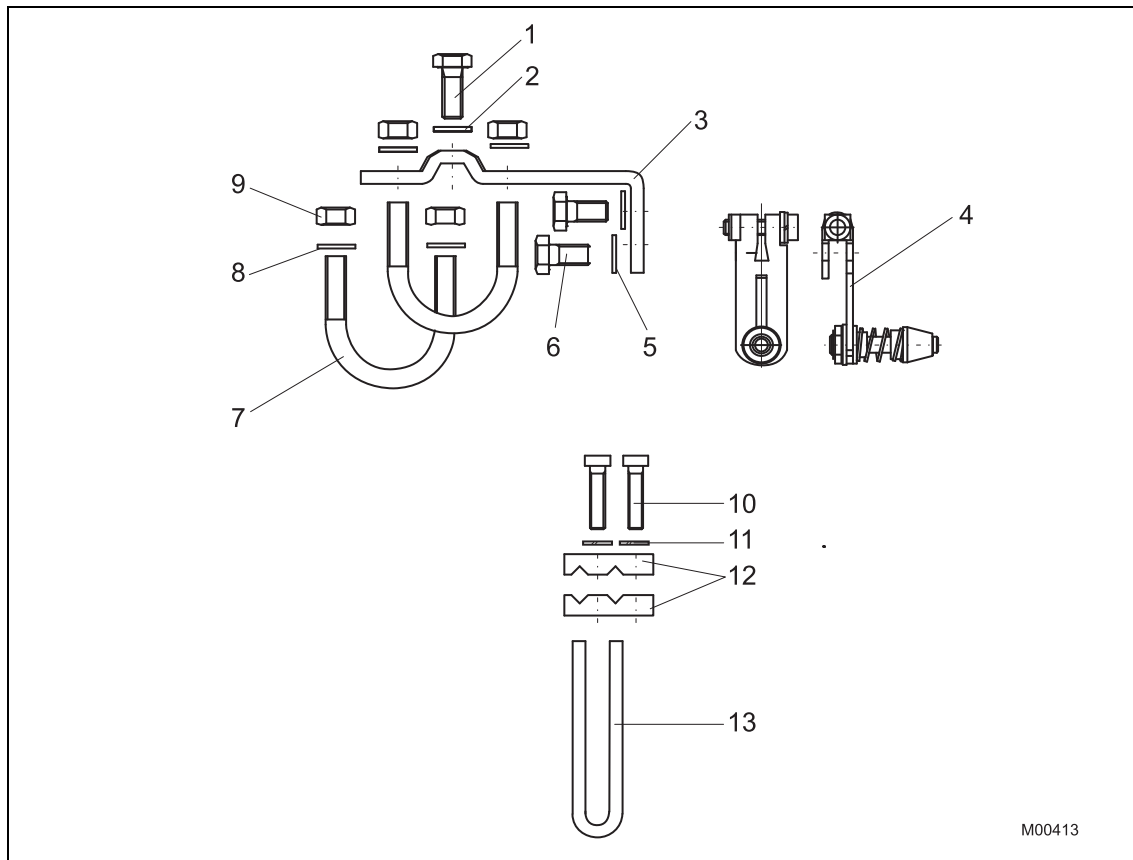
Fig. 4: Mounting kit for linear actuators

- Lever (4) with follower pin, for stroke adjustment 10 ... 35 mm (0.39 ... 1.38 inch) or 20 ... 100 mm (0.79 ... 3.94 inch)
- Follower guide (13) with two screws (10), spring washers (11) and clamp plates (12)
- Mount bracket (3) with two screws (6) and two shims (5)
- Screw (1) and shim (2) for mounting to cast iron yoke
- Two U-bolts (7) with two shims (8) and two nuts (9) for mounting to columnar yoke

Required tools:
- Wrench, size 10 / 13
- Allen key, size 4

Procedure:

1. Attach follower guide to actuator
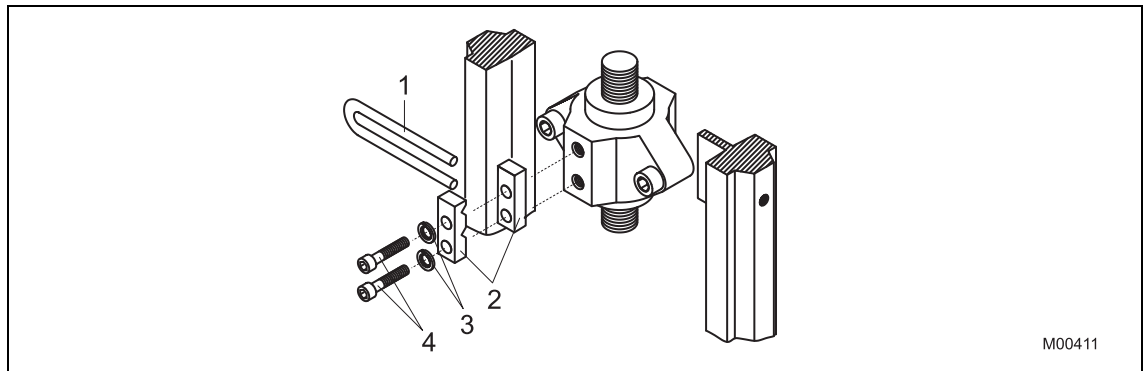
Fig. 5

ℹ️ **IMPORTANT (NOTE)**
Hand tighten the screws.

- Attach the follower guide (1) and clamp plates (2) with screws (4) and spring washers (3) to the actuator stem

2. Mount the lever and bracket on the positioner
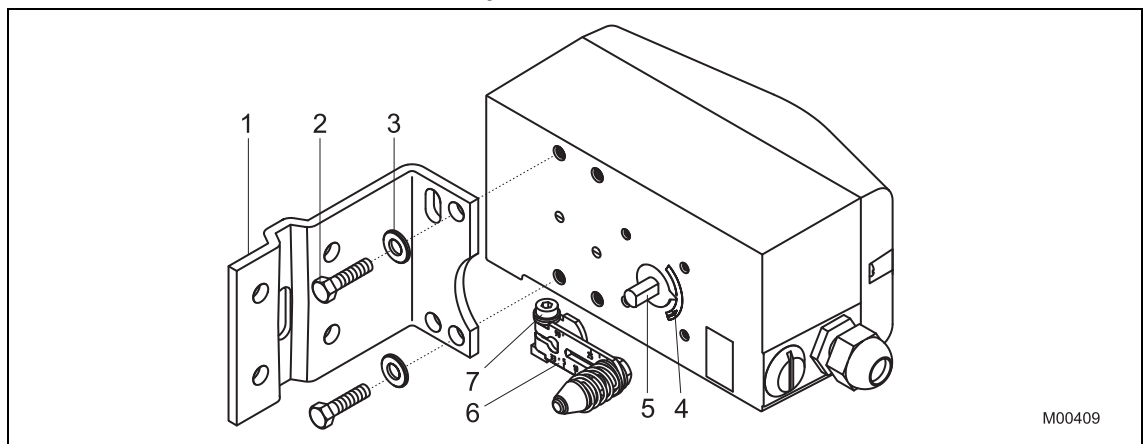
Fig. 6

- Attach the lever (6) to the feedback shaft (5) of the positioner (can only be mounted in one position due to the flat on the side of the shaft)
- Using the arrow marks (4) check whether the lever moves within the operating range (between the arrows)
- Hand-tighten the screw (7) on the lever
- Hold the prepared positioner with loose mount bracket (1) to the actuator so that the follower pin for the lever enters the follower guide to determine which holes on the positioner must be used for the mount bracket
- Attach the mount bracket (1) with screws (2) and shims (3) to the proper holes on the positioner housing. Tighten the screws as evenly as possible to ensure subsequent linearity. Align the mount bracket in the oblong hole to ensure that the operating range is symmetrical (lever moves between the arrows (4))

3.a Mounting on cast iron yoke
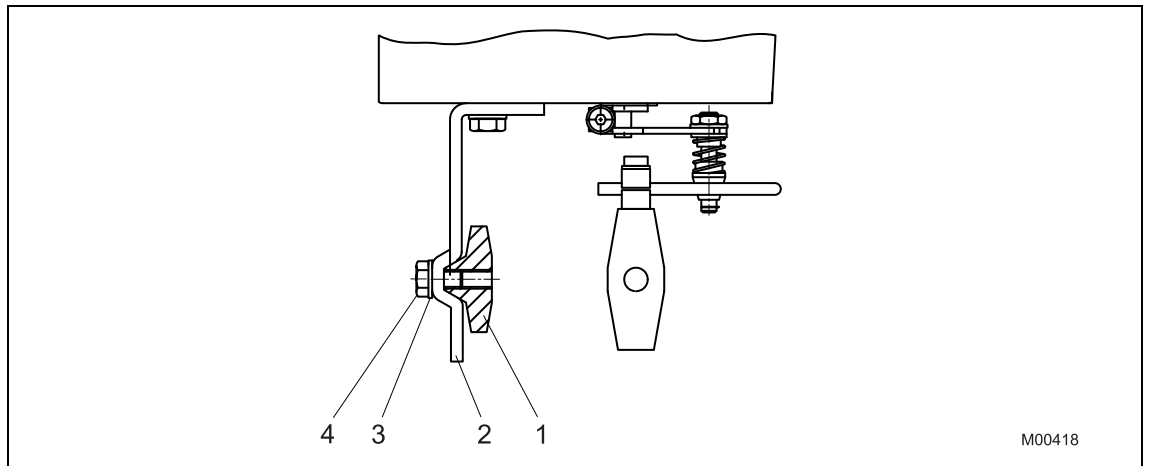
Fig. 7

- Attach the mount bracket (2) with screw (4) and shim (3) to the cast iron yoke (1)

or

3.b Mounting on columnar yoke
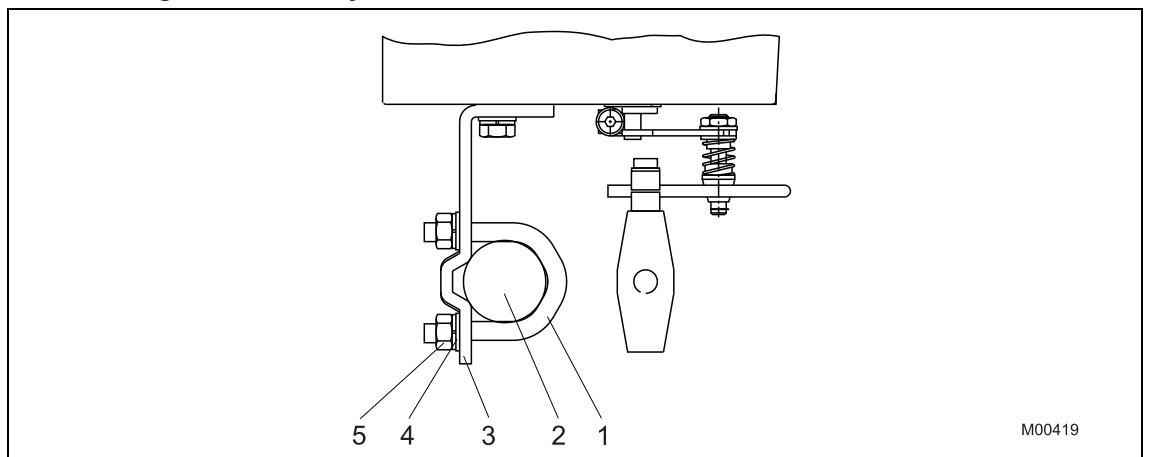
Fig. 8

- Hold the mount bracket (3) in the proper position on the columnar yoke (2)
- Insert the U-bolts (1) from the inside of the columnar yoke (2) through the holes for the mount bracket
- Add the washers (4) and nuts (5). Hand tighten the nuts

i **IMPORTANT (NOTE)**
Adjust the height of the positioner on the cast iron yoke or columnar yoke until the lever is horizontal (based on visual check) at half stroke of the valve.
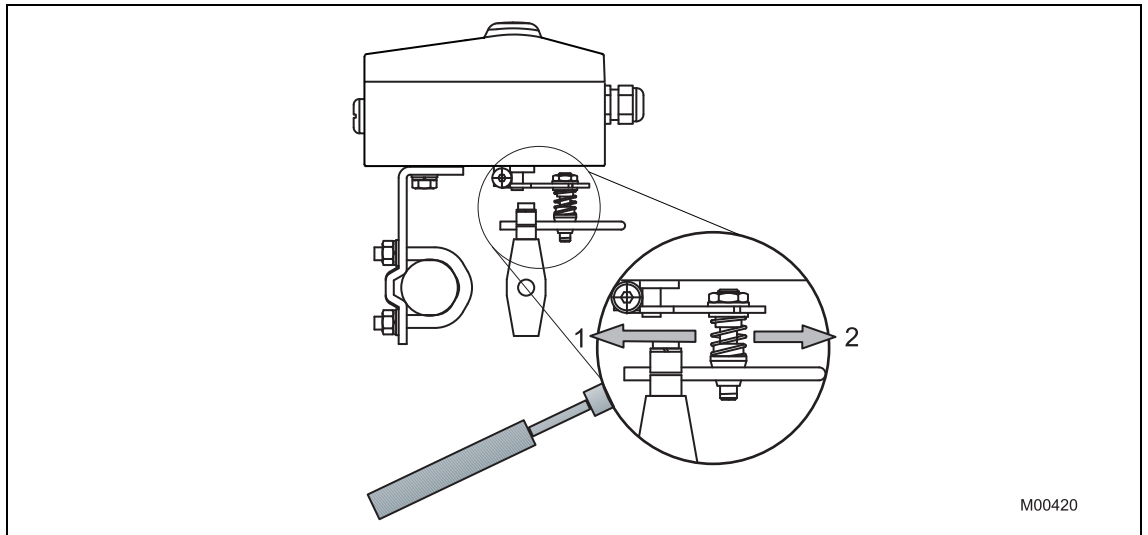
Fig. 9: Linkage for positioner
 1 larger
 2 smaller

The scale on the lever indicates the link point for the various stroke ranges of the valve.
Move the bolt with the follower guide into the oblong hole of the lever to adjust the stroke range of the valve to the operating range for the position sensor.
Moving the link point inward increases the rotation angle of the sensor. Moving the link point outward reduces the sensor's rotation angle.

Adjust the actuator stroke to make use of as large an angle of rotation as possible (symmetrical around the center position).

Recommended range for linear actuators:	between -28 ... 28°
Minimum angle:	25°

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IMPORTANT (NOTE)
After mounting the unit check whether the positioner is operating within the sensor range.

3.2.3   Mounting on rotary actuators

For mounting on rotary actuators in accordance with VDI / VDE 3845, the following mounting kit is available:
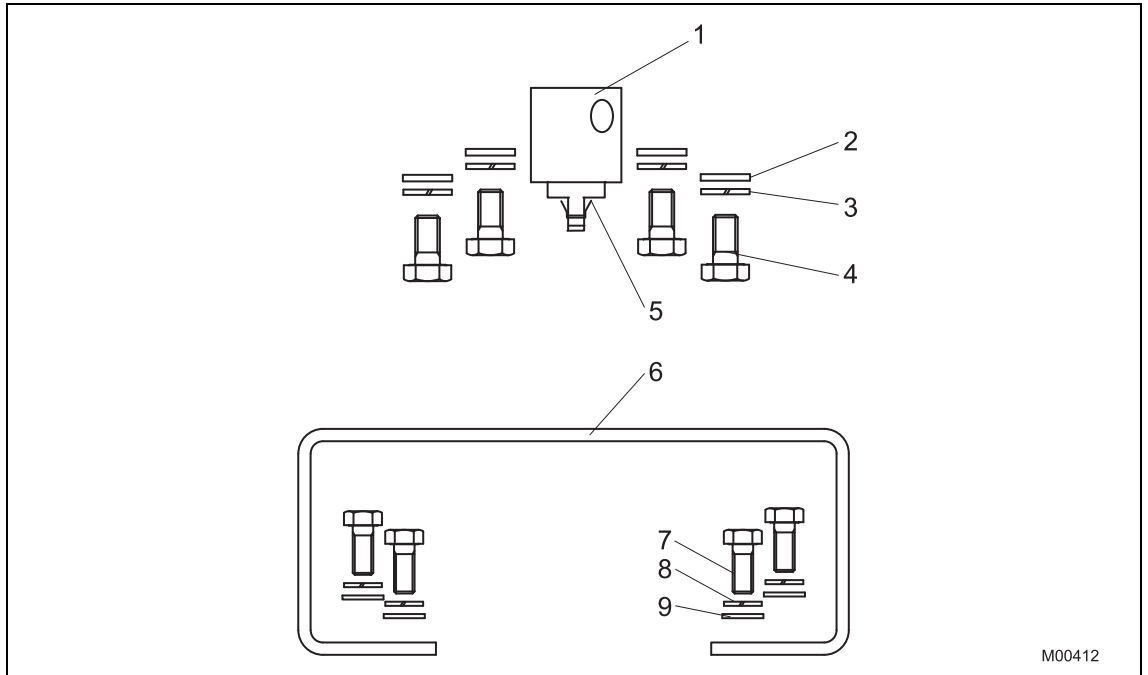
Fig. 10

• Adapter (1) with spring (5)
• each four screws M6 (4), spring washers (3) and shim (2) to attach the mounting bracket (6) on the positioner
• each four screws M5 (7), spring washers (8) and shim (9) to attach the mounting bracket on the actuator

Required tools:
-   Wrench, size 10 / 13
-   Allen key, size 3

Procedure:

1. Mounting the adapter on the positioner
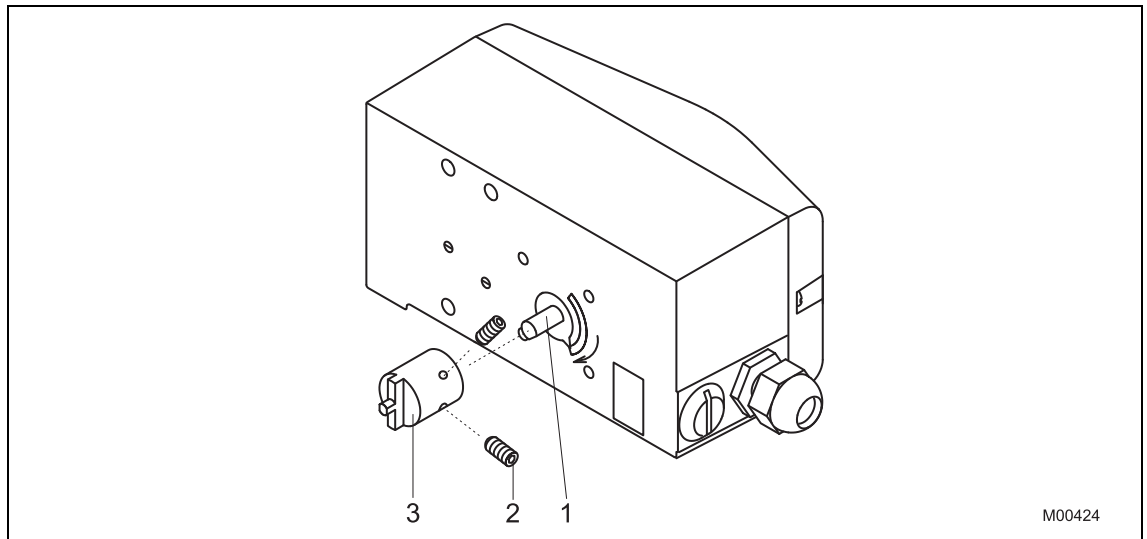
Fig. 11

- Determine the mounting position (parallel to actuator or at 90° angle)
- Calculate the rotational direction of the actuator (right or left)
- Move the rotary actuator into home position
- Based on the mounting position as well as the home position and rotational direction of the actuator, determine in which position the feedback shaft (1) for the positioner must be pre-adjusted and in which position the adapter (2) must be placed to enable the positioner to travel within the proper range (the arrow on the rear of the device must travel within the admissible range, see Fig. 2)
- Pre-adjust feedback shaft
- Place the adapter in the proper position on the feedback shaft and fasten with set screws (3). One of the set screws must be locked in place on the flat side of the feedback shaft

2. Attach mounting bracket on the positioner
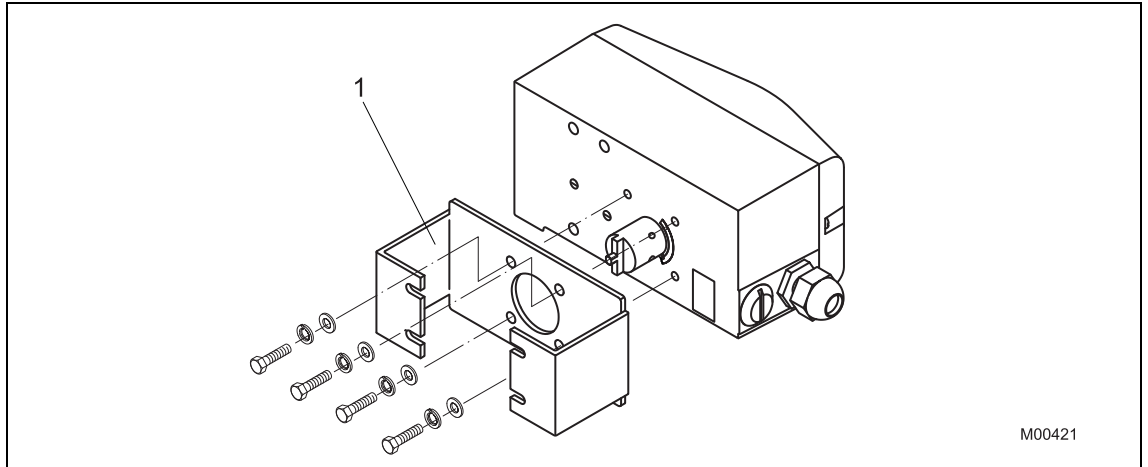
M00421

Fig. 12
 1   Mounting bracket

3. Attach positioner to the actuator

M00416

Fig. 13

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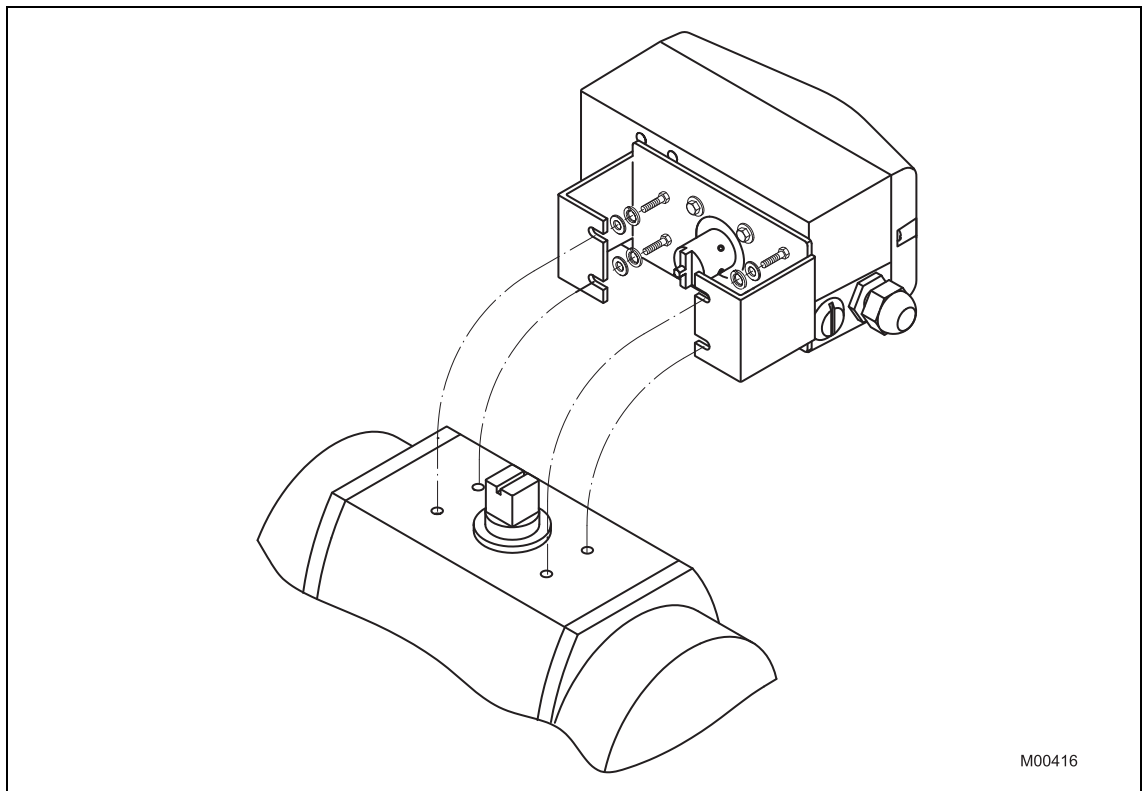
IMPORTANT (NOTE)
After mounting the unit check whether the operating range for the actuator matches the sensor range on the positioner.

4 Electrical connections

> ⚠️ **DANGER! Risk of explosion! (TZIDC only)**
>
> It is prohibited to use the integrated communication interface (LKS) in an Ex area.
>
> Never use the integrated communication interface (LKS) on the mainboard with a positioner that is being used in an explosion risk area.

1. Strip the wire by approx. 6 mm (0.24 inch).
2. To connect the signal lines, the emergency shutdown module and the proximity switches or micro switches, insert the wire ends from the left into the respective screw terminals and hand-tighten the screws (access from above). To connect a plug-in module, insert the wire ends from above in the appropriate screw terminals and hand-tighten the screws (access from the side).
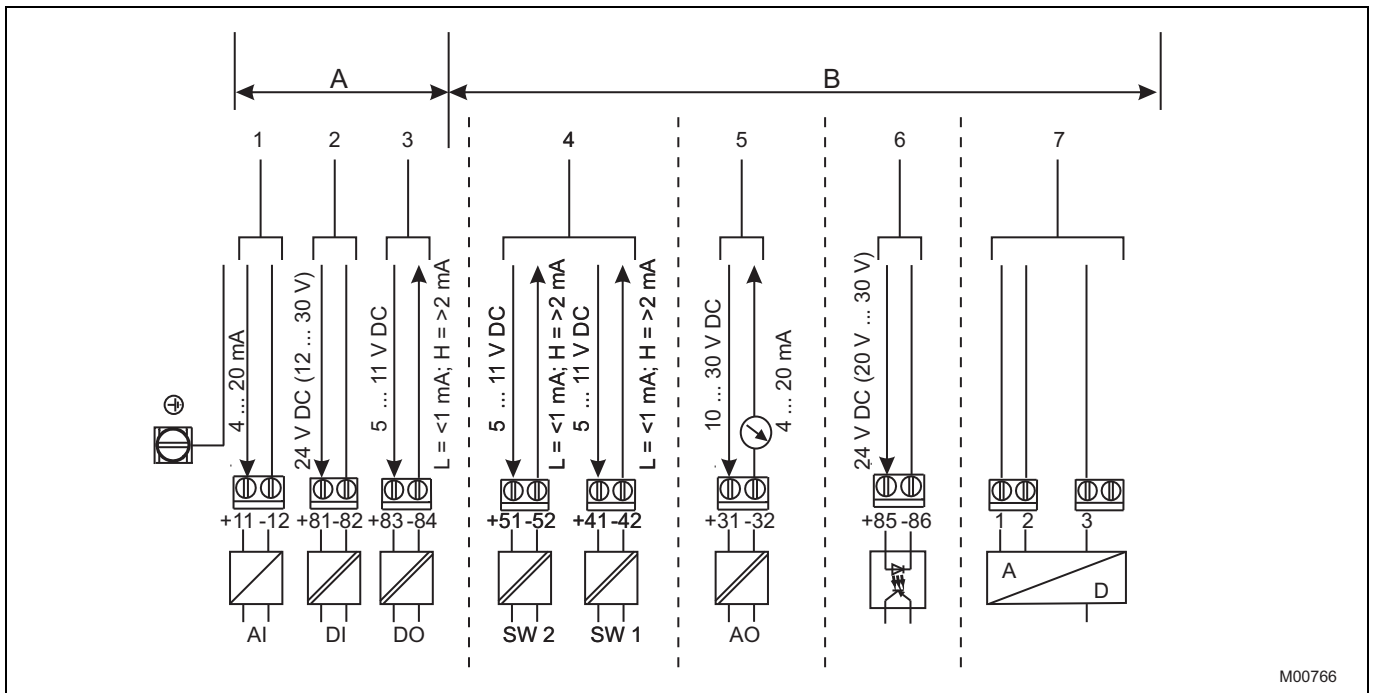
Fig. 14: Control unit connection diagram

A Basic device
B Options

1 Analog input / Bus connection
2 Binary input [1]
3 Binary input [1]
4 Digital feedback [1]
5 Analog feedback [1]
6 Emergency shutdown module
7 Remote sensor

1) TZIDC only
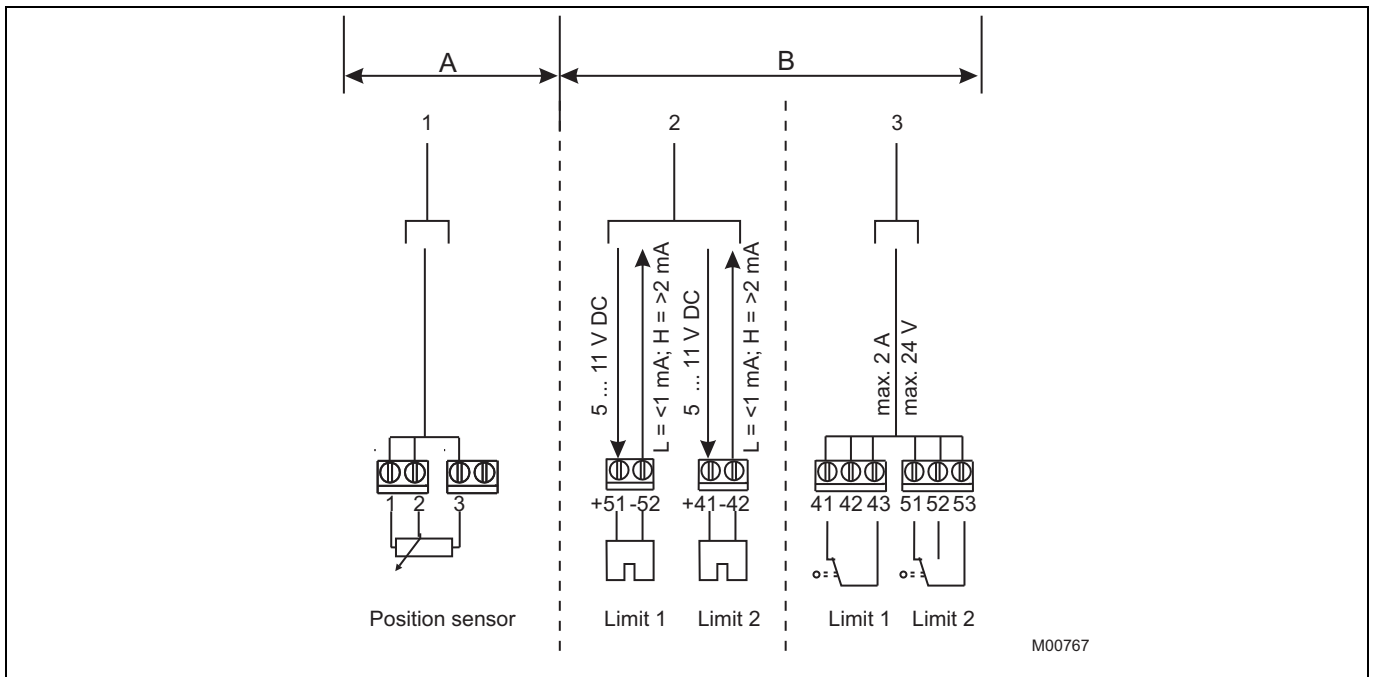
Fig. 15: Remote sensor connection diagram

A Basic device
B Options

1 Control unit
2 Proximity switches
3 Microswitches

i **IMPORTANT (NOTE)**
Keep cable shields as short as possible and connect on both sides.

4.1 Screw terminal assignments
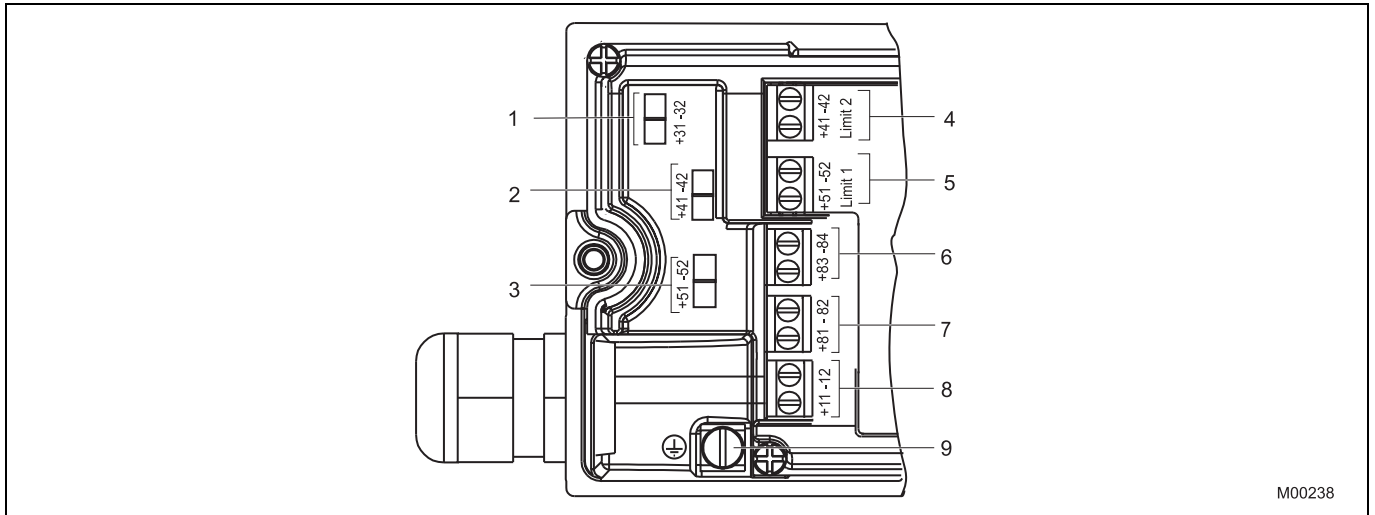
Fig. 16

1 Module for analog position feedback [1]
2 Module for digital feedback [1] or service switch of emergency shutdown module
3 Module for digital position feedback [1] or terminals of the shutdown module
4 Installation kit for digital position feedback, either proximity switches or 24 V microswitches
5 Same as 4

6 Digital output DO [1]
7 Digital input DI [1]
8 Signal 4 ... 20 mA / Bus connector
9 Grounding screw

1) TZIDC only

4.2 Jumper configuration on mainboard (TZIDC-120 only)
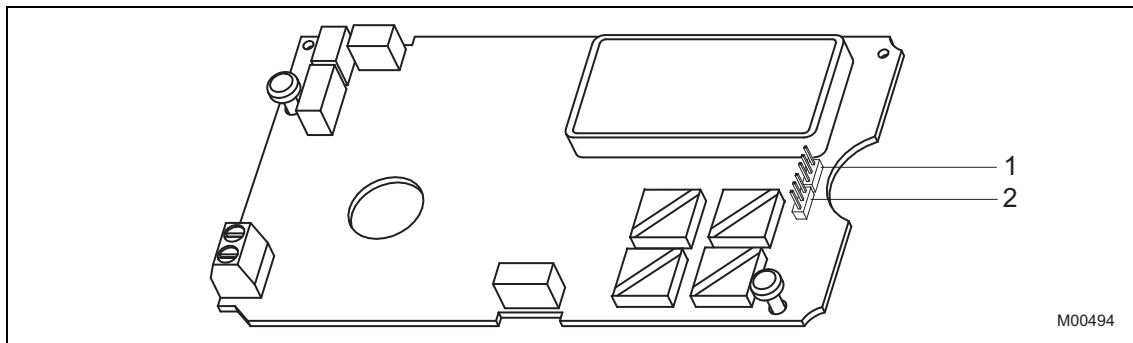
Fig. 17
 1 Simulation
 2 Write access

There are two jumpers on the mainboard that can be used to activate or block simulation mode and write access. Set the jumpers as shown below:
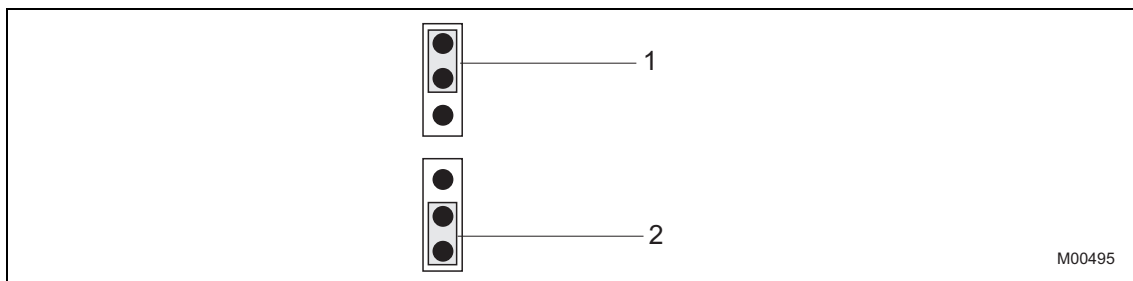
Fig. 18
 1 Block (Simulation blocked [1])
 2 Activate (Write access enabled [1])

1) Default setting (complies with Fieldbus Foundation standard)

4.3 Cable entry

i

IMPORTANT (NOTE)

The cable terminals are delivered closed and must be unscrewed before inserting the cable.

For the cable entry into the housing, on the left-hand side of the housing there are two tap holes in four thread combinations to accommodate the cable entry and pneumatic connection.

- Cable: thread 1/2-14NPT, air pipe: thread 1/4-18 NPT

- Cable: thread M20 x 1,5, air pipe: thread 1/4-18 NPT

- Cable: thread M20 x 1,5, air pipe: thread G 1/4

- Cable: thread G 1/2, air pipe: thread Rc 1/4

As an option, one thread can be fitted with a cable gland and the other with a pipe plug if necessary.
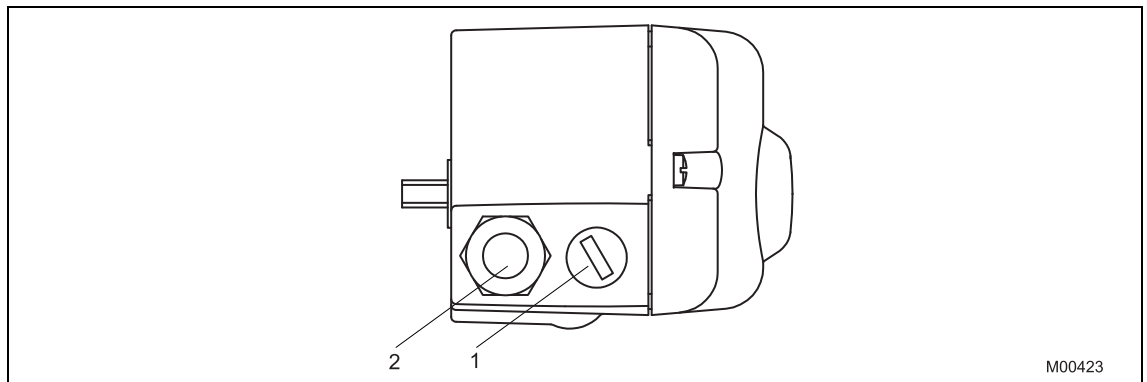
Fig. 19: Cable entry

1　Pipe plug
2　Cable gland

4.4 "TZIDC with remote position sensor"

In the TZIDC designed with a remote position sensor, the components are accommodated in two housings, which together form one harmonized unit.

Housing 1 (control unit) contains the electronics and pneumatics along with the following options (where applicable):

• Analog position feedback
• Digital position feedback
• Shutdown module

Housing 2 (remote sensor) contains the position sensor and is suitable for mounting on linear and part-turn actuators.
The following options can be installed if required:

• Optical position indicator
• Mechanical feedback contacts designed as proximity switches or microswitches.

The two housings can be or are connected to a shielded 3-wire cable. The maximum cable length is 10 m.

Installation and commissioning procedures are described in chapters 3 "Mounting", 5 "Pneumatic connection" and 6 "Commissioning".
Procedures for connecting the electronic unit (housing 1) and the options (housings 1 and 2) are described in chapter 4 "Electrical connections".

With remote sensors designed to protection class IP 67, ensure that the cover screws are pre-tightened with approx. 50 Ncm and then firmly tightened with 250 ± 30 Ncm.

i **IMPORTANT (NOTE)**

If the device is being operated on a cylinder, for reasons associated with linearity you should run the Auto Adjust function for part-turn actuators.
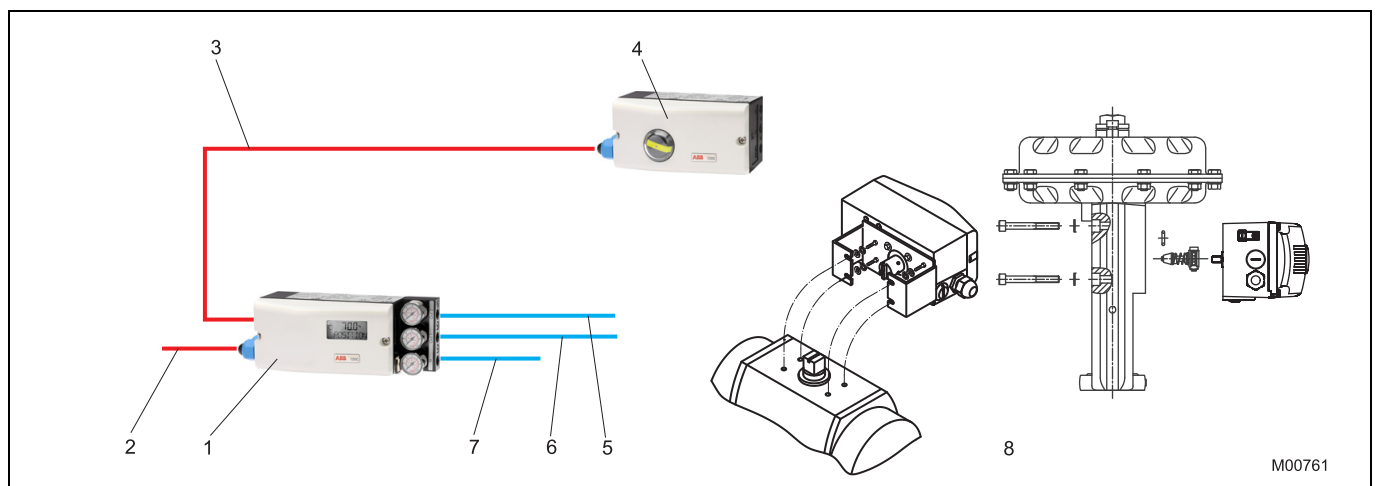
Fig. 20: TZIDC with remote position sensor

1 Housing 1 (control unit)	5 Pneumatic output 2
2 Setpoint signal	6 Pneumatic output 1
3 Connecting cable	7 Air supply
4 Housing 2 (remote sensor)	8 Pneumatic drive

4.4.1 Electrical connection of TZIDC with remote position sensor

TZIDC control unit   TZIDC remote sensor

Fig. 21

1 Analog position feedback
2 Digital position feedback switch 1
3 Digital position feedback switch 2
4 Connecting cable for remote position sensor
5 Connecting cable for remote position sensor
6 Connecting cable for remote position sensor

7 Binary output
8 Binary input
9 Setpoint input
10 Ground connection
11 Proximity switches/Microswitches, switch 1
12 Proximity switches/Microswitches, switch 2

IMPORTANT (NOTE)

The sensor and the electronics have been carefully matched. Therefore, during installation, please make sure that devices are only connected if they have the same serial number.

Connect the connecting cable shield to both housings using EMC cable glands.

The pneumatic outputs must be connected to the drive using cables at least 6 mm in diameter.

If the control unit is attached so that it is it non-conductive, the housing must be grounded (control unit and remote sensor housing at same electrical level); otherwise, control deviations could occur with regard to analog position feedback.

4.5 "TZIDC for remote position sensor"

With the TZIDC designed for remote position sensors, the positioner is supplied without position detection.

The housing (control unit) contains the electronics and pneumatics along with the following options (where applicable):
- Analog position feedback
- Digital position feedback
- Shutdown module

The TZIDC designed for remote position sensors can be connected to any position sensor (4 to 30 kΩ, with open circuit detection 4 to 18 kΩ).
The maximum length of the shielded 3-wire cable is 10 m.

Installation and commissioning procedures are described in chapters 3 "Mounting", 5 "Pneumatic connection" and 6 "Commissioning".

Procedures for connecting the electronic unit (housing 1) and the options are described in chapter 4 "Electrical connections".

i **IMPORTANT (NOTE)**

If the device is being operated on a cylinder, for reasons associated with linearity you should run the Auto Adjust function for part-turn actuators.
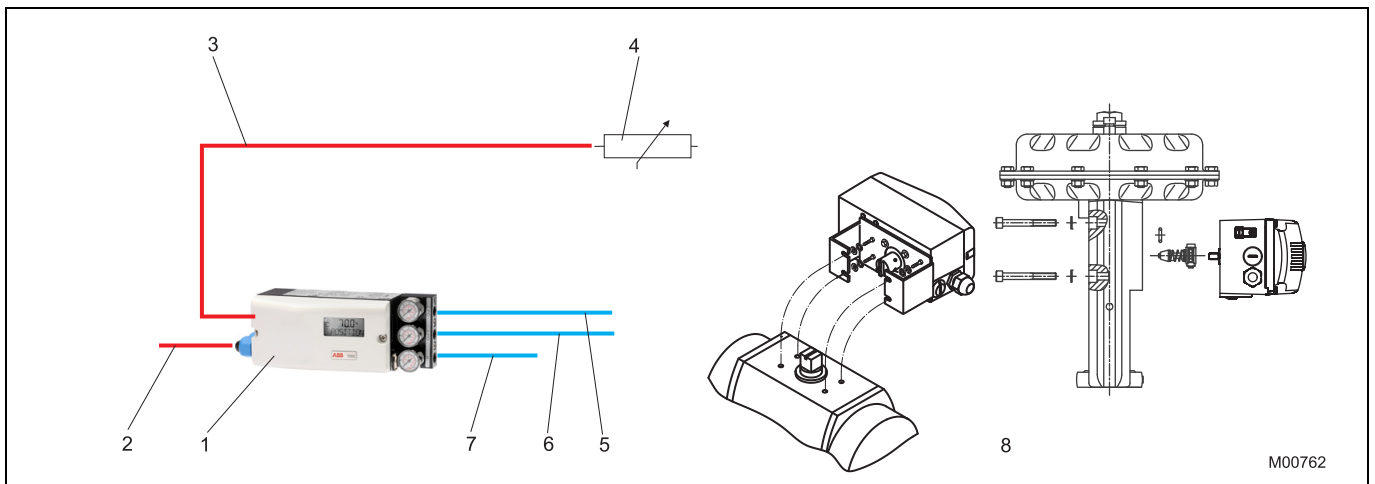
Fig. 22:   TZIDC for remote position sensor

1 Housing (control unit)	5 Pneumatic output 2
2 Setpoint signal	6 Pneumatic output 1
3 Connecting cable	7 Air supply
4 Remote position sensor	8 Pneumatic drive

4.5.1 Electrical connection of TZIDC for remote position sensor
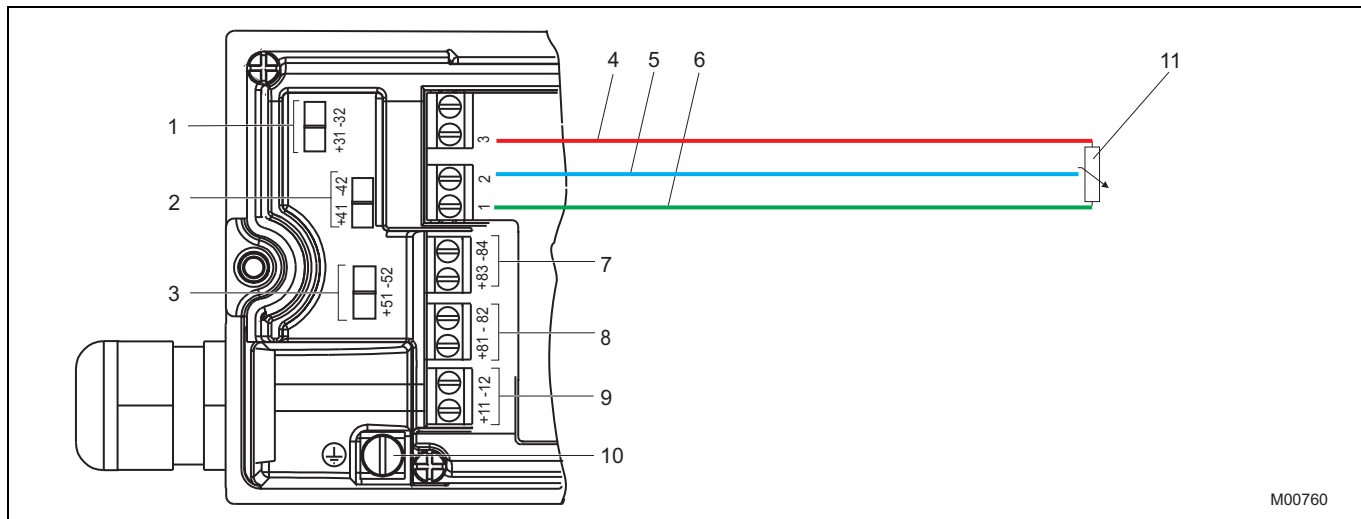
Fig. 23: TZIDC control unit

1	Analog position feedback	7	Binary output
2	Digital position feedback switch 1	8	Binary input
3	Digital position feedback switch 2	9	Setpoint input
4	Connecting cable for remote position sensor	10	Ground connection
5	Connecting cable for remote position sensor	11	Remote position sensor
6	Connecting cable for remote position sensor		

IMPORTANT (NOTE)

Connect the connecting cable shield to both housings using EMC cable glands.

If the control unit is attached so that it is it non-conductive, the housing must be grounded (control unit and remote sensor housing at same electrical level); otherwise control deviations could occur with regard to analog position feedback.

The pneumatic outputs must be connected to the drive using cables at least 6 mm in diameter.

5 Pneumatic connection

IMPORTANT (NOTE)

The TZIDC, TZIDC-110, TZIDC-120 positioner must be supplied with instrument air that is free of oil, water and dust.

The purity and oil content should meet the requirements of Class 3 according to DIN/ISO 8573-1.

NOTICE - Potential damage to parts!

Impurities on the pipe and positioner can damage components.

The recommended pipe dimension is 6 x 1 mm. Dust, splinters or any other particles must be blown off the pipe before connecting.

To connect the air pipes, G1/4 or 1/4-18 NPT tap holes are provided. We recommend that you use a line with the 6 x 1 mm dimensions.

NOTICE - Potential damage to parts!

Pressure above 6 bar (90 psi) can damage the positioner or actuator.

Provisions should be made to ensure that in the event of an error the pressure does not rise above 6 bar (90 psi).
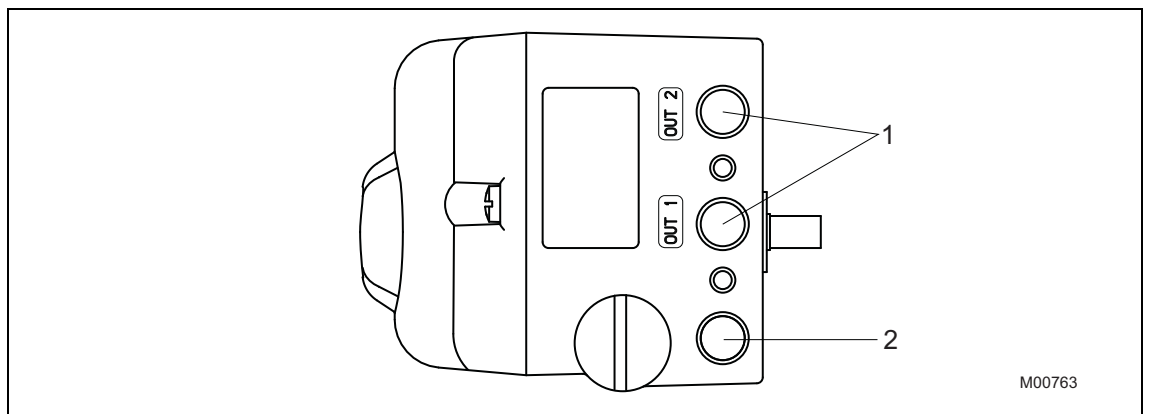
Fig. 24: Pneumatic connections
1 Pneumatic outputs
2 Supply air

All pneumatic piping connections are located on the right-hand side of the positioner. Tapped holes are provided to connect the pneumatic pipes, G1/4 or 1/4-18 NPT. The positioner is labeled according to the available tapped holes. The corresponding pipe connections must be included.

The level of supply air pressure required to apply the actuating force should be adjusted according to the actuating pressure in the actuator. The positioner operating range is between 1.4 ... 6 bar (20 ... 90 psi).

i

IMPORTANT (NOTE)

With control systems for double-acting spring return actuators, modulation problems may occur due to the spring force combining with the compression force. The pressure values in the springless chamber may exceed those of the supply air as a result of the compression induced by the spring force. This may cause two effects:

Effect 1

The pressure values in the springless chamber exceed the max. permissible limit values.

The diaphragms in the I/P module or the actuator may sustain damage leading to device failure as a result.

Effect 2

The pressure in the springless chamber is higher than the service pressure.

If this is the case and if the line to the springless chamber is actuated by the positioner, the excess pressure will first be redirected towards the supply air, and the actuator will move briefly (and inadvertently) in the wrong direction.

In order to ensure that this behavior cannot occur, it is recommended to install a pressure compensation valve between the springless chamber and the supply air for these types of applications. It enables the increased pressure to be transferred back to the air inlet line.

The opening pressure of the check valve should be < 250 mbar.

Join the pipe connections according to the following designation:

Designation	Pipe connection
-	Supply air, pressure 1.4 ... 6 bar (20 ... 90 psi)
OUT1	Actuating pressure for actuator
OUT2	Actuating pressure for actuator (2nd connection with double-acting actuator)

6 Commissioning

6.1 TZIDC

1. Feed in pneumatic supply power
2. Feed in electrical supply power
   - Feed in setpoint current 4 ... 20 mA (terminals +11 / -12)
3. Check mount:
   - Press and hold **MODE**, plus ↟ or ↡ until operating mode 1.3 (manual adjustment within the sensor range) is displayed. Release **MODE**
   - Press ↟ or ↡ to move the actuator into the mechanical end position; check the end positions; rotation angle is displayed in degrees; for high-speed mode, press ↟ and ↡ simultaneously

     Recommended range:
     - between -28 ... 28° for linear actuators
     - between -57 ... 57° for part-turn actuators

     Minimum angle: 25°
4. Run Autoadjust

ℹ **IMPORTANT (NOTE)**
Autoadjust is available for software version 2.XX and higher.

For linear actuators [1]**:**
- Press and hold down **MODE** until **ADJ_LIN** is displayed; release the control button
- Press **MODE** again and hold down until the countdown ends
- Release **MODE**; this starts Autoadjust

For part-turn actuators [1]**:**
- Press **ENTER** and hold down until **ADJ_ROT** is displayed; release the control button
- Press **ENTER** again and hold down until the countdown ends
- Release **ENTER**; this starts Autoadjust

If Autoadjust is successful, the parameters will be stored automatically and the positioner will revert to operating mode 1.1.

If an error occurs during Autoadjust, the process will be terminated with an error message. If this happens, press and hold down ↟ or ↡ for approximately three seconds. The unit will switch to the operating level, mode 1.3 (manual adjustment within the sensor range). The mount is checked and corrected if necessary. Autoadjust then runs again.

ℹ **IMPORTANT (NOTE)**
Autoadjust does not always result in optimum control conditions.

1) The zero position is determined automatically and saved during Autoadjust (counter-clockwise (CTCLOCKW) for linear actuators and clockwise (CLOCKW) for part-turn actuators).

6.1.1 Operating modes

Selection from the operating level:
- Press and hold down **MODE**.
- Press and release ⬆ rapidly as often as required. The selected operating mode is displayed.
- Release **MODE**.
- The position is displayed in % or as a rotation angle.

Operating mode	Mode indicator	Position indicator
1.0 Control mode[1] with adaptation (the control parameter)	1.0 CTRL_ADP	50.0 % POSITION
1.1 Control mode[1] without adaptation (the control parameter)	1.1 CTRL_FIX	50.0 % POSITION
1.2 Manual adjustment [2] in the operating range. Adjust with ⬆ or ⬇ [3]	1.2 MANUAL	50.0 % POSITION
1.3 Manual adjustment [2] in the sensor range. Adjust with ⬆ or ⬇ [3]	1.3 MAN_SENS	-15.0 ° SENS_POS

1) Since self-optimization in operating mode 1.0 is subject to several factors during control operation with adaptation, incorrect adjustments could be made over an extended period.
2) Position not active
3) For high-speed mode: Press ⬆ and ⬇ simultaneously

6.2   TZIDC-110 / TZIDC-120

1. Feed in pneumatic supply power
2. Connect the bus to the bus terminals with any polarity (or supply power 9 ... 32 V DC)

   ⟳ **20.0**%   **REMOTE**   is displayed

3. Check mount:
   - Press and hold down **MODE** and **ENTER**; once the countdown has gone from 3 to 0, release **MODE** and **ENTER**; the unit switches to the operating level, mode 1.x
   - Press and hold down **MODE** and **ENTER**.
   - Additionally, press ♠ or ♣ until operating mode 1.3 (manual adjustment within the sensor range) is displayed. Release **MODE**
   - Press ♠ or ♣ to move the actuator into the mechanical end position; check the end positions; rotation angle is displayed in degrees (for high-speed mode, press ♠ and ♣ simultaneously)

     Recommended range:

     - between -28 ... 28° for linear actuators
     - between -57 ... 57° for rotary actuators

     Minimum angle: 25°

4. Go back to the bus level:

   - Press and hold down **MODE** and **ENTER**; once the countdown has gone from 3 to 0, release **MODE** and **ENTER**

   ⟳ **20.0**%   **REMOTE**   is displayed.

5. Run Autoadjust
   - Check that the unit is on the bus level ("REMOTE")

   For linear actuators [1]:
   - Press and hold down **MODE** until **ADJ_LIN** is displayed. Release the control button
   - Press **MODE** again and hold down until the countdown ends
   - Release **MODE**; this starts Autoadjust

   For rotary actuators [1]:
   - Press and hold down **ENTER** until **ADJ_ROT** is displayed. Release the control button
   - Press **ENTER** again and hold down until the countdown ends
   - Release **ENTER**; this starts Autoadjust

If Autoadjust is successful, the parameters will be stored automatically and the positioner will revert to operating mode 1.1.

If an error occurs during Autoadjust, the process will be terminated with an error message. If this happens, press and hold down ▲ or ▼ for approximately three seconds. The unit will switch to the operating level, mode 1.3 (manual adjustment within the sensor range). The mount is checked and corrected if necessary. Autoadjust then runs again.

6. Set potential dead band and tolerance band

   This step is only required for critical (e.g., very small) actuators. It is not necessary under normal circumstances.

1) The zero position is determined automatically and saved during Autoadjust (counter-clockwise (CTCLOCKW) for linear actuators and clockwise (CLOCKW) for rotary actuators).

6.2.1 Operating modes

Selection from the operating level:
- Press and hold down **MODE**
- Press and release ▲ as often as required to display the selected operating mode
- Release **MODE**
- The position is displayed in % or as a rotation angle

Operating mode	Mode indicator	Position indicator
1.1 Positioning with fixed setpoint Use ▲ or ▼ to adjust the setpoint	1.1 CTRL_FIX	50.0% POSITION
1.2 Manual adjustment [1] in the operating range Adjust with ▲ or ▼ [2]	1.2 MANUAL	50.0% POSITION
1.3 Manual adjustment [1] in the sensor range Adjust with ▲ or ▼ [2]	1.3 MAN_SENS	-15.0° SENS_POS

1) Positioning not active.
2) for high-speed mode: Press ▲ and ▼ simultaneously.

7 Ex relevant specifications

i **IMPORTANT (NOTE)**
The values indicated here are taken from the respective certificates. Always observe the specifications and supplements in the explosion protection certificates.

7.1 TZIDC

7.1.1 ATEX Ex i

Designation:	II 2 G Ex ia IIC T6 resp. T4 Gb
	II 2 G Ex ib IIC T6 resp. T4 Gb
	II 2 D Ex ia IIIC T51°C resp. 81°C Db
Type Examination Test Certificate:	TÜV 04 ATEX 2702 X
Type:	Intrinsically safe equipment
Device class:	II 2G
Standards:	EN 60079-0:2009
	EN 60079-11:2012
Device class:	II 2D
Standards:	EN 60079-0:2009
	EN 61241-11:2006

II 2 G Temperature class	Ta Ambient temperature range
T4	-40 ... 85 °C
T5	-40 ... 50 °C
T6 [1)]	-40 ... 40 °C

1) When using the "digital feedback" plug-in module in temperature class T6, the maximum permissible ambient temperature range is -40 ... 35 °C.

II 2 D Housing surface temperature	Ta Ambient temperature range (II 2 D)
T81 °C	-40 ... 70 °C
T61 °C	-40 ... 50 °C
T51 °C	-40 ... 40 °C

Electrical data

	With the intrinsically safe Ex ib IIC, Ex ia IIC or Ex ia IIIC type of ignition protection, only for connection to a certified intrinsically safe circuit.
Signal circuit (terminal +11 / -12)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 6.6 nF L_i negligibly small
Contact input (terminal +81 / -82)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 4.2 nF L_i negligibly small
Switch output (terminal +83 / -84)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 500 mW C_i = 4.2 nF L_i negligibly small
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	For max. values, see EC type examination test certificate number PTB 00 ATEX 2049 X Proximity switches manuf. by Pepperl & Fuchs
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 500 mW C_i = 3.7 nF L_i negligibly small
Plug-in module for analog position feedback (terminal +31 / -32)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 6.6 nF L_i negligibly small
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 3.7 nF L_i negligibly small
Optional interface to remote sensor (terminal X2-2: +U_{ref} X3-2: GND X3-1: Signal	Maximum values: U_0 = 5.4 V I_0 = 74 mA P_0 = 100 mW C_i negligibly small L_i negligibly small Ex ia or Ex ib type of ignition protection IIC: L_0 = 5mH C_0 = 2 µF IIB: L_0 = 5mH C_0 = 10 µF
Local communication interface (LKS)	Only for connection to a programmer outside the potentially explosive area. (See special conditions)

Special conditions

- The local communication interface (LKS) may only be operated at $U_m \leq 30$ V DC outside the potentially explosive area.
- Variants with special certification confirming that they meet the requirements for the "flameproof enclosure" type of ignition protection may not be used as "intrinsically safe", if they have been previously used as a flameproof type of ignition protection.
- When used with gases from group IIA and a temperature class of T1 for auxiliary power, the TZIDC positioner may only be used outdoors or inside sufficiently ventilated buildings.
- The gas supplied must be kept sufficiently free of air and oxygen to prevent an ignitable atmosphere from forming.
- The equipment may only be used as a II 2 D type device in areas where the level of mechanical hazard is "low".
- Cable and wire entries that meet the requirements of EN 61241-11 for Category II 2 D as well as the ambient temperature range must be used.
- Prevent electrostatic charging due to propagating brush discharge when the equipment is used for applications involving combustible dust.

7.1.2 ATEX Ex n

Designation:	II 3 G Ex nA IIC T6 resp. T4 Gc
Declaration of conformity:	TÜV 02 ATEX 1943 X
Type:	"n" type of protection
Device class:	II 3 G
Standards:	EN 60079-15:2010
	EN 60079-0:2009

II 3 G Temperature class	Ta Ambient temperature range
T4	-40 ... 85 °C
T6	-40 ... 50 °C

Electrical data	
Signal circuit (terminal +11 / -12)	U = 9.7 V DC I = 4 ... 20 mA, max. 21.5 mA
Contact input (terminal +81 / -82)	U = 12 ... to 24 V DC; 4 mA
Switch output (terminal +83 / -84)	U = 11 V DC
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 to 11 V DC
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	U = 5 to 11 V DC
Plug-in module for analog position feedback (terminal +31 / -32)	U = 10 ... 30 V DC I = 4 ... 20 mA, max. 21.5 mA
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	U = 20 ... 30 V DC

Special conditions

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Comment: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

7.1.3 IECEx

Designation:	Ex ia IIC T6 or T4 Gb
	Ex ib IIC T6 or T4 Gb
	Ex nA IIC T6 or T4 Gc
Certificate No.:	IECEx TUN 04.0015X
Issue No.:	5
Type:	Intrinsic safety "i" or "n" type of protection
Standards:	IEC 60079-0:2011
	IEC 60079-11:2011
	IEC 60079-15:2010

Type and designation	TZIDC Ex ia IIC or Ex ib IIC	
Temperature class	Ambient temperature range	
T4	-40 ... 85 °C	-40 ... 85 °C
T6 [1]	-40 ... 40 °C	-40 ... 50 °C

1) When using the "digital feedback" plug-in module in temperature class T6, the maximum permissible ambient temperature range is -40 ... 35 °C.

7.1.4 IECEx i

Electrical data for a TZIDC designated as Ex ia IIC or Ex ib IIC

	With the intrinsically safe Ex ib IIC or Ex ia IIC type of ignition protection, only for connection to a certified intrinsically safe circuit.
Signal circuit (terminal +11 / -12)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 6.6 nF L_i negligibly small
Contact input (terminal +81 / -82)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 4.2 nF L_i negligibly small
Switch output (terminal +83 / -84)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 500 mW C_i = 4.2 nF L_i negligibly small
Local communication interface (LKS)	Only for connection to a programmer outside the potentially explosive area. (See Special conditions)
The following modules may be operated as an option:	
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 500 mW C_i = 3.7 nF L_i negligibly small
Plug-in module for analog position feedback (terminal +31 / -32)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 mW C_i = 6.6 nF L_i negligibly small
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	Maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 mW C_i = 3.7 nF L_i negligibly small

7.1.5 IECEx n

Electrical data	
Signal circuit (terminal +11 / -12)	U = 9.7 V DC I = 4 ... 20 mA, max. 21.5 mA
Contact input (terminal +81 / -82)	U = 12 ... 24 V DC; 4 mA
Switch output (terminal +83 / -84)	U = 11 V DC
The following modules may be operated with the TZIDC as an option:	
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	U = 5 ... 11 V DC
Plug-in module for analog position feedback (terminal +31 / -32)	U = 10 ... 30 V DC I = 4 ... 20 mA, max. 21.5 mA
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	U = 20 ... 30 V DC
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 ... 11 V DC

Special conditions

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Comment: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

7.1.6 CSA International

Certificate:	1052414
Class 2258 02	PROCESS CONTROL EQUIPMENT – For Hazardous Locations
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations

Class I, Div 2, Groups A, B, C and D;

Class II, Div 2, Groups E, F, and G,

Class III, Enclosure Type 4X:

Model TZIDC, P/N V18345-x0x2x2xx0x Intelligent Positioner	
Input rated	30 V DC; max. 4 ... 20 mA
Max output pressure	90 psi
Max. ambient	85 Deg C

Class I, Div 1, Groups A, B, C and D;

Class II, Div 1, Groups E, F and G

Class III, Enclosure Type 4X:

Model TZIDC, P/N V18345-x0x2x2xx0x Intelligent Positioner intrinsically safe with entity parameters of:	
Terminals 11 / 12	V max = 30 V I max = 104 mA C_i = 6.6 nF L_i = 0 uH
Terminals 81 / 82	V max = 30 V I max = 110 mA C_i = 4.2 nF L_i = 0 uH
Terminals 83 / 84	V max = 30 V I max = 90 mA C_i = 4.2 nF L_i = 0 uH
Terminals 31 / 32	V max = 30 V I max = 110 mA C_i = 6.6 nF L_i = 0 uH
Terminals 41 / 42 and 51 / 52	V max = 30 V I max = 96 mA C_i = 3.7 nF L_i = 0 uH
Terminals Limit2 41 / 42 and Limit1 51 / 52	V max = 15.5 V I max = 52 mA C_i = 20 nF L_i = 30 uH

When installed per installation Drawing No 901064	
Temperature Code	T4
Max. Ambient	85 Deg C

i

IMPORTANT (NOTE)

- The "x" in P/N denotes minor mechanical variations or optional features.
- Do not use the local communication interface (LKS) in hazardous areas.
- Each pair of conductors for each intrinsic safety circuit must be shielded.

7.1.7 CSA Certification Record

Certificate: 1649904 (LR 20312)
Class 2258 04 PROCESS CONTROL EQUIPMENT –
Intrinsically Safe, Entity – For Hazardous
Locations

Class I, Div 1, Groups A, B, C and D;

Class II, Div 1, Groups E, F, and G,

Class III, Div 1, Enclosure Type 4X:

Model TZIDC, P/N V18345-x0x2x2xx0x Intelligent Positioner	
Input rated	30 V DC; max.4 … 20 mA
Output pressure	Max. 90 psi
Intrinsically safe with entity parameters of:	
Terminals 11 / 12	V_{max} = 30 V I_{max} = 104 mA C_i = 6.6 nF L_i = 0 uH
Terminals 81 / 82	V_{max} = 30 V I_{max} = 110 mA C_i = 3.7 nF L_i = 0 uH
Terminals 83 / 84	V_{max} = 30 V I_{max} = 96 mA C_i = 3.7 nF L_i = 0 uH
Terminals 31 / 32	V_{max} = 30 V I_{max} = 110 mA C_i = 6.6 nF L_i = 0 uH
Terminals 41 / 42 and 51 / 52	V_{max} = 30 V I_{max} = 96 mA C_i = 3.7 nF L_i = 0 uH
Terminals Limit2 41 / 42 and Limit1 51 / 52	V_{max} = 15.5 V I_{max} = 52 mA C_i = 20 nF L_i = 30 uH

When installed per installation Drawing No 901064	
Temperature Code	T4
Max. Ambient	85 Deg C

i

IMPORTANT (NOTE)

- The "x" in P/N denotes minor mechanical variations or optional features.
- Do not use the local communication interface (LKS) in hazardous areas.
- Each pair of conductors for each intrinsic safety circuit must be shielded.

7.1.8 FM Approvals

TZIDC Positioner, Model V18345-a0b2c2de0f

IS/I,II,III/1/ABCDEFG/T4 Ta = 85 °C – 901064/7/4; Enity; NI/I/2/ABCD/T4 Ta = 85 °C;

S/II,III/2/FG/T4 Ta =85 °C; Type 4XMax Enity Parameters: Per Control Drawings

a = Case/mounting – 1, 2, 3, 4 or 9

b = Input/communication port – 1 or 2

c = Output/safe protection – 1, 2, 4 or 5

d = Option modules for analog or digital position feedback – 0, 1, 3 or 5

e = Mechanical kit (proximity swiches) for digital position feedback (option) – 0, 1 or 3

f = Design (varnish/coding) – 1 or 2

7.1.9 FM Control Document

CONTROL DOCUMENT NO 901064

Hazardous area | Nonhazardous area

Class I, Div. I, Groups A, B, C, D
Class II, Div. I, Groups E, F, G
Class III, Div. I
(Note 2)

TZIDC
VI8345-X0X2X2XX0X

Associated Apparatus

Control Equipment

+11
Terminals
-12

(Note 9)
(Note 5)
(Note 6)

(Note 3)

Int. Safe Gnd

(Input)

Entity Parameters:
Vmax = 30 Vdc   Imax = 104 mA
Ci = 6.6 nF   Li = 0 µH
                      Pi = I W

Notes
1. Voc or Vi <= Vmax, Isc or It <= Imax, Ca >= Ci+Ccable, La >= Li + Lcable; Po <= Pi
2. Dust-tight conduit seal must be used when installed in Class II and Class III environments.
3. Control equipment connected to barrier must not use or generate more than 250 Vrms or Vdc
4. Installation should be in accordance with ANSI/ISA RP12.6 "Installation of Intrinsically Safe System for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70).
5. The configuration of associated apparatus must be FMRC Approved/CSA Approved as required.
6. Associated apparatus manufacturers installation drawing must be followed when installing this equipment.
7. When connecting conduit to the enclosure use conduit hubs that have the the same environmental rating as the enclosure.
8. No revision to drawing without prior FMRC Approval/CSA Approval.
9. OUTPUT CURRENT MUST BE LIMITED BY A RESISTOR SUCH THAT THE OUTPUT VOLTAGE CURRENT PLOT IS A STRAIGHT LINE DRAWN BETWEEN OPEN CIRCUIT VOLTAGE AND SHORT CIRCUIT CURRENT.
10. Tampering and replacement with non-factory components may adversely affect the safe use of the system. Substitution of components may impair suitability for hazardous locations.
11. FOR FM DIV. 2 USE: Do not connect or disconnect unless the power was switched off or the area is known to be non hazardous.
12. For Div 2 Models: WARNING - EXPLOSION HAZARD - Substitution of components may impair suitability for Class I, Division 2.
13. For Div 2 Models: WARNING - EXPLOSION HAZARD - Do not connect while circuit is live unless area is known to be nonhazardous.
14. Local communication interface LKS shall not be used in hazardous locations.
15. To maintain intrinsic safety, wiring associated with each channel must be run in separate cable shields connected to intrinsically safe (associated apparatus) ground.
16. Caution: Substitution of components may impair intrinsic safety.

			All Dimensions in mm		Title		Scale
			Date	Name	CONTROL_DOCUMENT		
			Drawn 08-Apr-99	Lasarzik			
			Checked				
10	-	05.10.09	Lasarzik		Drawing No. (Part No)	Sheet	
Rev.	Amendment	Date	Name		901064	1/4	
				ABB Automation	Replacement for: -	Category: -	

CONTROL DOCUMENT NO 901064

Hazardous area   Nonhazardous area

Class I, Div. I, Groups A, B, C, D
Class II, Div. I, Groups E, F, G
Class III, Div. I
(Note 2)

TZIDC   Associated   Control
VI8345-X0X2X2XX0X   Apparatus   Equipment

+81
Terminals   (Note 9)
-82   (Note 5)
                         (Note 6)   (Note 3)

(Switching Input)   Int. Safe Gnd

Entity Parameters:
Vmax = 30 Vdc   Imax = 110 mA
Ci = 4.2 nF   Li = 0 µH
Pi = 1 W

+83
Terminals   (Note 9)
-84   (Note 5)
                         (Note 6)   (Note 3)

(Switching Output)   Int. Safe Gnd

Entity Parameters:
Vmax = 30 Vdc   Imax = 96 mA
Ci = 4.2 nF   Li = 0 µH
Pi = 1 W

			All Dimensions in mm	◁▣ ◉	Title		Scale
			Date	Name	CONTROL_DOCUMENT		
			Drawn 08-Apr-99	Lasarzik			
			Checked				
					Drawing No. (Part No)		Sheet
				ABB	901064		2/4
10	-	05.10.09	Lasarzik	ABB Automation			
Rev.	Amendment	Date	Name		Replacement for: -	Category: -	

CONTROL DOCUMENT NO 901064

Hazardous area

Nonhazardous area

Class I, Div. I, Groups A, B, C, D
Class II, Div. I, Groups E, F, G
Class III, Div. I
(Note 2)

TZIDC
VI8345-X0X2X21X0X

Associated Apparatus

Control Equipment

Terminals +31 / -32

(Note 9)
(Note 5)
(Note 6)

(Note 3)

Int. Safe Gnd

(Analog Position Feedback)
Entity Parameters:
$Vmax = 30\ Vdc$ $Imax = 110\ mA$
$Ci = 6.6\ nF$ $Li = 0\ \mu H$
$Pi = 1\ W$

TZIDC
VI8345-X0X2X23X0X

Terminals +51 / -52

(Note 9)
(Note 5)
(Note 6)

(Note 3)

Terminals +41 / -42

(Note 9)
(Note 5)
(Note 6)

(Note 3)

Int. Safe Gnd

(Digital Position Feedback)
Entity Parameters:
$Vmax = 30\ Vdc$ $Imax = 96\ mA$
$Ci = 3.7\ nF$ $Li = 0\ \mu H$ $Pi = 1\ W$

			All Dimensions in mm		◁⊙	Title		Scale
				Date	Name	**CONTROL DOCUMENT**		
			Drawn	08-Apr-99	Lasarzik			
			Checked					
						Drawing No. (Part No)		Sheet
10	-	05.10.09	Lasarzik			**901064**		3/4
Rev.	Amendment	Date	Name	**ABB Automation**		Replacement for:	-	Category: -

CONTROL DOCUMENT NO 901064

Hazardous area	Nonhazardous area

Class I, Div. I, Groups A, B, C, D
Class II, Div. I, Groups E, F, G
Class III, Div. I
(Note 2)

TZIDC
VI8345-X0X2X2XI0X
or VI8345-X0X2X2X30X

Associated Apparatus

Control Equipment

+51
Terminals Limit I
-52

(Note 5)
(Note 6)

(Note 3)

Int. Safe Gnd

+41
Terminals Limit 2
-42

(Note 5)
(Note 6)

(Note 3)

Int. Safe Gnd

(Mechanical Digital Feedback)

Entity Parameters:
Vmax = 15.5 V
Imax = 52 mA
Ci = 20 nF
Li = 30 µH
Pi = I W

				All Dimensions in mm		◁⊙	Title		Scale
					Date	Name	CONTROL DOCUMENT		
				Drawn	08-Apr-99	Lasarzik			
				Checked					
							Drawing No. (Part No)		Sheet
I0	-	05.10.09	Lasarzik				901064		4/4
Rev.	Amendment	Date	Name				Replacement for:	-	Category: -

ABB Automation

7.2 TZIDC-110

7.2.1 ATEX Ex i

Designation:	II 2 G Ex ia IIC T6 resp. T4 Gb
	II 3 G Ex ic IIC T6 resp. T4 Gc
Type Examination Test Certificate:	TÜV 02 ATEX 1831 X
Type:	Intrinsically safe equipment
Standards:	EN 60079-0:2009
	EN 60079-11:2007
	EN 60079-27:2008

Temperature class	Ambient temperature range
T4	-40 ... 85 °C
T6	-40 ... 40 °C

Electrical data for ia/ib/ic for groups IIB/IIC

	With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified FISCO power supply unit, a barrier, or a power supply unit with linear characteristics and the following maximum values:
Signal circuit (terminal +11 / -12 or + / -)	U_i = 24 V I_i = 250 mA P_i = 1.2 W Characteristic curve: linear L_i < 10 µH C_i < 5 nF

	With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified intrinsically safe circuit with maximum values
Shutdown contact input (terminal +85 / -86)	U_i = 30 V C_i = 3.7 nF L_i negligibly small
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	For max. values, see EC type examination test certificate number PTB 00 ATEX 2049 X

7.2.2 ATEX Ex n

<table>
<tr><td>Designation:</td><td>II 3 G Ex nA IIC T6 resp. T4 Gc</td></tr>
<tr><td>Declaration of conformity:</td><td>TÜV 02 ATEX 1943 X</td></tr>
<tr><td>Type:</td><td>"n" type of protection</td></tr>
<tr><td>Device class:</td><td>II 3 G</td></tr>
<tr><td>Standards:</td><td>EN 60079-15:2010</td></tr>
<tr><td></td><td>EN 60079-0:2009</td></tr>
</table>

II 3 G Temperature class	Ta Ambient temperature range
T4	-40 ... 85 °C
T6	-40 ... 50 °C

Electrical data for II 3 G Ex nA IIC T6 or T4 Gc	
Signal circuit (terminal +11 / -12)	U = 9 to 32 V DC I = 10.5 mA
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 ... 11 V DC
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	U = 20 ... 30 V DC

Special conditions

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).

- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.

- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Comment: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.

- Only non-flammable gases may be used for the pneumatic auxiliary power.

- Only use suitable cable entries which meet the requirements of IEC 60079-15.

- If the SJ2_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

7.2.3   IECEx

Designation:	Ex ia IIC T6 resp. T4 Gb
	Ex ib IIC T6 resp. T4 Gb
	Ex ic IIC T6 resp. T4 Gc
	Ex nA IIC T6 resp. T4 Gc
Certificate No.	IECEx TUN 04.0015X
Issue No.:	5
Type:	Intrinsic safety "i" or Type of protection "n"
Standards:	IEC 60079-0:2011
	IEC 60079-11:2011
	IEC 60079-15:2010

Type and designation	TZIDC-110 Ex i IIC	TZIDC-110 Ex nA IIC
Temperature class	Ambient temperature range	
T4	-40 ... 85 °C	-40 ... 85 °C
T6	-40 ... 40 °C	-40 ... 50 °C

7.2.4   IECEx i

Electrical data for TZIDC-110 for ia/ib/ic designated as Ex i IIC T6 or T4 Gb

	With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified FISCO power supply unit, a barrier, or a power supply unit with linear characteristics and the following maximum values:
Signal circuit (terminal +11 / -12 or + / -)	U_i = 24 V I_i = 250 mA P_i = 1.2 W Characteristic curve: linear

The following modules may be used as an option: Ex nA IIC T6 or T4 Gc:

	With the intrinsically safe Ex ia IIC or Ex ib type of ignition protection, only for connection to a certified intrinsically safe circuit with maximum values
Shutdown contact input (terminals: +51,-52 or +85 / -86)	U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 3.7 nF L_i negligibly small

7.2.5 IECEx n

Electrical data for TZIDC-110 designated as Ex nA IIC T6 or T4 Gc	
Signal circuit (terminal +11 / -12)	U = 9 ... 32 V DC I = 10.5 mA
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 ... 11 V DC
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	U = 20 ... 30 V DC

Special conditions

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Comment: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

7.2.6 CSA International

Certificate:	1649904 (LR 20312)
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations
Class 2258 02	PROCESS CONTROL EQUIPMENT – For Hazardous Locations

Class I, Div 2, Groups A, B, C and D;

Class II, Div 2, Groups E, F, and G,

Class III, Enclosure Type 4X:

Model TZIDC-110, P/N V18346-x032x2xx0x Intelligent Positioner		
Input rated	32 V DC; max.15 mA (powered by a SELV circuit)	
Intrinsically safe with entity parameters of:		
Terminals 11 / 12	V max = 24 V I max = 250 mA C_i = 2.8 nF L_i = 7.2 uH	
Terminals 85 / 86	U max = 30 V I max = 50 mA C_i = 3.8 nF L_i = 0 uH	
Terminals 41 / 42	U max = 16 V I max = 20 mA C_i = 60 nF L_i = 100 uH	
Terminals 51 / 52	U max = 16 V I max = 20 mA C_i = 60 nF L_i = 100 uH	

When installed per installation Drawing No 901265	
Temperature Code	T4
Max. Ambient	85 Deg C

i **IMPORTANT (NOTE)**

- The "x" in P/N denotes minor mechanical variations or optional features.
- Do not use the local communication interface (LKS) in hazardous areas.
- Each pair of conductors for each intrinsic safety circuit must be shielded.

7.2.7 CSA Certification Record

Certificate:	1649904 (LR 20312)
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations

Class I, Div 1, Groups A, B, C and D;

Class II, Div 1, Groups E, F, and G,

Class III, Div 1, Enclosure Type 4X:

Model TZIDC-110, P/N V18346-x032x2xx0x Intelligent Positioner	
Input rated	32 V DC; max. 15 mA (powered by a SELV Circuit)
Intrinsically safe with entity parameters of:	
Terminals 11 / 12	$V \max = 24$ V $I \max = 250$ mA $C_i = 2.8$ nF $L_i = 7.2$ uH
Terminals 85 / 86	$U \max = 30$ V $I \max = 50$ mA $C_i = 3.8$ nF $L_i = 0$ uH
Terminals 41 / 42	$U \max = 16$ V $I \max = 20$ mA $C_i = 60$ nF $L_i = 100$ uH

When installed per installation Drawing No 901265	
Temperature Code	T4
Max. Ambient	85 Deg C

i **Notice**
- The "x" in P/N denotes minor mechanical variations or optional features.
- Do not use the local communication interface (LKS) in hazardous areas.
- Each pair of conductors for each intrinsic safety circuit must be shielded.

7.2.8 FM Approvals

TZIDC-110 Positioner, Model V18346-a032b2cd0e

IS/I,II,III/1/ABCDEFG/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C-901265 Entity, FISCO

Entity and FISCO Parameters							
Terminals	Type	Groups	Parameters				
			Vmax	Imax	Pi	Ci	Li
+11 / -12	Entity	A-G	24 V	250 mA	1.2 W	2.8 nF	7.2 uH
+11 / -12	FISCO	A-G	17.5 V	360 mA	2.52 W	2.8 nF	7.2 uH
+11 / -12	FISCO	C-G	17.5 V	380 mA	5.32 W	2.8 nF	7.2 uH
+51 / -52	Entity	A-G	16 V	20 mA	-	60 nF	100 uH
+41 / -42	Entity	A-G	16 V	20 mA	-	60 nF	100 uH
+85 / -86	Entity	A-G	30 V	-	-	3.7 nF	< 1 uH

NI/I/2/ABCD/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C

S/II,III/2/EFG//T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C

Enclosure type 4x

a = Case/mounting – 1, 2, 5 or 6

b = Output/safe protection – 1, 2, 4 or 5

c = Option modules (shutdown) – 0 or 4

d = Optional mechanical kit for digital position feedback – 0, 1 or 3

e = Design (varnish/coding) – 1 or E

Equipment Ratings:

TZIDC-110

Intrinsically safe, Entity and FISCO, for Class I, II and III, Division 1,

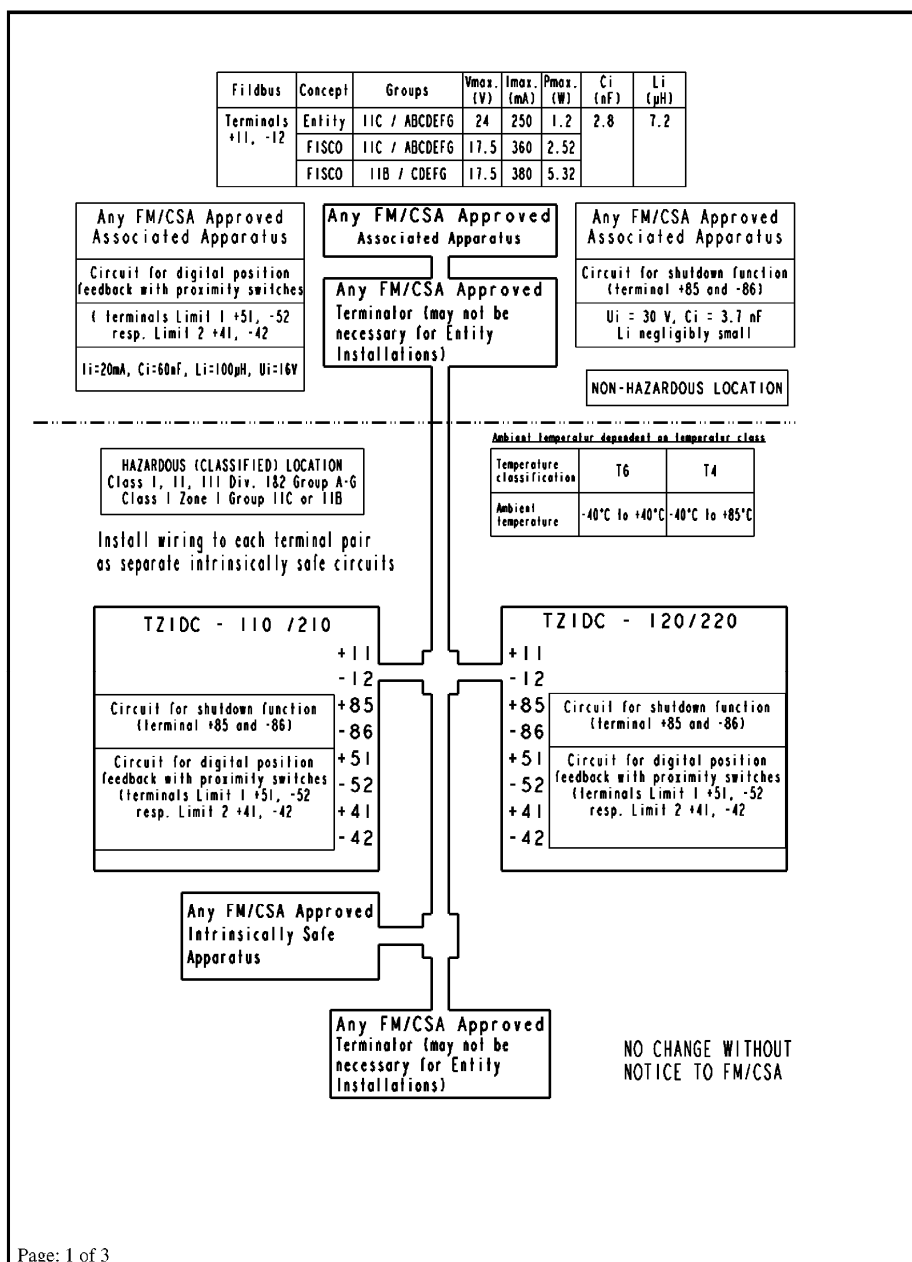Applicable Groups A, B, C, D, E, F, G; nonincendive for Class I, Division 2,

Group E, F and G hazardous (classified) indoor and outdoor NEMA 4x locations.

The following temperature code ratings were assigned for the equipment and protection methods described above:
T6 in ambient temperatures of 40 °C
T5 in ambient temperatures of 55 °C
T4 in ambient temperatures of 85 °C

7.2.9   FM Control Document

Fildbus	Concept	Groups	Vmax. (V)	Imax. (mA)	Pmax. (W)	Ci (nF)	Li (µH)
Terminals +11, -12	Entity	IIC / ABCDEFG	24	250	1.2	2.8	7.2
	FISCO	IIC / ABCDEFG	17.5	360	2.52		
	FISCO	IIB / CDEFG	17.5	380	5.32		

Any FM/CSA Approved Associated Apparatus

Circuit for digital position feedback with proximity switches

(terminals Limit 1 +51, -52 resp. Limit 2 +41, -42)

Ii=20mA, Ci=60nF, Li=100µH, Ui=16V

Any FM/CSA Approved Associated Apparatus

Any FM/CSA Approved Terminator (may not be necessary for Entity Installations)

Any FM/CSA Approved Associated Apparatus

Circuit for shutdown function (terminal +85 and -86)

Ui = 30 V, Ci = 3.7 nF Li negligibly small

NON-HAZARDOUS LOCATION

Ambient temperatur dependent on temperatur class

Temperature classification	T6	T4
Ambient temperature	-40°C to +40°C	-40°C to +85°C

HAZARDOUS (CLASSIFIED) LOCATION
Class I, II, III Div. 1&2 Group A-G
Class I Zone I Group IIC or IIB

Install wiring to each terminal pair as separate intrinsically safe circuits

TZIDC - 110 /210

| +11 |
| -12 |

Circuit for shutdown function (terminal +85 and -86)   +85 / -86

Circuit for digital position feedback with proximity switches (terminals Limit 1 +51, -52 resp. Limit 2 +41, -42)   +51 / -52 / +41 / -42

TZIDC - 120/220

| +11 |
| -12 |

+85 / -86   Circuit for shutdown function (terminal +85 and -86)

+51 / -52 / +41 / -42   Circuit for digital position feedback with proximity switches (terminals Limit 1 +51, -52 resp. Limit 2 +41, -42)

Any FM/CSA Approved Intrinsically Safe Apparatus

Any FM/CSA Approved Terminator (may not be necessary for Entity Installations)

NO CHANGE WITHOUT NOTICE TO FM/CSA

Page: 1 of 3

				2003	Date	Name	Title		Scale
- -				Name	27.03.03	Thiem.	FM/CSA-Control-Document		
				Appr.					/
				Std.					
3	Rev.2	26.06.06	Thie.				**ABB**	Drwg.-No. (Part-No.)	
2	Rev.1	22.05.06	Thie.					**901265**	
1	Rev.0	27.03.	Thie.				Automation Products		
Rev.	Chang	Date	Name					Supersedes Dwg. :	Part Class:

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FM/CSA-CONTROL-DOCUMENT_901265

FISCO rules

The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Vmax), the current (Imax) and the power (Pi) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It,) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (Ci) and inductance(Li) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10 µH respectively.

In each I.S. Fieldbus segment only one active sourca, normaly the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14V d.c. to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 µA for each connected device. Separately powered equipment needs a galvanic Isolation to insure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance R': 15…150 Ω/km

Inductance per unit length L': 0.4…1mH/km

Capacitance per unit length C':80…200 nF / km

C' = C' line/line + 0.5C' line/screen, if both lines are floating

or

C' = C' line/line + C' Line/screen, if the screen is connected to one line

Length of spur cable: max. 30m

Length of trunk cable: max. 1km

Length of splice: max. 1m

Terminators

At each end of the trunk cable an approved line terminator with the following parameters is suitable:

R = 90…100 Ω

C = 0…2.2 µF.

System evaluation

The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to I.S. Reasons. Furthemore, if the above rules are respected, the inductance and capacitance of the cable need not to be considered and will not impair the intrinsic safety of the installation.

				2003	Date	Name	Title		Scale
- -				Name	27.03.03	Thiem.	FM/CSA-Control-Document		
				Appr.					/
				Std.					
3	Rev.2	26.06.06	Thie.		**ABB**		Drwg.-No. (Part-No.)		
2	Rev.1	22.05.06	Thie.				**901265**		
1	Rev.0	27.03.	Thie.	Automation Products					
Rev.	Chang	Date	Name				Supersedes Dwg. :	Part Class:	

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FM/CSA-CONTROL-DOCUMENT_901265

Installation Notes For FISCO and Entity Concepts:
1. The Intrinsic Safety Entity concept allows the interconnection of FM/CSA Approved Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:
   Uo or Voc or Vt $\leq$ Vmax, Io or Isc or It $\leq$ Imax, Po $\leq$ Pi. Ca or Co $\geq \sum$Ci + $\sum$C cable.
   For inductance use either La or Lo $\geq \sum$Li + $\sum$L cable or Lc / Rc $\leq$ (La / Ra or Lo / Ro) and Li / Ri $\leq$ (La / Ra or Lo / Ro)
2. The Intrinsic Safety FISCO concept allows the interconnecting of FM/CSA Approved Intrinsically safe devices with FISCO parameters not specifically examine in combination as a system when: Uo or Voc or Vt $\leq$ Vmax., Io or Isc or It $\leq$ Imax, Po $\leq$ Pi.
3. Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
4. Installation should be in accordance with ANSI/ISA RP12.6 (except chapter 5 for FISCO Installations) "Installation of Intrinsically Safe System for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70) Sections 504 and 505.
5. The configuration of associated Apparatus must be Factory Mutual Research /Canadian Standards Association Approved under the associated concept.
6. Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
7. No revision to drawing without prior Factory Mutual Research Approval/Canadian Standards Association.
8. Special conditions for safe use
   The operation of the local communication interface (LKS) and of the programming interface (X5) is only allowed outside of the Hazardous explosive area.

NONINCENDIVE, CLASS I, DIV. 2, GROUP A, B, C, D, AND FOR CLASS II AND III, DIV. 1&2, GROUP E, F, G
HAZARDOUS LOCATION INSTALLATION.

1. Install per National Electrical Code (NEC) using threaded metal conduit. Intrinsic safety barrier required. Max. Supply voltage 30 V. For T-code see table.

2. A dust tight seal must be used at the conduit entry when the positioner is used in a Class II & III Location.

3. WARNING: Explosion Hazard – do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.
   WARNING: Substitution of components may impair suitability for hazardous locations.

				2003	Date	Name	Title		Scale
- -				Name	27.03.03	Thiem.	FM/CSA-Control-Document		/
				Appr.					
				Std.					
3	Rev.2	26.06.06	Thie.		**ABB**		Drwg.-No. (Part-No.)		
2	Rev.1	22.05.06	Thie.				**901265**		
1	Rev.0	27.03.	Thie.		Automation Products				
Rev.	Chang	Date	Name				Supersedes Dwg. :	Part Class:	

7.3 TZIDC-120

7.3.1 ATEX Ex i

Designation:	II 2 G Ex ia IIC T6 resp. T4 Gb
	II 3 G Ex ic IIC T6 resp. T4 Gc
Type Examination Test Certificate:	TÜV 02 ATEX 1834 X
Type:	Intrinsically safe equipment
Standards:	EN 60079-0:2009
	EN 60079-11:2007
	EN 60079-27:2008

Temperature class	Ambient temperature range
T4	-40 ... 85 °C
T5	-40 ... 55 °C
T6	-40 ... 40 °C

Electrical data for ia/ib/ic for groups IIB/IIC

	With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified FISCO power supply unit, a barrier, or a power supply unit with linear characteristics and the following maximum values:
Signal circuit (terminal +11 / -12 or + / -)	U_i = 24 V I_i = 250 mA P_i = 1.2 W Characteristic curve: linear L_i < 10 µH C_i < 5 nF

	With the intrinsically safe Ex ia IIC or Ex ib IIC type of ignition protection, only for connection to a certified intrinsically-safe circuit with maximum values
Shutdown contact input (terminal +85 / -86)	U_i = 30 V C_i = 3.7 nF L_i negligibly small
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	For maximum values, see EC type examination test certificate number PTB 00 ATEX 2049 X

7.3.2 ATEX Ex n

Designation:	II 3 G Ex nA IIC T6 resp. T4 Gc
Declaration of conformity:	TÜV 02 ATEX 1943 X
Type:	Type of ignition protection "n"
Device class:	II 3 G
Standards:	EN 60079-15:2010
	EN 60079-0:2009

II 3 G Temperature class	Ta Ambient temperature range
T4	-40 ... 85 °C
T6	-40 ... 50 °C

Electrical data for II 3 G Ex nA IIC T6 or T4 Gc	
Signal circuit (terminal +11 / -12)	U = 9 ... 32 V DC I = 11.5 mA
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 ... 11 V DC
Plug-in module for shutdown contact input (terminal+51 / -52 or +85 / -86)	U = 20 ... 30 V DC

Special conditions

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Comment: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

7.3.3 IECEx

Designation:	Ex ia IIC T6 or T4 Gb
	Ex ib IIC T6 or T4 Gb
	Ex ic IIC T6 or T4 Gc
	Ex nA IIC T6 or T4 Gc
Certificate No.:	IECEx TUN 04.0015X
Issue No.:	5
Type:	Intrinsic safety "i" or "n" type of protection
Standards:	IEC 60079-0:2011
	IEC 60079-11:2011
	IEC 60079-15:2010

Type and designation	TZIDC-120 Ex i IIC	TZIDC-120 Ex nA IIC
Temperature class	**Ambient temperature range**	
T4	-40 … 85 °C	-40 … 85 °C
T6	-40 … 40 °C	-40 … 50 °C

7.3.4 IECEx i

Electrical data for TZIDC-110 for ia/ib/ic designated as Ex i IIC T6 or T4 Gb

	With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified FISCO power supply unit, a barrier, or a power supply unit with linear characteristics and the following maximum values:
Signal circuit (terminal +11 / -12 or + / -)	U_i = 24 V I_i = 250 mA P_i = 1.2 W Characteristic curve: linear

The following modules may be used as an option: Ex nA IIC T6 or T4 Gc

	With the intrinsically safe Ex ia IIC or Ex ib type of ignition protection, only for connection to a certified intrinsically safe circuit with maximum values:
Shutdown contact input (terminals: +51,-52 or +85 / -86)	U_i = 30 V I_i = 320 mA P_i = 1.1 W C_i = 3.7 nF L_i negligibly small

7.3.5 IECEx n

Electrical data for TZIDC-120 designated as Ex nA IIC T6 or T4 Gc	
Signal circuit (terminal +11 / -12)	U = 9 ... 32 V DC I = 11.5 mA
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 to 11 V DC
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	U = 20 ... 30 V DC

Special conditions

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Comment: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

7.3.6 CSA International

Certificate:	1649904 (LR 20312)
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations
Class 2258 02	PROCESS CONTROL EQUIPMENT – For Hazardous Locations

Class I, Div 2, Groups A, B, C and D;

Class II, Div 2, Groups E, F, and G,

Class III, Enclosure Type 4X:

Model TZIDC-120, P/N V18347-x042x2xx0x Intelligent Positioner	
Input rated	32 V DC; max.15 mA (powered by a SELV circuit)
Intrinsically safe with entity parameters of:	
Terminals 11 / 12	$V \max = 24$ V $I \max = 250$ mA $C_i = 2.8$ nF $L_i = 7.2$ uH
Terminals 85 / 86	$U \max = 30$ V $I \max = 50$ mA $C_i = 3.8$ nF $L_i = 0$ uH
Terminals 41 / 42	$U \max = 16$ V $I \max = 20$ mA $C_i = 60$ nF $L_i = 100$ uH
Terminals 51 / 52	$U \max = 16$ V $I \max = 20$ mA $C_i = 60$ nF $L_i = 100$ uH

When installed per installation Drawing No 901265	
Temperature Code	T4
Max. Ambient	85 Deg C

i **IMPORTANT (NOTE)**

- The "x" in P/N denotes minor mechanical variations or optional features.
- Do not use the local communication interface (LKS) in hazardous areas.
- Each pair of conductors for each intrinsic safety circuit must be shielded.

7.3.7 CSA Certification Record

Certificate:	1649904 (LR 20312)
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations

Class I, Div 1, Groups A, B, C and D;

Class II, Div 1, Groups E, F, and G,

Class III, Div 1, Enclosure Type 4X:

Model TZIDC-120, P/N V18347-x042x2xx0x Intelligent Positioner	
Input rated	32 V DC; max. 15 mA (powered by a SELV Circuit)
Intrinsically safe with entity parameters of:	
Terminals 11 / 12	V max = 24 V I max = 250 mA C_i = 2.8 nF L_i = 7.2 uH
Terminals 85 / 86	U max = 30 V I max = 50 mA C_i = 3.8 nF L_i = 0 uH
Terminals 41 / 42	U max = 16 V I max = 20 mA C_i = 60 nF L_i = 100 uH

When installed per installation Drawing No 901265	
Temperature Code	T4
Max. Ambient	85 Deg C

i

IMPORTANT (NOTE)

- The "x" in P/N denotes minor mechanical variations or optional features.
- Do not use the local communication interface (LKS) in hazardous areas.
- Each pair of conductors for each intrinsic safety circuit must be shielded.

7.3.8 FM Approvals

TZIDC-120 Positioner, Model V18347-a042b2cd0e

IS/I,II,III/1/ABCDEFG/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C-901265 Entity, FISCO

Entity and FISCO Parameters							
Terminals	Type	Groups	Parameters				
			Vmax	Imax	Pi	Ci	Li
+11 / -12	Entity	A-G	24 V	250 mA	1.2 W	2.8 nF	7.2 uH
+11 / -12	FISCO	A-G	17.5 V	360 mA	2.52 W	2.8 nF	7.2 uH
+11 / -12	FISCO	C-G	17.5 V	380 mA	5.32 W	2.8 nF	7.2 uH
+51 / -52	Entity	A-G	16 V	20 mA	-	60 nF	100 uH
+41 / -42	Entity	A-G	16 V	20 mA	-	60 nF	100 uH
+85 / -86	Entity	A-G	30 V	-	-	3.7 nF	< 1 uH

NI/I/2/ABCD/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C

S/II,III/2/EFG//T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C

Enclosure type 4x

a = Case/mounting – 1, 2, 5 or 6

b = Output/safe protection – 1, 2, 4 or 5

c = Option modules (shutdown) – 0 or 4

d = Optional mechanical kit for digital position feedback – 0, 1 or 3

e = Design (varnish/coding) – 1 or E

Equipment Ratings:

TZIDC-120 Positioners

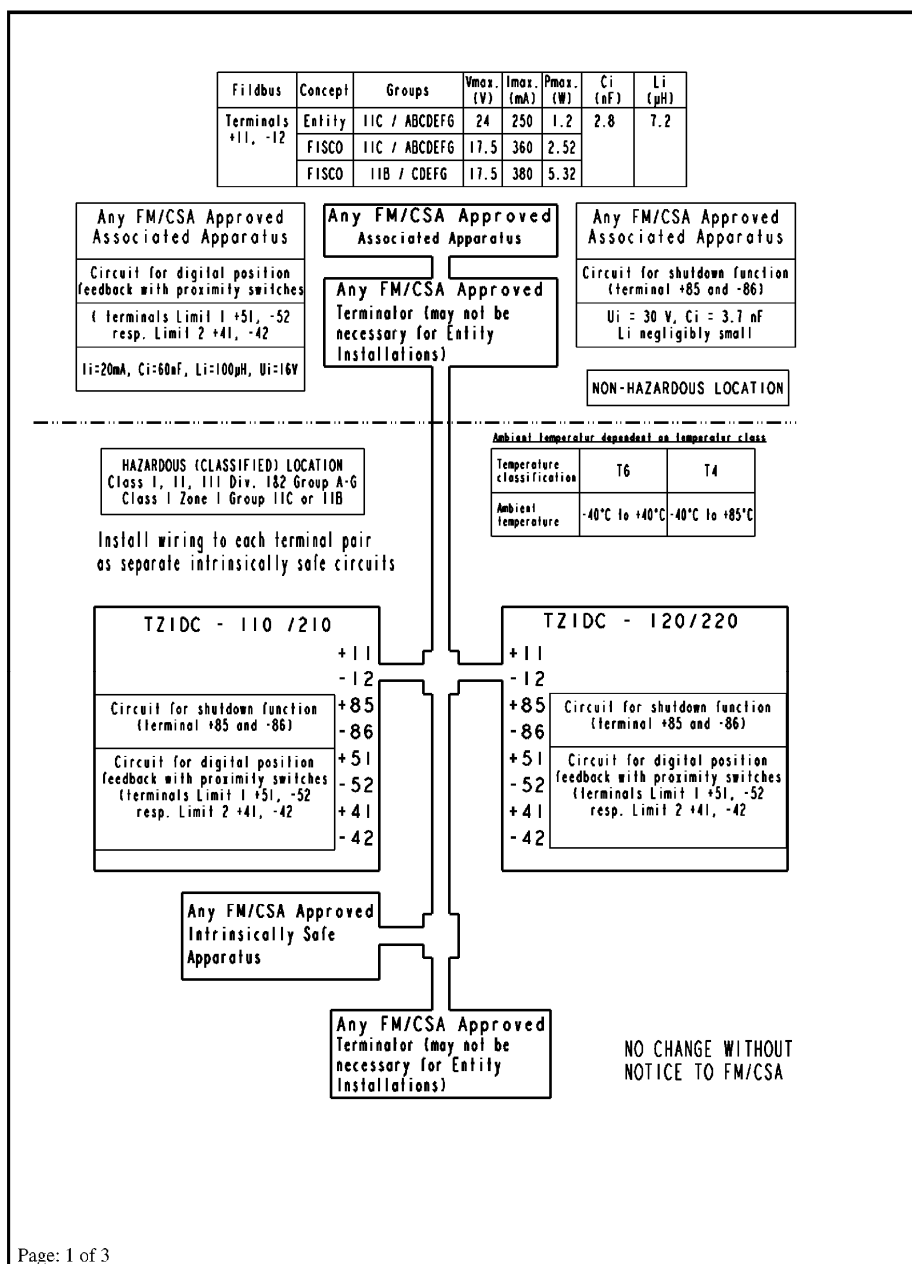Intrinsically safe, Entity and FISCO, for Class I, II and III, Division 1,

Applicable Groups A, B, C, D, E, F, G; nonincendive for Class I, Division 2,

Group E, F and G hazardous (classified) indoor and outdoor NEMA 4x locations.

The following temperature code ratings were assigned for the equipment and protection methods described above:
T6 in ambient temperatures of 40 °C
T5 in ambient temperatures of 55 °C
T4 in ambient temperatures of 85 °C

7.3.9   FM Control Document

Fildbus	Concept	Groups	Vmax. (V)	Imax. (mA)	Pmax. (W)	Ci (nF)	Li (µH)
Terminals +11, -12	Entity	IIC / ABCDEFG	24	250	1.2	2.8	7.2
	FISCO	IIC / ABCDEFG	17.5	360	2.52		
	FISCO	IIB / CDEFG	17.5	380	5.32		

Any FM/CSA Approved Associated Apparatus

Circuit for digital position feedback with proximity switches (terminals Limit 1 +51, -52 resp. Limit 2 +41, -42

Ii=20mA, Ci=60nF, Li=100µH, Ui=16V

Any FM/CSA Approved Associated Apparatus

Any FM/CSA Approved Terminator (may not be necessary for Entity Installations)

Any FM/CSA Approved Associated Apparatus

Circuit for shutdown function (terminal +85 and -86)

Ui = 30 V, Ci = 3.7 nF
Li negligibly small

NON-HAZARDOUS LOCATION

HAZARDOUS (CLASSIFIED) LOCATION
Class I, II, III Div. 1&2 Group A-G
Class I Zone 1 Group IIC or IIB

Install wiring to each terminal pair as separate intrinsically safe circuits

Ambient temperature dependent on temperature class

Temperature classification	T6	T4
Ambient temperature	-40°C to +40°C	-40°C to +85°C

TZIDC - 110 /210

+11
-12
Circuit for shutdown function (terminal +85 and -86)   +85 / -86
Circuit for digital position feedback with proximity switches (terminals Limit 1 +51, -52 resp. Limit 2 +41, -42   +51 / -52 / +41 / -42

TZIDC - 120/220

+11
-12
+85 / -86   Circuit for shutdown function (terminal +85 and -86)
+51 / -52 / +41 / -42   Circuit for digital position feedback with proximity switches (terminals Limit 1 +51, -52 resp. Limit 2 +41, -42

Any FM/CSA Approved Intrinsically Safe Apparatus

Any FM/CSA Approved Terminator (may not be necessary for Entity Installations)

NO CHANGE WITHOUT NOTICE TO FM/CSA

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			2003	Date	Name	Title		Scale
- -			Name	27.03.03	Thiem.	FM/CSA-Control-Document		
			Appr.					/
			Std.					
3	Rev.2	26.06.06	Thie.		**ABB**	Drwg.-No. (Part-No.)		
2	Rev.1	22.05.06	Thie.			**901265**		
1	Rev.0	27.03.	Thie.		Automation Products			
Rev.	Chang	Date	Name			Supersedes Dwg. :	Part Class:	

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FM/CSA-CONTROL-DOCUMENT_901265

FISCO rules

The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Vmax), the current (Imax) and the power (Pi) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It,) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (Ci) and inductance(Li) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10 µH respectively.

In each I.S. Fieldbus segment only one active sourca, nomally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14V d.c. to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 µA for each connected device. Separately powered equipment needs a galvanic Isolation to insure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance R': 15…150 Ω/km

Inductance per unit length L': 0.4…1mH/km

Capacitance per unit length C':80…200 nF / km

C' = C' line/line + 0.5C' line/screen, if both lines are floating

or

C' = C' line/line + C' Line/screen, if the screen is connected to one line

Length of spur cable: max. 30m

Length of trunk cable: max. 1km

Length of splice: max. 1m

Terminators

At each end of the trunk cable an approved line terminator with the following parameters is suitable:

R = 90…100 Ω

C = 0…2.2 µF.

System evaluation

The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to I.S. Reasons. Furthemore, if the above rules are respected, the inductance and capacitance of the cable need not to be considered and will not impair the intrinsic safety of the installation.

				2003	Date	Name	Title		Scale
- -				Name	27.03.03	Thiem.	FM/CSA-Control-Document		
				Appr.					/
				Std.					
3	Rev.2	26.06.06	Thie.		**ABB**		Drwg.-No. (Part-No.)		
2	Rev.1	22.05.06	Thie.				**901265**		
1	Rev.0	27.03.	Thie.		Automation Products				
Rev.	Chang	Date	Name				Supersedes Dwg. :	Part Class:	

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FM/CSA-CONTROL-DOCUMENT_901265

Installation Notes For FISCO and Entity Concepts:
1. The Intrinsic Safety Entity concept allows the interconnection of FM/CSA Approved Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:
Uo or Voc or Vt ≤ Vmax, Io or Isc or It ≤ Imax, Po ≤ Pi. Ca or Co ≥ ∑Ci + ∑C cable.
For inductance use either La or Lo ≥ ∑Li + ∑L cable or Lc / Rc ≤ (La / Ra or Lo / Ro) and Li / Ri ≤ (La / Ra or Lo / Ro)
2. The Intrinsic Safety FISCO concept allows the interconnecting of FM/CSA Approved Intrinsically safe devices with FISCO parameters not specifically examine in combination as a system when: Uo or Voc or Vt ≤ Vmax., Io or Isc or It ≤ Imax, Po ≤ Pi.
3. Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
4. Installation should be in accordance with ANSI/ISA RP12.6 (except chapter 5 for FISCO Installations) "Installation of Intrinsically Safe System for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70) Sections 504 and 505.
5. The configuration of associated Apparatus must be Factory Mutual Research /Canadian Standards Association Approved under the associated concept.
6. Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
7. No revision to drawing without prior Factory Mutual Research Approval/Canadian Standards Association.
8. Special conditions for safe use
The operation of the local communication interface (LKS) and of the programming interface (X5) is only allowed outside of the Hazardous explosive area.

NONINCENDIVE, CLASS I, DIV. 2, GROUP A, B, C, D, AND FOR CLASS II AND III, DIV. 1&2, GROUP E, F, G
HAZARDOUS LOCATION INSTALLATION.

1. Install per National Electrical Code (NEC) using threaded metal conduit. Intrinsic safety barrier required. Max. Supply voltage 30 V. For T-code see table.

2. A dust tight seal must be used at the conduit entry when the positioner is used in a Class II & III Location.

3. WARNING: Explosion Hazard – do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.
WARNING: Substitution of components may impair suitability for hazardous locations.

				2003	Date	Name	Title		Scale
- -				Name	27.03.03	Thiem.	FM/CSA-Control-Document		
				Appr.					/
				Std.					
3	Rev.2	26.06.06	Thie.		**ABB**		Drwg.-No. (Part-No.)		
2	Rev.1	22.05.06	Thie.				**901265**		
1	Rev.0	27.03.	Thie.		Automation Products				
Rev.	Chang	Date	Name				Supersedes Dwg. :	Part Class:	

8 Appendix

8.1 Approvals and certifications

CE mark	CE	The version of the meter in your possession meets the requirements of the following European directives: - EMC directive 2004/108/EC - ATEX directive 94/9/EC
Explosion Protection		Identification for intended use in potentially explosive atmospheres according to:
	Ex	- ATEX directive (marking in addition to CE marking)
	IECEx	- IEC standards
	FM APPROVED	- FM Approvals (US)
	CSA®	- CSA International (Canada)

i **IMPORTANT (NOTE)**

All documentation, declarations of conformity and certificates are available in ABB's download area.

www.abb.com/instrumentation

ABB

EG-KONFORMITÄTSERKLÄRUNG
EC DECLARATION OF CONFORMITY
ATTESTATION DE CONFORMITE C.E.

Hersteller: *Manufacturer / Fabricant:*	**ABB Automation Products GmbH** **Minden**
Anschrift: *Address / Adresse:*	**Schillerstraße 72** **D-32425 Minden**
Produktbezeichnung: *Product name:* *Désignation du produit:*	**Elektropneumatische Stellungsregler -TZIDC, TZIDC-110, TZIDC-120,** *Electro-Pneumatic Positioners* **TZIDC-200, TZIDC-210, TZIDC-220** *Positionneur Électro-Pneumatique* **TZIDC Control Unit, TZIDC Remote Sensor**

Das Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:
This product meets the requirements of the following European directives:
Les produits répondent aux exigences des Directives C.E. suivantes:

2004/108/EG   **EMV-Richtlinie ***
2004/108/EC   *Electromagnetic Compatibility Directive **
2004/108/CE   *Directives concernant la compatibilité électromagnétique **

* einschließlich Änderungen und deutscher Umsetzung durch das EMVG und Gerätesicherheitsgesetz
* including alterations and German realization by the EMC law and the instruments safety law
* y compris les modifications et la réalisation allemande par la loi cocernant la compatibilité électromagnétique et la
sécurité d'appareils

Die Übereinstimmung mit den Vorschriften dieser Richtlinien wird nachgewiesen durch die vollständige Einhaltung folgender Normen:
Conformity with the requirements of these Directives is proven by complete adherence to the following standards:
La conformité avec les exigences de ces directives est prouvée par l'observation complète des normes suivantes:

EN 61 000-6-1:2007 / EN 61 000-6-2:2005 / EN 61 000-6-3:2007 / EN 61 000-6-4:2007

Für Geräte in Ex-Ausführung gemäß Kennzeichnung auf Typschild gilt zusätzlich:
For products in Ex design according to identification on nameplate the following is additionally applicable:
Pour des produits en exécution Ex selon marque sur plaque signalétique le suivant est aussi applicable:

⟨Ex⟩ C€ 0044

94/9/EG   **ATEX-Richtlinie**
94/9/EEC   *ATEX Directive*
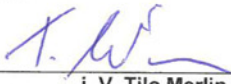*94/9/C.E.E.*   *ATEX Directive*

Ex: **Es gelten die in den EG-Baumusterprüfbescheinigungen aufgeführten Normen**
     The listed standards inside the EC- type-examination certificates are to be noted
     Les normes énumérées à l'intérieur des CE d'examen de type certificats sont à noter

     TÜV 04 ATEX 2702 X
     TÜV 02 ATEX 1943 X
     TÜV 02 ATEX 1831 X
     TÜV 02 ATEX 1834 X
     DMT 02 ATEX E 029 X

18.12.2012

Datum *Date* *Date*	**i. V. Tilo Merlin** **Leiter R&D** Head of R&D Responsable R&D	**i. V. Manfred Klüppel** **Leiter Qualitätsmanagement** Head of Quality Management Responsable Management de la Qualité

Statement on the contamination of devices and components

Repair and / or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.

Otherwise, the device / component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:

Address:

Contact person: Telephone:

Fax: E-mail:

Device details:

Type: Serial no.:

Reason for the return/description of the defect:

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes   ☐ No

If yes, which type of contamination (please place an X next to the applicable items)?

Biological	☐	Corrosive / irritating	☐	Combustible (highly / extremely combustible)	☐
Toxic	☐	Explosive	☐	Other toxic substances	☐
Radioactive	☐				

Which substances have come into contact with the device?

1.

2.

3.

We hereby state that the devices / components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date   Signature and company stamp

ABB