

# **TZIDC-210, TZIDC-220**

## Digital Positioner



Digital Positioner for the positioning of pneumatically controlled final control elements.

—  
TZIDC-210  
TZIDC-220

### **Introduction**

The TZIDC-210, TZIDC-220 is an electronically configurable positioner with communication capabilities designed for mounting on pneumatic linear or rotary actuators.

Fully automatic determination of the control parameters and adaptation to the positioner allow for considerable time savings as well as optimum control behavior.

### **Additional Information**

Additional documentation on TZIDC-210, TZIDC-220 is available for download free of charge at [www.abb.com/positioners](http://www.abb.com/positioners).

Alternatively simply scan this code:



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# 1 Safety

## General information and instructions

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

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

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 nor an amendment to any previous or existing agreement, promise or legal relationship.

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

Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times. The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

## Warnings

The warnings in these instructions are structured as follows:

 **DANGER**

The signal word **'DANGER'** indicates an imminent danger. Failure to observe this information will result in death or severe injury.

 **WARNING**

The signal word **'WARNING'** indicates an imminent danger. Failure to observe this information may result in death or severe injury.

 **CAUTION**

The signal word **'CAUTION'** indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

**NOTICE**

The signal word **'NOTICE'** indicates possible material damage.

**Note**

**'Note'** indicates useful or important information about the product.

## Intended use

Positioning of pneumatically controlled actuators; designed for mounting on linear and rotary actuators.

The device is designed for use exclusively within the stated values on the name plate and in the data sheet.

- The maximum operating temperature must not be exceeded.
- The maximum ambient temperature must not be exceeded.
- The housing's rating must be observed during operation.

## Improper use

The following are considered to be instances of especially improper use of the device:

- For use as a climbing aid, for example for mounting purposes.
- For use as a bracket for external loads, for example as a support for piping, etc.
- Material application, for example by painting over the housing, name plate or welding/soldering on parts.
- Material removal, for example by spot drilling the housing.

## Cable glands

Cable glands should be selected and implemented by the operator in accordance with their use and application requirements.

The cable glands must comply with the requirements of EN 60079-7, EN 60079-11 or EN 60079-15.

Especially in Ex applications, the requirements of the appropriate type of protection should be observed.

## Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, 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.

## Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is operator's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be).

Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

## Software downloads

By visiting the web pages indicated below, you will find notifications about newly found software vulnerabilities and options to download the latest software. It is recommended that you visit this web pages regularly:

[www.abb.com/cybersecurity](http://www.abb.com/cybersecurity)

[ABB Library – TZIDC-210 – Software downloads](#)



[ABB Library – TZIDC-220 – Software downloads](#)



## Manufacturer's address

### ABB AG

#### Measurement & Analytics

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32425 Minden

Germany

Tel: +49 571 830-0

Fax: +49 571 830-1806

## Service address

To find your local ABB contact visit:

[www.abb.com/contacts](http://www.abb.com/contacts)

For more information visit:

[www.abb.com/measurement](http://www.abb.com/measurement)

## 2 Use in potentially explosive atmospheres

### General requirements

- The ABB positioner has been approved only for appropriate and intended use in standard industrial atmospheres. Any breach of this rule leads to a cancellation of warranty and manufacturer's responsibility!
- Make sure that only devices which comply with the types of protection relevant to the applicable zones and categories are installed.
- All electric equipment has to be suited for the respective intended use.

### Approvals and certifications

The digital positioner TZIDC-210, TZIDC-220 has a variety of different explosion protection approvals. The scope of these approvals extends over the entire EU, Switzerland, and special countries.

They range from explosion protection approvals in accordance with ATEX directives to internationally recognized approvals such as IECEx, and additionally include country-specific explosion protection approvals.

#### Explosion protection approvals

##### TZIDC-210

- ATEX / UKEX Ex d / Ex i, details see for Ex d page 10, for Ex i page 11.
- IECEx Ex d / Ex i, details see for Ex d page 12, for Ex i page 13.
- cFMus, details see page 14.
- EAC TR-CU-012 Ex d / Ex i, details see for Ex d page 18, for Ex i page 18.

##### TZIDC-220

- ATEX / UKEX Ex d / Ex i, details see for Ex d page 20, for Ex i page 21.
- IECEx Ex d / Ex i, details see for Ex d page 22, for Ex i page 23.
- cFMus, details see page 24.
- EAC TR-CU-012 Ex d / Ex i, details see for Ex d page 28, for Ex i page 29.

#### Standards applied

The standards including the date of issue with the devices are in compliance are specified in the EU Type examination certificate and in the declaration of conformity of the manufacturer.

### Product identification

Depending on the type of explosion protection, Ex-marking is attached to the positioner on the right, next to the main name plate.

This indicates the level of explosion protection and the device's relevant Ex certificate.

#### Marking (name plate)



Figure 1: Ex marking (example, ATEX / IECEx)



Figure 2: Ex marking (example, cFMus)



Figure 3: Ex marking (example, EAC Ex)

## Commissioning, Installation

The ABB positioner has to be mounted in a major system. Depending on the degrees of IP-protection, an interval for cleaning the equipment (dust settlement) has to be defined. Strict care has to be taken that only devices which comply with the types of protection relevant to the applicable zones and categories is installed.

When installing the device, the locally applicable installation regulations, such as EN 60079-14, must be observed.

Other important facts to be observed:

- The electric circuits of the positioner must be put into operation in all zones by persons qualified in accordance with TRBS 1203. The details on the type label are mandatory for doing this.
- The device has been designed in accordance with IP 65 (optionally IP 66) and must be protected accordingly against adverse ambient conditions.
- In accordance with the selected Ex approval, the information in the EU type examination certificate or the Ex certificates must be observed, including the special conditions defined in them.
- The device may only be used in accordance with its intended use.
- The device may only be connected when de-energized.
- The potential equalization of the system must be established in accordance with installation regulations applicable in the respective country (VDE 0100, Part 540, IEC 364-5-54).
- Circulating currents must not be guided through the housing!
- Make sure that the housing is properly installed and that its IP rating has not been compromised.
- In potentially explosive atmospheres, assembly may be conducted only in compliance with locally applicable installation regulations. The following conditions have to be observed (incomplete):
  - Assembly and maintenance may only be conducted if there is no explosion hazard in the area and you have a hot work permit.
  - The TZIDC-210, TZIDC-220 may be operated in a fully mounted and intact housing only.

## Notes for operation

- The positioner must be integrated in the local potential equalization system.
- Only either intrinsically safe or non intrinsically safe circuits may be connected. A combination is not permitted.
- If the positioner is operated with non intrinsically safe circuits, later use for the intrinsic safety type of protection is not permitted.

## Use, Operation

The TZIDC-210, TZIDC-220 is approved for proper and intended use only. In case of non-compliance, the warranty and manufacturer's liability do no longer apply!

- Only those auxiliary components which fulfill all the requirements of European and national standards may be used in potentially explosive atmospheres.
- The ambient conditions specified in the operating instruction must be strictly followed.
- The TZIDC-210, TZIDC-220 is approved for proper and intended use in standard industrial atmospheres only. Where aggressive substances are present in the air, the manufacturer has to be consulted.

## ... 2 Use in potentially explosive atmospheres

### Maintenance, repair

Definition of terms according to IEC 60079-17:

#### Maintenance

Defines a combination of actions performed to maintain or restore the condition of an item such that the item meets the requirements of the relevant specification and performs its required functions.

#### I –Analyzer module without electronics module (power supply):

Defines an action which involves careful inspection of an item (either without disassembly or with partial disassembly, as required) supplemented by measurements, aimed at achieving a reliable conclusion regarding the condition of the item.

#### Visual inspection

Defines an inspection which identifies defects which are visible to the naked eye, such as missing screws, without the use of access equipment and tools.

#### Close inspection

Defines an inspection which encompasses the aspects covered by a visual inspection and in addition, identifies defects such as loose screws, which can only be detected with the use of access equipment (e.g. steps) and tools.

#### Detailed inspection

Defines an inspection which encompasses the aspects covered by a close inspection and in addition, identifies defects, such as loose connections, which can only be detected by opening the housing and / or by using tools and test devices, as needed.

- Maintenance and exchange work may be conducted by qualified specialists only, i.e., qualified personnel in accordance with TRBS 1203 or similar.
- Only those auxiliary components which fulfill all the requirements of European and national guidelines and regulations may be used in potentially explosive atmospheres.
- Maintenance works that require disassembly of the system may only be performed in non-hazardous areas. If that is not possible, however, the usual precautions have to be ensured according to local regulations.
- Components may only be replaced by original spare parts which are therefore approved for use in potentially explosive atmospheres.
- The device must be regularly cleaned when used in potentially explosive atmospheres. The intervals must be defined by the operator in compliance with the ambient conditions present at the operating location.
- After all maintenance and repair work has been completed, any barriers and plates removed for that purpose must be put back in their original place.
- The flameproof joints differ from the tables of IEC 60079-1 and may be repaired by the manufacturer only.

Activity	Visual inspection (every 3 months)	Close inspection (every 6 months)	Detailed inspection (every 12 months)
Visual inspection of the positioner for integrity, removal of dust deposits	●		
Inspection of electric installation for integrity and proper operation			●
Inspection of the entire installation		Responsibility of the operator	



## Preconditions for safe operation of the positioner

### **DANGER**

#### **Risk of explosion due to hot parts**

Hot parts inside the device pose an explosion hazard.

- Never open the device immediately after switch-off.
- A waiting time of at least four minutes should be observed before opening the device.

When using in hazardous areas, observe the following points:

- Observe the specification and special conditions applicable for the device in accordance with the relevant valid certificate.
- Manipulation of the device in any form by the user is not permitted. Only the manufacturer or an explosion protection specialist may modify the device
- The IP 65 / NEMA 4x IP rating is only achieved if the splash guard is screwed in place. Operating the unit without splash guard cap is prohibited.
- The device may only be operated using instrument air that is free from oil, water and dust. The use of flammable gas, oxygen, or oxygen-enriched gas is not permitted.
- High / recurring charging processes in gas zones must be excluded by the operator.

#### **Cable gland**

Limited temperature range of the M20 × 1.5 plastic cable gland for explosion protection variants:

- The permissible ambient temperature range is –20 to 80 °C (–4 to 176 °F).
- When using the cable gland, you need to make sure that the ambient temperature is within the permissible range plus 10 K or that they are suited in terms of the minimal ambient temperature.
- The cable gland must be installed in the housing with a tightening torque of 3.8 Nm. When installing the connection of the cable gland and cable, check for tightness to ensure that the required IP rating is met.

## ... 2 Use in potentially explosive atmospheres

### TZIDC-210 – Ex relevant specification

#### ATEX / UKEX – ‘Ex d’ type of protection

##### Ex-marking

Ex marking	
Marking	II 2 G Ex db IIC T6/T5/T4 Gb
Type examination certificate (ATEX)	DMT 02 ATEX E 029 X
Certificate (UKEX)	See attached certificate.
Type of protection	Flameproof enclosure 'd'
Device class	II 2 G
Standards	EN 60079-0, EN 60079-1

##### Temperature data

Temperature class	Ambient temperature Ta
T4	–40 to 85 °C
T5	–40 to 80 °C
T6	–40 to 65 °C

##### Electrical Data

Voltage	≤ 30 V AC/DC
Current	≤ 20 mA

##### Pneumatic data

Supply pressure	Standard version: ≤ 6 bar
	Marine version: ≤ 5.5 bar

##### Special conditions

- Prior to final installation, the operator must decide how the device is to be used, either:
  - as a device with the ‘intrinsically safe Ex i’ type of protection or
  - as a device with ‘Flameproof enclosure Ex d’ type of protection

The operator must permanently mark the selected type of use on the name plate. Specific ambient conditions, such as chemical corrosion, must be taken into account when affixing the permanent mark.

Devices that also meet the requirements for the ‘Intrinsic safety Ex i’ type of protection in accordance with a separate declaration may no longer be operated as intrinsically safe if they have been previously used in the ‘flameproof enclosure Ex d’ type of protection.
- In the case of high torsional forces, the bearing sleeves must be replaced due to wear on the shaft for the position pickoff (significant control deviation).
- If the positioner is operated at an ambient temperature above 60 °C (140 °F) or below –20 °C (–4 °F), make sure to use cable entries and lines suited for an operating temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.
- The dimensions of the flameproof joint of this equipment partly exceed the minimum values required by EN 60079-1 or IEC 60079-1 and also partly down-scale the maximum required values therein. All inquiries relating to dimensions must be directed to the manufacturer
- Screws that comply with the minimum requirements of the A2-70, A2-80 or 10.12 quality grades must be used to close the flameproof enclosure.

## ATEX / UKEX – ‘Ex i’ type of protection

### Ex-marking

Ex marking	
Marking	II 2 G Ex ia IIC T6/ T4...T1 Gb II 2 G Ex ib IIC T6/ T4 ...T1 Gb II 3 G Ex ic IIC T6/T4 ... T1 Gc
Type Examination Test Certificate	TÜV 04 ATEX 2702 X
Certificate (UKEX)	EMA22UKEX0032X
Type of protection	Intrinsic safety ‘i’
Device class	II 2G / II 3G
Standards	EN 60079-0, EN 60079-11

### Temperature data

Temperature class	Ambient temperature Ta
T4 to T1	–40 to 85 °C
T6	–40 to 40 °C*

### Electric Data

With the ‘Intrinsic safety Ex i IIC’ type of protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values according to the following tables:

#### Connection to a barrier or power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	24 V
	Current:	250 mA
	Power:	1.2 W
	L <sub>p</sub> , C <sub>i</sub>	Negligible
	Characteristic curve:	rectangular

#### Connection to a FISCO power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	17.5 V      17.5 V
	Current:	380 mA      360 mA
	Power:	5.32 W      2.52 W
	L <sub>p</sub> , C <sub>i</sub>	Negligible
	Characteristic curve:	rectangular      trapezoidal

Current circuit (terminal)	Electrical information (maximum values)
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs S32-SN) (Limit1: +51 / –52), (Limit2: +41 / –42)	For maximum values, see EU-Type examination certificate PTB 00 ATEX 2049 X Pepperl & Fuchs Type 2 proximity switches
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter (U <sub>m</sub> ≤ 30 V DC) outside the hazardous area.

### Special conditions

- Before the final installation, the operator decides on the use of the device, either
  - as a device with the ‘Intrinsically safe Ex i’ type of protection or
  - as a device with ‘Flameproof enclosure Ex d’ type of protection

The operator must permanently mark the selected type of use on the name plate. Specific ambient conditions, such as chemical corrosion, must be taken into account when affixing the permanent mark.

Devices that also meet the requirements for the ‘Intrinsic safety Ex i’ type of protection in accordance with a separate declaration may no longer be operated as intrinsically safe if they have been previously used in the ‘flameproof enclosure Ex d’ type of protection.

- Permissible for the ‘Natural gas version’ only:
  - The positioner TZIDC-210 may be operated as a power supply only with gases of Group IIA and temperature class T1 outdoors or inside of buildings with sufficient ventilation.
  - The supplied gas must be free of air and oxygen to prevent the forming of a hazardous atmosphere.
  - Exhaust gas must always be discharged outside.
- The equipment may only be used as a II 2D type device TZIDC-210 in areas where the level of mechanical danger is "low".
- For TZIDC-210 electrostatic charging caused by propagating brush discharge should be prevented when the device is used for applications involving combustible dust.
- For devices that are operated in an intrinsically safe manner, cable and wire entries should be used that meet the requirements of EN 60079-11 for Category II 2G as well as the ambient temperature range.
- The ‘local communication interface’ (LCI) of the TZIDC-210 may only be operated at U<sub>m</sub> ≤ 30 V DC outside the hazardous area.

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-210 – Ex relevant specification

#### IECEEx – ‘Ex d’ type of protection

##### Ex-marking

Ex marking	
Marking	Ex db IIC T6/T5/T4 Gb
Type Examination Test Certificate	IECEEx BVS 07.0030X
Type of protection	Druckfeste Kapselung „d“
Standards	IEC 60079-0, IEC 60079-1

##### Temperature data

Temperature class	Ambient temperature Ta
T4	–40 to 85 °C
T5	–40 to 80 °C
T6	–40 to 65 °C

##### Electrical Data

Voltage	≤ 30 V AC/DC
Current	≤ 20 mA

##### Pneumatic data

Supply pressure	Standard version: ≤ 6 bar
	Marine version: ≤ 5.5 bar

##### Special conditions

- The positioner is designed for a maximum permissible ambient temperature range of –40 to 85 °C (–40 to 185 °F)
- Devices that also meet the requirements for the ‘intrinsic safety’ type of protection in accordance with the declaration may no longer be used as intrinsically safe if they have been previously used in the ‘flameproof enclosure’ type of protection.
- If the positioner is operated at an ambient temperature above 60 °C (140 °F) or below –20 °C (–4 °F), make sure to use cable entries and lines suited for an operating temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.
- The dimensions of the flameproof joint of this equipment partly exceed the minimum values required by IEC 60079-1 and also down-scale the maximum required values therein. All inquiries relating to dimensions must be directed to the manufacturer
- Only use suited cable entries that meet the requirements of EN 60079-1.
- Screws that comply with the minimum requirements of the A2-70, A2-80 or 10.12 quality grades must be used to close the flameproof enclosure.

## IECEEx – ‘Ex i’ type of protection

### Ex-marking

Ex marking	
Marking	Ex ia IIC T6 / T4...T1 Gb Ex ib IIC T6 / T4...T1 Gb
Type Examination Test Certificate	IECEX TUN 04.0015X
Type	Intrinsic safety ‘i’
Standards	IEC 60079-0, IEC 60079-11

### Temperature data

Temperature class	Ambient temperature Ta
T4 to T1	–40 to 85 °C
T6	–40 to 40 °C*

### Electric Data

With the ‘Intrinsic safety Ex i IIC’ type of protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values according to the following tables:

#### Connection to a barrier or power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	24 V
	Current:	250 mA
	Power:	1.2 W
	L <sub>p</sub> , C <sub>p</sub>	Negligible
	Characteristic curve:	rectangular

#### Connection to a FISCO power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	17.5 V      17.5 V
	Current:	380 mA      360 mA
	Power:	5.32 W      2.52 W
	L <sub>p</sub> , C <sub>p</sub>	Negligible
	Characteristic curve:	rectangular      trapezoidal

Current circuit (terminal)	Electrical information (maximum values)
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs S22-SN) (Limit1: +51 / –52), (Limit2: +41 / –42)	For maximum values, see EU-Type examination certificate PTB 00 ATEX 2049 X Pepperl & Fuchs Type 2 proximity switches
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter (U <sub>m</sub> ≤ 30 V DC) outside the hazardous area.

### Special conditions

- Before the final installation, the operator decides on the use of the device, either
  - as a device with the ‘Intrinsically safe Ex i’ type of protection or
  - as a device with ‘Flameproof enclosure Ex d’ type of protection

The operator must permanently mark the selected type of use on the name plate. Specific ambient conditions, such as chemical corrosion, must be taken into account when affixing the permanent mark.

Devices that also meet the requirements for the ‘Intrinsic safety Ex i’ type of protection in accordance with a separate declaration may no longer be operated as intrinsically safe if they have been previously used in the ‘flameproof enclosure Ex d’ type of protection.
- Permissible for the ‘Natural gas version’ only:
  - The positioner TZIDC-210 may be operated as a power supply only with gases of Group IIA and temperature class T1 outdoors or inside of buildings with sufficient ventilation.
  - The supplied gas must be free of air and oxygen to prevent the forming of a hazardous atmosphere.
  - Exhaust gas must always be discharged outside.
- The equipment may only be used as a II 2D type device TZIDC-210 in areas where the level of mechanical danger is "low".
- For TZIDC-210 electrostatic charging caused by propagating brush discharge should be prevented when the device is used for applications involving combustible dust.
- For devices that are operated in an intrinsically safe manner, cable and wire entries should be used that meet the requirements of EN 60079-11 for Category II 2G as well as the ambient temperature range.
- The ‘local communication interface’ (LCI) of the TZIDC-210 may only be operated at U<sub>m</sub> ≤ 30 V DC outside the hazardous area.

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-210 – Ex relevant specification

#### cFMus

#### Ex-marking

#### TZIDC-210

Model number: V18349-a0b2c3d3ef

XP / I / 1 / CD / T5 Ta = -40°C to +82°C

Type 4X

Certificate FM20US0122X and FM20CA0061X

#### Model number details

- a Housing / assembly: 1, 2, 3, 4, 5 or 6
- b Operation and display 0 or 1
- c Set output / safety position: 1, 2, 3 or 4
- d Optional upgrade with mechanical digital feedback: 0, 1, 2 or 3
- e Design (Paint / marking): 1, H, P or 2
- f Measuring point tag plate: 0, 1 or 2

#### Electric Data

Refer to **FM installation drawing No. 901265** on page 30.

#### Commissioning, installation

The ABB positioner has to be mounted in a major system. Depending on the degrees of IP-protection, an interval for cleaning the equipment (dust settlement) has to be defined. Strict care has to be taken that only such equipment is installed that complies with the types of protection relevant to the applicable zones and categories.

When installing the equipment, the locally applicable rules on erection, have to be observed, see page 33 to page 34.

#### Other important facts to be observed:

- The equipment is constructed for IP 66 and has to be protected accordingly in adverse ambient conditions.
- The Certificates have to be taken into account including any special conditions defined therein.
- The equipment shall only be used as intended.
- The equipment is only to be connected when de-energized.
- The potential equalization of the system has to be established according to the regulations of erection applicable in the respective country of use, see page 33 to page 34. For installation according to the North American Zone concept the external grounding is supplementary.
- Circulating currents shall not be led via the enclosures!
- It has to be ensured that the enclosure is properly installed and that its IP protection is not impaired.
- Inside the potentially explosive atmospheres' assembly shall only be performed taking the locally applicable rules of erection into account.

The following conditions have to be observed (incomplete):

- Assembly and maintenance to be done only if atmosphere is Ex-free and a permit for hot works is in place.
- The TZIDC-210, TZIDC-220 is only to be operated in a fully mounted and intact enclosure.
- Outside of the housing is a connector for the equipotential bonding.

The following opportunities are available:

- Direct connection of single-strand wires of up to 2.5 mm<sup>2</sup> or
- Direct connection of fine wires of up to 1.5 mm<sup>2</sup> or
- Connection of cross-sections of up to 6 mm<sup>2</sup> using a ring or spade terminal with 4 mm drill hole.
- For proper selection of cables see electrical installation instructions in the original manufacturer's manual. Use cables rated at least 20 K greater than the ambient temperature.
- High / recurring charging processes in gas areas must be excluded by the operator.

#### Notes for operation

- The positioner shall be included in the local equipotential bonding system
- Either only intrinsically or non intrinsically safe circuits shall be connected. A combination is not permitted.
- When the Positioner is operated with non intrinsically safe circuits, the subsequent use for type of protection Intrinsic Safety is not permitted.

#### Special conditions for the safe use of intrinsically safe positioners

##### Special conditions

- The 'Local communication interface (LCI)' may only be used outside of the explosion hazardous area with  $U_m \leq 30$  V DC.
- Measures of lightning protection have to be provided by the user.

#### Special conditions for safe use of Positioners non I.S.

- Only devices which are suitable for the operation in explosion hazardous areas declared as zone 2 and the conditions available at the place of operation are allowed to be connected to circuits in the zone 2.
- The connecting and disconnecting as well as the switching of circuits under voltage are only permitted during installation, for maintenance or repair purposes.

#### Note

The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes is assessed as improbably.

- For the circuit 'Position feedback with proximity switches or microswitches' measures have to be taken outside the device that the rated voltage is exceeded not more than 40 % by transient disturbances.
- Only non combustible gases are allowed to be used as pneumatic auxiliary energy.
- Only suitable cable entries which meet the requirements of IEC 60079-15 are allowed to be used.

#### Use, operation

The TZIDC-210, TZIDC-220 is only approved for intended and appropriate use. In case of non-compliance, the warranty and manufacturer's liability do no longer apply!

- In explosive atmospheres only such auxiliary components shall be used that meet all requirements of the European and the national standards.
- The ambient conditions specified in the instruction manual have to be adhered to strictly.
- The TZIDC-210, TZIDC-220 has only been approved for its appropriate and intended use in standard industrial atmospheres. Where aggressive substances are present in the air, the manufacturer has to be consulted.

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-210 – Ex relevant specification

#### Maintenance, repair

Maintenance: defines a combination of any actions carried out to retain an item in, or restore it to, conditions in which it is able to meet the requirements of the relevant specification and perform its required functions.

#### Inspection:

defines any action comprising careful scrutiny of an item carried out either without dismantling, or with the addition of partial dismantling as required, supplemented by means such as measurement, in order to arrive at reliable conclusion as to the condition of an item.

#### Visual inspection:

defines an inspection which identifies, without the use of access equipment and tools, those defects, such as missing bolts, which will be apparent to the eye.

#### Close inspection:

defines an inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only be the use of access equipment, for example steps, where necessary, and tools.

#### Detailed inspection:

defines an inspection which encompasses those aspects covered by a close inspection and, in addition, identifies those defects, such as loose terminations, which will only be apparent by opening the enclosure, and/or using, where necessary, tools and test equipment.

- Maintenance or replacement works are to be carried out by qualified personnel only, i.e. personnel qualified according to TRBS 1203 or similar.
- Only such auxiliary components may be used in explosive atmospheres which meet all requirements of European and national directives and legislation.
- Maintenance works that require a dismantling of the system shall only be performed if the atmosphere is Ex-free. If that is not possible, however, the usual precautions have to be ensured according to local regulations.
- Components shall only be replaced by original spare parts which are therefore approved for the use in ex- plosive atmospheres.
- Inside the Ex-atmosphere the equipment has to be cleaned regularly. The intervals are to be defined by the user in compliance with the environmental conditions present at the place of operation.
- After maintenance and repair works have been performed, all barriers and notes removed for that purpose have to be put back in their original place.
- The flameproof joints differ from the tables of IEC 60079-1 and should only be repaired by the manufacturer.

#### Activity

Activity	Visual	Close inspection	Detailed
	inspection every 3 months	every 6 months	inspection every 12 months
Visual inspection of positioner for intactness, removal of dust settlements	●		
Check of electrical system for intactness and functionality			●
Check of entire system	User's responsibility		

#### Fault elimination

No changes or modifications may be performed on equipment that is operated in conjunction with explosive atmospheres. Such equipment shall only be repaired by expert personnel trained and authorized to do so.



**Warning markings**

- “TO PREVENT IGNITION OF FLAMMABLE GASES OR VAPORS,  
DO NOT REMOVE COVER WHILE CIRCUITS ARE LIVE”  
“POUR ÉVITER L'INFLAMMATION DE GAZ OU DE VAPEURS  
INFLAMMABLES, NE PAS RETIRER LE COUVERCLE LORSQUE  
LES CIRCUITS SONT SOUS TENSION.”
- “FOR PROPER SELECTION OF CABLES SEE ELECTRICAL  
INSTALLATION INSTRUCTIONS IN THE MANUAL”  
“POUR LA SÉLECTION APPROPRIÉE DES CÂBLES, VOIR LES  
INSTRUCTIONS D'INSTALLATION ÉLECTRIQUE DANS LE  
MANUEL”

If the equipment was tested according to the exception of table 5 from FM class 3615, the label shall contain the statement:

- “SEAL ALL CONDUITS WITHIN 18 INCHES”  
“SCELLER TOUS LES CONDUITS À MOINS DE 18 POUCES”

Equipment supplied with a factory-installed conduit seal shall be marked with the words:

- “FACTORY SEALED, CONDUIT SEAL NOT REQUIRED”  
“SCELLÉ EN USINE, JOINT DE CONDUIT NON REQUIS”

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-210 – Ex relevant specification

#### EAC TR-CU-012 Ex d

Ex marking	
Marking	1Ex d IIC T6...T4 Gb X
Certificate	EAC TR-CU-012
Type	TZIDC-210 Doc. 901132
Device class	II 2 G
Standards	EN 60079-0, EN 60079-1

#### Special conditions

- Before final installation, the operator needs to decide on the use of the device, either
  - A) as a device with 'Ex i' intrinsically safe type of protection or
  - B) as a device with 'Ex d' type of protection and permanently mark the selected type of use on the name plate. Specific conditions of the surrounding environment, such as chemical corrosion, must be taken into account when affixing the permanent mark. Only the manufacturer must change the selected type of use following a re-examination
- Variants that, according to declarations, also meet the requirements for the 'intrinsically safe' type of protection may no longer be used as 'intrinsically safe' if they have been previously used as a flameproof type of protection
- Secure cable entries against twisting and loosening by using a (medium-strength) securing adhesive.
- In the case of high torsional forces, the bearing sleeves must be replaced due to wear on the shaft for the position pickoff (significant control deviation).
- If the positioner is operated at an ambient temperature above 60 °C (140 °F) or below -20 °C (-4 °F), make sure to use cable entries and lines suited for an operating temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.
- Screws that comply with the minimum requirements of the A2-70, A2-80 or 10.12 quality grades must be used to close the flameproof enclosure.

#### EAC TR-CU-012 Ex i

Ex marking	
Marking	1Ex ia IIC T6/T4 Gb X 1Ex ib IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X
Certificate	EAC TR-CU-012
Type	TZIDC-210
Standards	EN 60079-0, EN 60079-11

#### Temperature data

Device group II 2 G	
Temperature class	Ambient temperature Ta
T4	-40 to 85 °C
T5	-40 to 50 °C
T6*	-40 to 40 °C*

\* When using the plug-in module for 'Digital Feedback' in Temperature Class T6, the maximum permissible ambient temperature range is -40 to 35 °C (-40 to 95 °F).

#### Temperature characteristic curves

Intrinsically safe circuit according to ATEX, IECEx and EAC / TR CU 012/2011

Device category 1: Use in Zone 0

Device category 2: Use in Zone 1

Device category 3: Use in Zone 2

#### Electric 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 or a barrier, i.e., a power supply unit with maximum values according to the following table:

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit	U <sub>i</sub> = 24 V	C <sub>i</sub> < 5 nF
(+11 / -12)	I <sub>i</sub> = 250 mA	L <sub>i</sub> < 10 µH
	P <sub>i</sub> = 1.2 W	Characteristic curve = linear

With the intrinsically safe Ex i IIC type of protection, only for connection to a certified intrinsically safe circuit with maximum values:

Current circuit (terminal)	Electrical information (maximum values)
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs SJ2-SN) (Limit1: +51 / -52) (Limit2: +41 / -42)	For maximum values EU type examination certificate PTB 00 ATEX 2049 X / RU C-DE.AA87.B.00394 proximity switches produced by Pepperl & Fuchs Type 2

### Special conditions

- Before final installation, the operator needs to decide on the use of the device, either
  - A) as a device with 'Ex i' intrinsically safe type of protection or
  - B) as a device with 'Ex d' type of protection
 and permanently mark the selected type of use on the name plate. Specific conditions of the surrounding environment, such as chemical corrosion, must be taken into account when affixing the permanent mark. Only the manufacturer must change the selected type of use following a re-examination
- Variants that, according to declarations, also meet the requirements for the 'flameproof enclosure' type of protection may no longer be used as 'intrinsically safe' if they have been previously used as a flameproof type of protection

## ... 2 Use in potentially explosive atmospheres

### TZIDC-220 – Ex relevant specification

#### ATEX / UKEX – ‘Ex d’ type of protection

##### Ex-marking

Ex marking	
Marking	II 2 G Ex db IIC T6/T5/T4 Gb
Type examination certificate (ATEX)	DMT 02 ATEX E 029 X
Certificate (UKEX)	See attached certificate.
Type of protection	Flameproof enclosure 'd'
Device class	II 2 G
Standards	EN 60079-0, EN 60079-1

##### Temperature data

Temperature class	Ambient temperature Ta
T4	–40 to 85 °C
T5	–40 to 80 °C
T6	–40 to 65 °C

##### Electrical Data

Voltage	≤ 30 V AC/DC
Current	≤ 20 mA

##### Pneumatic data

Supply pressure	Standard version: ≤ 6 bar
	Marine version: ≤ 5.5 bar

##### Special conditions

- Prior to final installation, the operator must decide how the device is to be used, either:
  - as a device with the ‘intrinsically safe Ex i’ type of protection or
  - as a device with ‘Flameproof enclosure Ex d’ type of protection

The operator must permanently mark the selected type of use on the name plate. Specific ambient conditions, such as chemical corrosion, must be taken into account when affixing the permanent mark.

Devices that also meet the requirements for the ‘Intrinsic safety Ex i’ type of protection in accordance with a separate declaration may no longer be operated as intrinsically safe if they have been previously used in the ‘flameproof enclosure Ex d’ type of protection.

- In the case of high torsional forces, the bearing sleeves must be replaced due to wear on the shaft for the position pickoff (significant control deviation).
- If the positioner is operated at an ambient temperature above 60 °C (140 °F) or below –20 °C (–4 °F), make sure to use cable entries and lines suited for an operating temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.
- The dimensions of the flameproof joint of this equipment partly exceed the minimum values required by EN 60079-1 or IEC 60079-1 and also partly down-scale the maximum required values therein. All inquiries relating to dimensions must be directed to the manufacturer
- Screws that comply with the minimum requirements of the A2-70, A2-80 or 10.12 quality grades must be used to close the flameproof enclosure.

## ATEX / UKEX – ‘Ex i’ type of protection

### Ex-marking

Ex marking	
Marking	II 2 G Ex ia IIC T6/ T4...T1 Gb II 2 G Ex ib IIC T6/ T4 ...T1 Gb II 3 G Ex ic IIC T6/T4 ... T1 Gc
Type Examination Test Certificate	TÜV 04 ATEX 2702 X
Certificate (UKEX)	EMA22UKEX0032X
Type of protection	Intrinsic safety ‘i’
Device class	II 2G / II 3G
Standards	EN 60079-0, EN 60079-11

### Temperature data

Temperature class	Ambient temperature Ta
T4 to T1	–40 to 85 °C
T6	–40 to 40 °C*

### Electric Data

With the ‘Intrinsic safety Ex i IIC’ type of protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values according to the following tables:

#### Connection to a barrier or power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	24 V
	Current:	250 mA
	Power:	1.2 W
	L <sub>p</sub> , C <sub>i</sub>	Negligible
	Characteristic curve:	rectangular

#### Connection to a FISCO power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	17.5 V      17.5 V
	Current:	380 mA      360 mA
	Power:	5.32 W      2.52 W
	L <sub>p</sub> , C <sub>i</sub>	Negligible
	Characteristic curve:	rectangular      trapezoidal

Current circuit (terminal)	Electrical information (maximum values)
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs S32-SN) (Limit1: +51 / –52), (Limit2: +41 / –42)	For maximum values, see EU-Type examination certificate PTB 00 ATEX 2049 X Pepperl & Fuchs Type 2 proximity switches
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter (U <sub>m</sub> ≤ 30 V DC) outside the hazardous area.

### Special conditions

- Before the final installation, the operator decides on the use of the device, either
  - as a device with the ‘Intrinsically safe Ex i’ type of protection or
  - as a device with ‘Flameproof enclosure Ex d’ type of protection

The operator must permanently mark the selected type of use on the name plate. Specific ambient conditions, such as chemical corrosion, must be taken into account when affixing the permanent mark.

Devices that also meet the requirements for the ‘Intrinsic safety Ex i’ type of protection in accordance with a separate declaration may no longer be operated as intrinsically safe if they have been previously used in the ‘flameproof enclosure Ex d’ type of protection.

- Permissible for the ‘Natural gas version’ only:
  - The positioner TZIDC-220 may be operated as a power supply only with gases of Group IIA and temperature class T1 outdoors or inside of buildings with sufficient ventilation.
  - The supplied gas must be free of air and oxygen to prevent the forming of a hazardous atmosphere.
  - Exhaust gas must always be discharged outside.
- The equipment may only be used as a II 2D type device TZIDC-220 in areas where the level of mechanical danger is "low".
- For TZIDC-220 electrostatic charging caused by propagating brush discharge should be prevented when the device is used for applications involving combustible dust.
- For devices that are operated in an intrinsically safe manner, cable and wire entries should be used that meet the requirements of EN 60079-11 for Category II 2G as well as the ambient temperature range.
- The ‘local communication interface’ (LCI) of the TZIDC-220 may only be operated at U<sub>m</sub> ≤ 30 V DC outside the hazardous area.

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-220 – Ex relevant specification

#### IECEEx – ‘Ex d’ type of protection

##### Ex-marking

Ex marking	
Marking	Ex db IIC T6/T5/T4 Gb
Type Examination Test Certificate	IECEEx BVS 07.0030X
Type of protection	Druckfeste Kapselung „d“
Standards	IEC 60079-0, IEC 60079-1

##### Temperature data

Temperature class	Ambient temperature Ta
T4	–40 to 85 °C
T5	–40 to 80 °C
T6	–40 to 65 °C

##### Electrical Data

Voltage	≤ 30 V AC/DC
Current	≤ 20 mA

##### Pneumatic data

Supply pressure	Standard version: ≤ 6 bar
	Marine version: ≤ 5.5 bar

##### Special conditions

- The positioner is designed for a maximum permissible ambient temperature range of –40 to 85 °C (–40 to 185 °F)
- Devices that also meet the requirements for the ‘intrinsic safety’ type of protection in accordance with the declaration may no longer be used as intrinsically safe if they have been previously used in the ‘flameproof enclosure’ type of protection.
- If the positioner is operated at an ambient temperature above 60 °C (140 °F) or below –20 °C (–4 °F), make sure to use cable entries and lines suited for an operating temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.
- The dimensions of the flameproof joint of this equipment partly exceed the minimum values required by IEC 60079-1 and also down-scale the maximum required values therein. All inquiries relating to dimensions must be directed to the manufacturer
- Only use suited cable entries that meet the requirements of EN 60079-1.
- Screws that comply with the minimum requirements of the A2-70, A2-80 or 10.12 quality grades must be used to close the flameproof enclosure.

## IECEEx – ‘Ex i’ type of protection

### Ex-marking

Ex marking	
Marking	Ex ia IIC T6 / T4...T1 Gb Ex ib IIC T6 / T4...T1 Gb
Type Examination Test Certificate	IECEEx TUN 04.0015X
Type	Intrinsic safety ‘i’
Standards	IEC 60079-0, IEC 60079-11

### Temperature data

Temperature class	Ambient temperature Ta
T4 to T1	–40 to 85 °C
T6	–40 to 40 °C*

### Electric Data

With the ‘Intrinsic safety Ex i IIC’ type of protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values according to the following tables:

#### Connection to a barrier or power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	24 V
	Current:	250 mA
	Power:	1.2 W
	$L_i$ , $C_i$	Negligible
	Characteristic curve:	rectangular

#### Connection to a FISCO power supply unit

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / –12)	Voltage:	17.5 V      17.5 V
	Current:	380 mA      360 mA
	Power:	5.32 W      2.52 W
	$L_i$ , $C_i$	Negligible
	Characteristic curve:	rectangular      trapezoidal

Current circuit (terminal)	Electrical information (maximum values)
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs S22-SN) (Limit1: +51 / –52), (Limit2: +41 / –42)	For maximum values, see EU-Type examination certificate PTB 00 ATEX 2049 X Pepperl & Fuchs Type 2 proximity switches
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter ( $U_m \leq 30$ V DC) outside the hazardous area.

### Special conditions

- Before the final installation, the operator decides on the use of the device, either
  - as a device with the ‘Intrinsically safe Ex i’ type of protection or
  - as a device with ‘Flameproof enclosure Ex d’ type of protection

The operator must permanently mark the selected type of use on the name plate. Specific ambient conditions, such as chemical corrosion, must be taken into account when affixing the permanent mark.

Devices that also meet the requirements for the ‘Intrinsic safety Ex i’ type of protection in accordance with a separate declaration may no longer be operated as intrinsically safe if they have been previously used in the ‘flameproof enclosure Ex d’ type of protection.
- Permissible for the ‘Natural gas version’ only:
  - The positioner TZIDC-220 may be operated as a power supply only with gases of Group IIA and temperature class T1 outdoors or inside of buildings with sufficient ventilation.
  - The supplied gas must be free of air and oxygen to prevent the forming of a hazardous atmosphere.
  - Exhaust gas must always be discharged outside.
- The equipment may only be used as a II 2D type device TZIDC-220 in areas where the level of mechanical danger is "low".
- For TZIDC-220 electrostatic charging caused by propagating brush discharge should be prevented when the device is used for applications involving combustible dust.
- For devices that are operated in an intrinsically safe manner, cable and wire entries should be used that meet the requirements of EN 60079-11 for Category II 2G as well as the ambient temperature range.
- The ‘local communication interface’ (LCI) of the TZIDC-220 may only be operated at  $U_m \leq 30$  V DC outside the hazardous area.

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-220 – Ex relevant specification

#### cFMus

##### Ex-marking

##### TZIDC-220

**Model number:** V18350-a0b2c3d4ef

XP / I / 1 / CD / T5 Ta = -40°C to +82°C

Type 4X

Certificate FM20US0122X and FM20CA0061X

##### Model number details

- a Housing / assembly: 1, 2, 3, 4, 5 or 6
- b Operation and display 0 or 1
- c Set output / safety position: 1, 2, 3 or 4
- d Optional upgrade with mechanical digital feedback: 0, 1, 2 or 3
- e Design (Paint / marking): 1, H, P or 2
- f Measuring point tag plate: 0, 1 or 2

##### Electric Data

Refer to **FM installation drawing No. 901265** on page 30.

##### Commissioning, installation

The ABB positioner has to be mounted in a major system. Depending on the degrees of IP-protection, an interval for cleaning the equipment (dust settlement) has to be defined. Strict care has to be taken that only such equipment is installed that complies with the types of protection relevant to the applicable zones and categories.

When installing the equipment, the locally applicable rules on erection, have to be observed, see page 33 to page 34.

##### Other important facts to be observed:

- The equipment is constructed for IP 66 and has to be protected accordingly in adverse ambient conditions.
- The Certificates have to be taken into account including any special conditions defined therein.
- The equipment shall only be used as intended.
- The equipment is only to be connected when de-energized.
- The potential equalization of the system has to be established according to the regulations of erection applicable in the respective country of use, see page 33 to page 34. For installation according to the North American Zone concept the external grounding is supplementary.
- Circulating currents shall not be led via the enclosures!
- It has to be ensured that the enclosure is properly installed and that its IP protection is not impaired.
- Inside the potentially explosive atmospheres' assembly shall only be performed taking the locally applicable rules of erection into account.



The following conditions have to be observed (incomplete):

- Assembly and maintenance to be done only if atmosphere is Ex-free and a permit for hot works is in place.
- The TZIDC-210, TZIDC-220 is only to be operated in a fully mounted and intact enclosure.
- Outside of the housing is a connector for the equipotential bonding.

The following opportunities are available:

- Direct connection of single-strand wires of up to 2.5 mm<sup>2</sup> or
- Direct connection of fine wires of up to 1.5 mm<sup>2</sup> or
- Connection of cross-sections of up to 6 mm<sup>2</sup> using a ring or spade terminal with 4 mm drill hole.
- For proper selection of cables see electrical installation instructions in the original manufacturer's manual. Use cables rated at least 20 K greater than the ambient temperature.
- High / recurring charging processes in gas areas must be excluded by the operator.

#### Notes for operation

- The positioner shall be included in the local equipotential bonding system
- Either only intrinsically or non intrinsically safe circuits shall be connected. A combination is not permitted.
- When the Positioner is operated with non intrinsically safe circuits, the subsequent use for type of protection Intrinsic Safety is not permitted.

#### Special conditions for the safe use of intrinsically safe positioners

##### Special conditions

- The 'Local communication interface (LCI)' may only be used outside of the explosion hazardous area with  $U_m \leq 30$  V DC.
- Measures of lightning protection have to be provided by the user.

##### Special conditions for safe use of Positioners non I.S.

- Only devices which are suitable for the operation in explosion hazardous areas declared as zone 2 and the conditions available at the place of operation are allowed to be connected to circuits in the zone 2.
- The connecting and disconnecting as well as the switching of circuits under voltage are only permitted during installation, for maintenance or repair purposes.

##### Note

The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes is assessed as improbably.

- For the circuit 'Position feedback with proximity switches or microswitches' measures have to be taken outside the device that the rated voltage is exceeded not more than 40 % by transient disturbances.
- Only non combustible gases are allowed to be used as pneumatic auxiliary energy.
- Only suitable cable entries which meet the requirements of IEC 60079-15 are allowed to be used.

#### Use, operation

The TZIDC-210, TZIDC-220 is only approved for intended and appropriate use. In case of non-compliance, the warranty and manufacturer's liability do no longer apply!

- In explosive atmospheres only such auxiliary components shall be used that meet all requirements of the European and the national standards.
- The ambient conditions specified in the instruction manual have to be adhered to strictly.
- The TZIDC-210, TZIDC-220 has only been approved for its appropriate and intended use in standard industrial atmospheres. Where aggressive substances are present in the air, the manufacturer has to be consulted.

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-220 – Ex relevant specification

#### Maintenance, repair

Maintenance: defines a combination of any actions carried out to retain an item in, or restore it to, conditions in which it is able to meet the requirements of the relevant specification and perform its required functions.

##### Inspection:

defines any action comprising careful scrutiny of an item carried out either without dismantling, or with the addition of partial dismantling as required, supplemented by means such as measurement, in order to arrive at reliable conclusion as to the condition of an item.

##### Visual inspection:

defines an inspection which identifies, without the use of access equipment and tools, those defects, such as missing bolts, which will be apparent to the eye.

##### Close inspection:

defines an inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only be the use of access equipment, for example steps, where necessary, and tools.

##### Detailed inspection:

defines an inspection which encompasses those aspects covered by a close inspection and, in addition, identifies those defects, such as loose terminations, which will only be apparent by opening the enclosure, and/or using, where necessary, tools and test equipment.

- Maintenance or replacement works are to be carried out by qualified personnel only, i.e. personnel qualified according to TRBS 1203 or similar.
- Only such auxiliary components may be used in explosive atmospheres which meet all requirements of European and national directives and legislation.
- Maintenance works that require a dismantling of the system shall only be performed if the atmosphere is Ex-free. If that is not possible, however, the usual precautions have to be ensured according to local regulations.
- Components shall only be replaced by original spare parts which are therefore approved for the use in ex- plosive atmospheres.
- Inside the Ex-atmosphere the equipment has to be cleaned regularly. The intervals are to be defined by the user in compliance with the environmental conditions present at the place of operation.
- After maintenance and repair works have been performed, all barriers and notes removed for that purpose have to be put back in their original place.
- The flameproof joints differ from the tables of IEC 60079-1 and should only be repaired by the manufacturer.

#### Activity

Activity	Visual	Close inspection	Detailed
	inspection every 3 months	every 6 months	inspection every 12 months
Visual inspection of positioner for intactness, removal of dust settlements	●		
Check of electrical system for intactness and functionality			●
Check of entire system	User's responsibility		

#### Fault elimination

No changes or modifications may be performed on equipment that is operated in conjunction with explosive atmospheres. Such equipment shall only be repaired by expert personnel trained and authorized to do so.

**Warning markings**

- “TO PREVENT IGNITION OF FLAMMABLE GASES OR VAPORS,  
DO NOT REMOVE COVER WHILE CIRCUITS ARE LIVE”  
“POUR ÉVITER L'INFLAMMATION DE GAZ OU DE VAPEURS  
INFLAMMABLES, NE PAS RETIRER LE COUVERCLE LORSQUE  
LES CIRCUITS SONT SOUS TENSION.”
- “FOR PROPER SELECTION OF CABLES SEE ELECTRICAL  
INSTALLATION INSTRUCTIONS IN THE MANUAL”  
“POUR LA SÉLECTION APPROPRIÉE DES CÂBLES, VOIR LES  
INSTRUCTIONS D'INSTALLATION ÉLECTRIQUE DANS LE  
MANUEL”

If the equipment was tested according to the exception of table 5 from FM class 3615, the label shall contain the statement:

- “SEAL ALL CONDUITS WITHIN 18 INCHES”  
“SCELLER TOUS LES CONDUITS À MOINS DE 18 POUCES”

Equipment supplied with a factory-installed conduit seal shall be marked with the words:

- “FACTORY SEALED, CONDUIT SEAL NOT REQUIRED”  
“SCELLÉ EN USINE, JOINT DE CONDUIT NON REQUIS”

## ... 2 Use in potentially explosive atmospheres

### ... TZIDC-220 – Ex relevant specification

#### EAC TR-CU-012 Ex d

Ex marking	
Marking	1Ex d IIC T6...T4 Gb X
Certificate	EAC TR-CU-012
Type	TZIDC-220 Doc. 901132
Device class	II 2 G
Standards	EN 60079-0 EN 60079-1

#### Temperature data

Device group II 2 G	
Temperature class	Ambient temperature Ta
T4	–40 to 85 °C
T5	–40 to 80 °C
T6	–40 to 65 °C

#### Electric Data

Voltage	≤ 30 V AC/DC
Current	≤ 20 mA

#### Pneumatic data

Supply pressure	Standard Version ≤ 6 bar Marine version ≤ 5.5 bar
-----------------	--

#### Special conditions

- Before final installation, the operator needs to decide on the use of the device, either
  - A) as a device with ‘Ex i’ intrinsically safe type of protection or
  - B) as a device with ‘Ex d’ type of protection and permanently mark the selected type of use on the name plate. Specific conditions of the surrounding environment, such as chemical corrosion, must be taken into account when affixing the permanent mark. Only the manufacturer must change the selected type of use following a re-examination
- Medium strength adhesive must be used to secure the cable entries and line entries and stop them from twisting and self-loosening
- In the case of high torsional forces, the bearing sleeves must be replaced due to wear on the shaft for the position pickoff (significant control deviation).
- If the positioner is operated at an ambient temperature above 60 °C (140 °F) or below –20 °C (–4 °F), make sure to use cable entries and lines suited for an operating temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.
- The dimensions of the flameproof joint of this equipment partly exceed the minimum values required by EN 60079-1:2014 or IEC 60079-1:2014 or partly down-scale the maximum values required therein. All inquiries relating to dimensions must be directed to the manufacturer
- Screws that comply with the minimum requirements of the A2-70, A2-80 or 10.12 quality grades must be used to close the flameproof enclosure.

**EAC TR-CU-012 Ex i**

<b>Ex marking</b>	
Marking	1Ex ia IIC T6/T4 Gb X 1Ex ib IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X
Certificate	EAC TR-CU-012
Type	TZIDC-220
Standards	EN 60079-0, EN 60079-11, EN 60079-27

**Temperature data**

<b>Device group II 2 G</b>	
<b>Temperature class</b>	<b>Ambient temperature Ta</b>
T4	-40 to 85 °C
T6*	-40 to 40 °C*

\* When using the plug-in module for 'Digital Feedback' in Temperature Class T6, the maximum permissible ambient temperature range is -40 to 35 °C (-40 to 95 °F).

**Temperature characteristic curves**

Intrinsically safe circuit according to ATEX, IECEx and EAC / TR CU 012/2011

Device category 1: Use in Zone 0

Device category 2: Use in Zone 1

Device category 3: Use in Zone 2

**Electric Data**

With the intrinsic safety Ex i IIC type of protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values in accordance with the following table.

<b>Current circuit (terminal)</b>	<b>Electrical information (maximum values)</b>	
Signal circuit	$U_i = 24 \text{ V}$	$C_i = < 5 \text{ nF}$
(+11 / -12)	$I_i = 250 \text{ mA}$	$L_i = < 10 \text{ } \mu\text{H}$
	$P_i = 1.2 \text{ W}$	Characteristic curve = linear

<b>Current circuit (terminal)</b>	<b>Electrical information (maximum values)</b>
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs S32-SN) (Limit1: +51 / -52) (Limit2: +41 / -42)	For maximum values EU type examination certificate PTB 00 ATEX 2049 X / RU C-DE.AA87.B.00394 proximity switches produced by Pepperl & Fuchs Type 2

**Special conditions**

- Before final installation, the operator needs to decide on the use of the device, either
  - A) as a device with 'Ex i' intrinsically safe type of protection or
  - B) as a device with 'Ex d' type of protection and permanently mark the selected type of use on the name plate. Specific conditions of the surrounding environment, such as chemical corrosion, must be taken into account when affixing the permanent mark. Only the manufacturer must change the selected type of use following a re-examination
- Variants that, according to declarations, also meet the requirements for the 'flameproof enclosure' type of protection may no longer be used as 'intrinsically safe' if they have been previously used as a flameproof type of protection

## ... 2 Use in potentially explosive atmospheres

### FM installation drawing No. 901265

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#### FM-CONTROL-DOCUMENT\_901265

1. Entity concept / Ex ec (TZIDC, TZIDC-110/-120)								
	Concept	Groups	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>max</sub> (W)	C <sub>i</sub> (nF)	L <sub>i</sub> (μH)	Comment
Terminals +11, -12	Entity	IIC / ABCD	30	320	1.1	6.6	-	Analog Input
	FISCO	IIC / ABCD	17.5	183	-			Input
	FISCO	IIB / CD	17.5	380	-			Input
Terminals +31, -32	Entity	IIC / ABCD	30	320	1.1	6.6	-	Analog Position Feedback
Terminals +41, -42; +51, -52	Entity	IIC / ABCD	30	320	0.25	3.7	-	Digital Feedback
Terminals +41, -42; +51, -52	Entity	IIC / ABCD	16	25	0.064	60	100	Limit switches
Terminals +81, -82	Entity	IIC / ABCD	30	320	1.1	14.5	-	Digital Input
Terminals +83, -84	Entity	IIC / ABCD	30	320	0.5	14.5	-	Digital Output

2. Intrinsic safety / Ex I (TZIDC, TZIDC-110/-120)								
	Concept	Groups	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>max</sub> (W)	C <sub>i</sub> (nF)	L <sub>i</sub> (μH)	Comment
Terminals +11, -12	Intrinsic safe	IIC / IIIC / ABCDEFG	30	320	1.1	6.6	-	Analog Input
	FISCO	IIC / IIIC / ABCDEFG	17.5	183	-			Input
	FISCO	IIB / IIIC / CDEFG	17.5	380	-			Input
Terminals +31, -32	Intrinsic safe	IIC / IIIC / ABCDEFG	30	320	1.1	6.6	-	Analog Position Feedback
Terminals +41, -42; +51, -52	Intrinsic safe	IIC / IIIC / ABCDEFG	30	320	0.25	3.7	-	Digital Position Feedback
Terminals +41, -42; +51, -52	Intrinsic safe	IIC / IIIC / ABCDEFG	16	25	0.064	60	100	Limit switches
Terminals +81, -82	Intrinsic safe	IIC / IIIC / ABCDEFG	30	320	1.1	14.5	-	Digital Input
Terminals +83, -84	Intrinsic safe	IIC / IIIC / ABCDEFG	30	320	0.5	14.5	-	Digital Output

3. Flameproof / Ex d (TZIDC-200/-210/-220)								
	Concept	Groups	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>max</sub> (W)	C <sub>i</sub> (nF)	L <sub>i</sub> (μH)	Comment
Terminals +11, -12	Flameproof	IIC / ABCDEFG	30					Analog Input
	FISCO	IIC / ABCDEFG	17.5	183				Input
	FISCO	IIB / CDEFG	17.5	380				Input
Terminals -31, -32	Flameproof	IIC / ABCDEFG	30					Analog Position Feedback
Terminals +51, -52; +41, -42	Flameproof	IIC / ABCDEFG	30					Digital Position Feedback
Terminals +51, -52; +41, -42	Flameproof	IIC / ABCDEFG	30					Mechanical Digital Feed-back
Terminals +41, -42; +51, -52	Flameproof	IIC / ABCDEFG	16					Limit switches

Ambient temperature TZIDC-200/-210/-220 Temperature class T5 = -40°C to 82°C

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6		2020-04-28	Ste	Appr.				
5		2011-07-08	Thie	Std.				
4		2009-10-07	Lasa.	<div>ABB</div> <div>Automation Products</div>			No change without notice to FM	Page -1/5-
3		2006-06-26	Thie.				Drwg.-No. (Part-No.)	
2		2006-05-22	Thie.				901265	
1		2006-03-27	Thie.					
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:

**FM-CONTROL-DOCUMENT\_901265**

Non-Hazardous Location	HAZARDOUS (CLASSIFIED) LOCATION Class I, II, III Div. I & 2 Group A-G Class I Zone 1, 21 Group IIC or IIB/ IIIC		
Any FM/CSA Approved Associated Apparatus			
	TZIDC-xxx		
	+11	Analog Input	
	-12	Analog Input	
	+31	Analog Position Feedback / Limit Switches	
	-32	Analog Position Feedback / Limit Switches	
	+41	Digital Position Feedback /	
	-42	Digital Position Feedback	
	+51	Digital Position Feedback/ Limit Switches	
	-52	Digital Position Feedback/ Limit Switches	
	+81	Digital Input	
	-82	Digital Input	
	+83	Digital Output	
	-84	Digital Output	
	→Any FM/ CSA Approved Terminator (maynot be necessary for Entity Installations)		
	<b>Ambient temperature dependent on temperature class</b>		
	<b>Type and Marking</b>	<b>TZIDC, TZDIC-110/-120</b>	
	Ambient temperature	Gas atmosphere	Dust atmosphere
		Temperature class	Ambient temperature
	-40 °C to 85 °C	T4	T 125 °C
	-40 °C to 40 °C	T6	T 85 °C

8		2022-02-19	Pet.	2003	Date	Name	Title	Scale
7	DIP marking removed	2021-06-23	Ste	Name	27.03.03	Thiem.	<b>FM-Control-Document</b>	/
6		2020-04-28	Ste	Appr.				
5		2011-07-08	Thie	Std.			No change without notice to FM	Page -2/5-
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## ... 2 Use in potentially explosive atmospheres

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##### 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 ( $V_{max}$ ), the current ( $I_{max}$ ) and the power ( $P_i$ ) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage ( $U_o$ ,  $V_o$ ,  $V_t$ ), the current ( $I_o$ ,  $I_{sc}$ ,  $I_t$ ), and the power ( $P_o$ ) which can be provided by the associated apparatus (supply unit).

In addition, the maximum unprotected residual capacitance ( $C_i$ ) and inductance ( $L_i$ ) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5 nF and 10  $\mu$ H respectively.

In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system.

The allowed voltage ( $U_o$ ,  $V_o$ ,  $V_t$ ) 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  $\mu$ A 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 $\Omega$ /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  $\Omega$
- C = 0...2.2  $\mu$ F.

##### System evaluation

The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to I.S. Reasons. Furthermore, 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.

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5		2011-07-08	Thie	Std.			No change without notice to FM	
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1		2006-03-27	Thie.					
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:



**FM-CONTROL-DOCUMENT\_901265****Installation Notes****A. Installation notes for all ignition protection methods**

- Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
- 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.
- 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
- The operation of the local communication interface (LKS) and of the programming interface (X5) is only allowed outside of the Hazardous explosive area.
- 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.
- 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
- Preventing electrostatic charging
- Due to the possibility of impermissible electrostatic charging of the housing occurring, the effects of high-voltage sources on the equipment must be prevented. Electrostatic charging can also occur if the device is wiped with a dry cloth or if large amounts of dust flow around the device in dusty environments.
- To prevent charging of this type from occurring, the C, device may only be cleaned using a damp cloth.
- Dust flowing round the device should be prevented by installing a flow restrictor or partition.

**B. Installation Notes for I.S.**

- 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:
  - $U_o$  or  $V_{oc}$  or  $V_t \leq V_{max}$ ,  $I_o$  or  $I_{sc}$  or  $I_t \leq I_{max}$ ,  $P_o \leq P_i$ .  $C_a$  or  $C_o \geq \sum C_i + \sum C_{cable}$ .
  - For inductance use either  $L_a$  or  $L_o \geq \sum L_i + \sum L_{cable}$  or  $L_c / R_c \leq (L_a / R_a \text{ or } L_o / R_o)$  and  $L_i / R_i \leq (L_a / R_a \text{ or } L_o / R_o)$
- 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:  $U_o$  or  $V_{oc}$  or  $V_t \leq V_{max}$ ,  $I_o$  or  $I_{sc}$  or  $I_t \leq I_{max}$ ,  $P_o \leq P_i$ .
- The configuration of associated Apparatus must be Factory Mutual Research /Canadian Standards Association Approved under the associated concept.
- Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- Caution: Substitution of components may impair intrinsic safety.
- To maintain intrinsic safety, wiring associated with each channel must be run in separate cable shields connected to intrinsically safe (associated apparatus) ground.

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# ... 2 Use in potentially explosive atmospheres

## ... FM installation drawing No. 901265

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#### C. Installation notes for flameproof housing

17. Dust-tight conduit seal must be used when installed in Class II and Class III environments.
18. When connecting conduit to the enclosure use conduit hubs that have the same environmental rating as the enclosure

#### D. 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

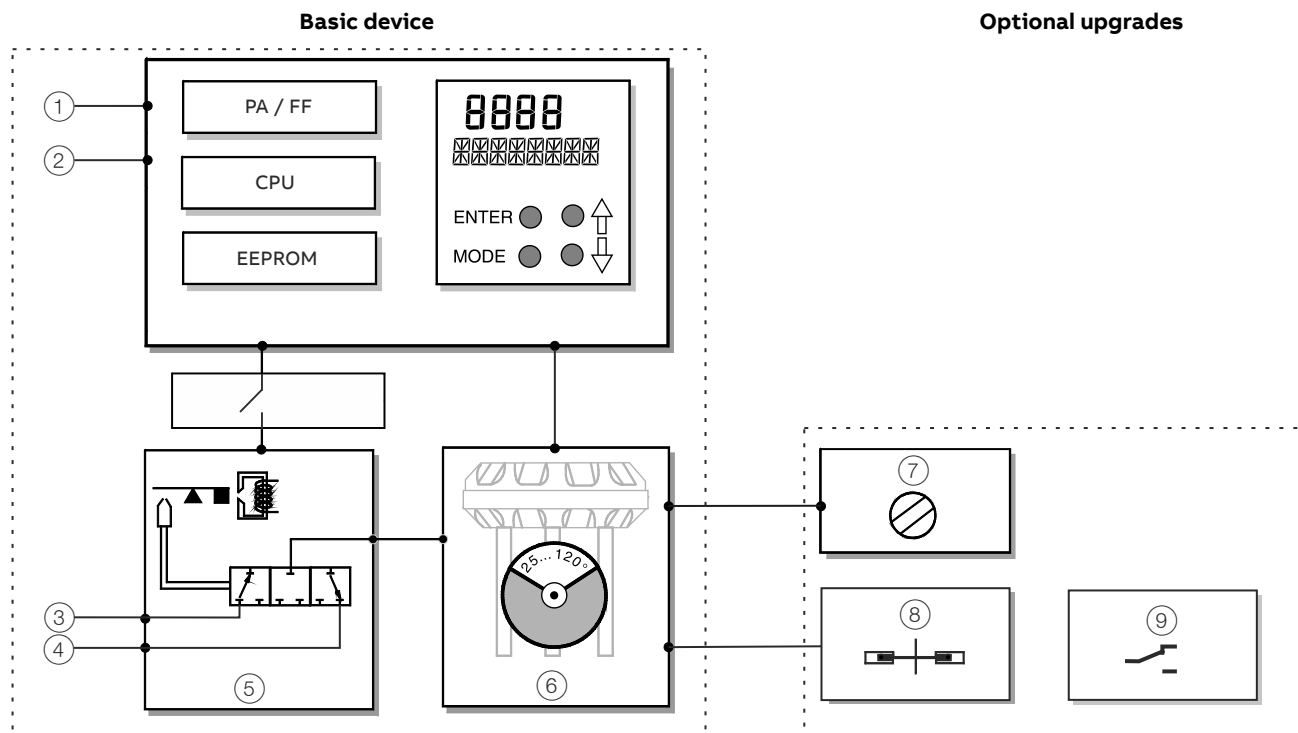
1. Install per National Electrical Code (NEC) using threaded metal conduit. Intrinsic safety barrier required. Max. Supply voltage 30 V. For T-code see table.
2. A dust tight seal must be used at the conduit entry when the positioner is used in a Class II & III Location.
3. WARNING: Explosion Hazard – 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.

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5		2011-07-08	Thie	Std.				
4		2009-10-07	Lasa.	<div>ABB</div> <div>Automation Products</div>			No change without notice to FM	Page -5/5-
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1		2006-03-27	Thie.					
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:

### 3 Design and function

#### Schematic diagram



#### Basic device

- ① LCI plug
- ② PROFIBUS PA® or FOUNDATION Fieldbus® bus connection
- ③ Supply air: 1.4 to 6 bar (20 to 90 psi)
- ④ Exhaust
- ⑤ I/P module with 3/3-way valve
- ⑥ Position sensor (optional up to 270° rotation angle)

#### Optional upgrades

- ⑦ Mechanical position indication
- ⑧ Feedback on the actuator position using proximity switches
- ⑨ Feedback on the actuator position using microswitches

Figure 4: Schematic diagram

#### Note

With optional extensions, either the 'Feedback on the actuator position using proximity switches' ⑧ or the 'Feedback on the actuator position using microswitches' ⑨ can be used. In both cases though, the mechanical position indication ⑦ must be installed.

#### Principle of operation

The TZIDC-210, TZIDC-220 is an electronically configurable positioner with communication capabilities designed for mounting on pneumatic linear or rotary actuators.

Fully automatic determination of the control parameters and adaptation to the positioner allow for considerable time savings as well as optimum control behavior.

## 4 Product identification

### Name plate

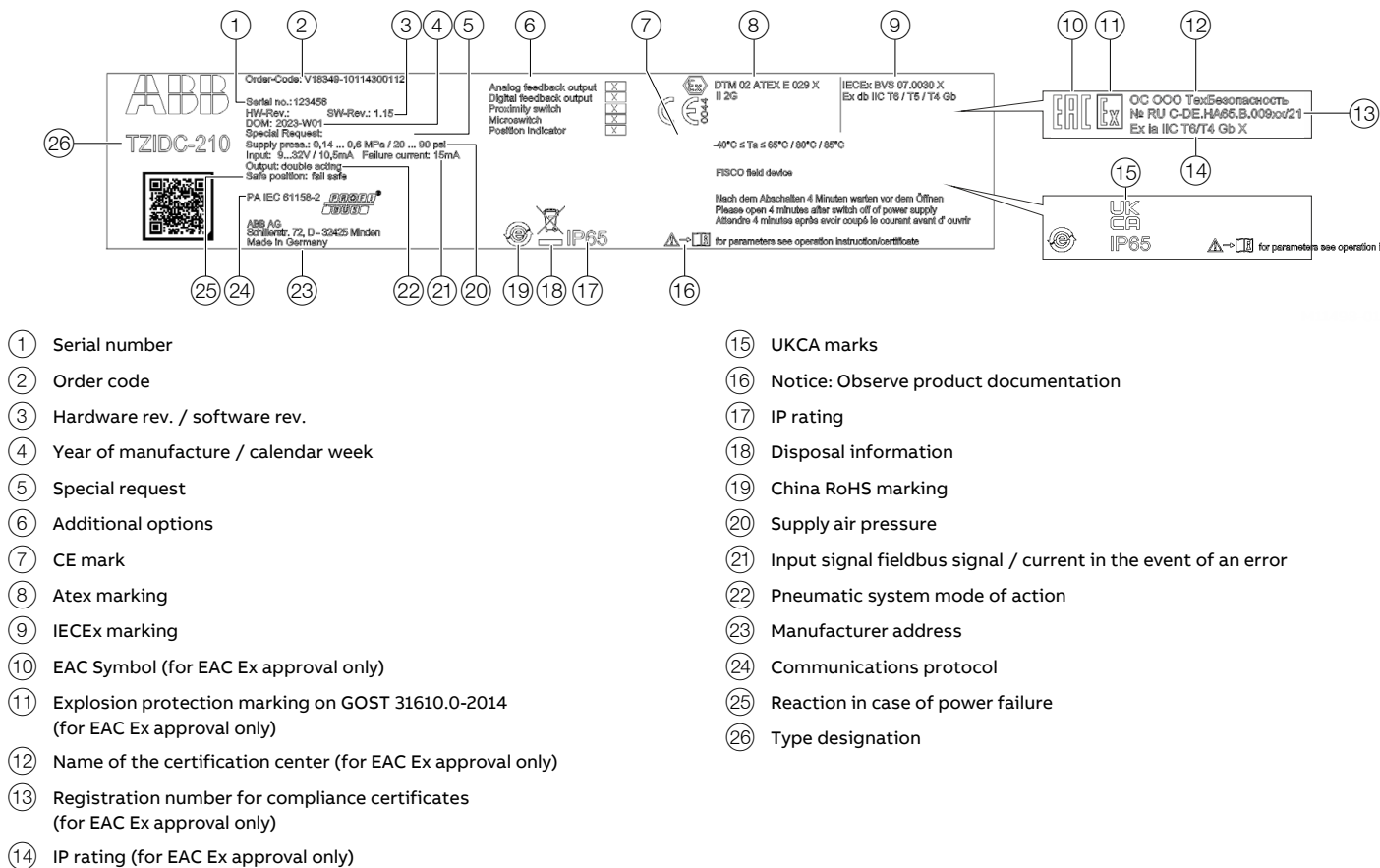


Figure 5: Name plate (Example TZIDC-210)

## 5 Transport and storage

### Inspection

Check the devices immediately after unpacking for possible damage that may have occurred from 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.

### Transporting the device

Observe the following instructions:

- Do not expose the device to humidity during transport. Pack the device accordingly.
- Pack the device so that it is protected against vibrations during transport, for example, by using air-cushioned packing.

### Storing the device

Bear the following points in mind when storing devices:

- Store the device in its original packaging in a dry and dust-free location. The device is also protected by a desiccant in the packaging.
- The storage temperature should be between  $-40$  to  $85\text{ }^{\circ}\text{C}$  ( $-40$  to  $185\text{ }^{\circ}\text{F}$ ).
- Avoid storing the device in permanent direct sunlight.
- In principle, the devices may be stored for an unlimited period. However, the warranty conditions stipulated in the order confirmation of the supplier apply.

### Ambient conditions

The ambient conditions for the transport and storage of the device correspond to the ambient conditions for operation of the device.

Adhere to the device data sheet!

### Returning devices

For the return of devices, follow the instructions in **Repair** on page 63.

## 6 Installation

### Safety instructions

#### CAUTION

##### Risk of injury

Risk of injury from pressurized positioner / actuator.

- Before starting work on the positioner / actuator, switch off the air supply and vent the positioner / actuator.

#### CAUTION

##### Risk of injury due to incorrect parameter values!

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

- Before recommissioning a positioner that was previously in use at another location, always reset the device to its factory settings.
- Never start automatic adjustment before restoring the factory settings!

### Note

Before assembly, check whether the positioner meets the control and safety requirements for the installation location (actuator or final control element).

Refer to the **Specification** in the data sheet.

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 carrying out any work on the device, always observe the local accident prevention regulations and the regulations concerning the construction of technical installations.

... 6 Installation

Mechanical mounting

General

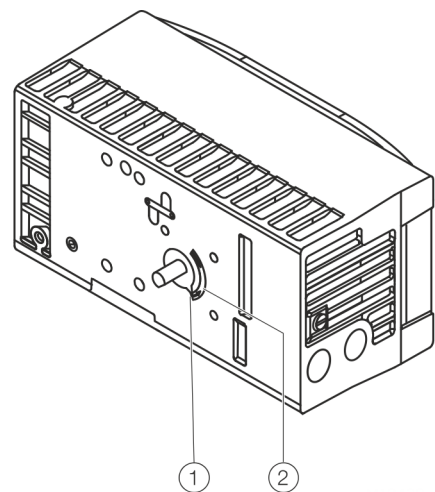


Figure 6: Operating range

Arrow ① on the device feedback shaft (position feedback point) must move between the arrow marks ②.

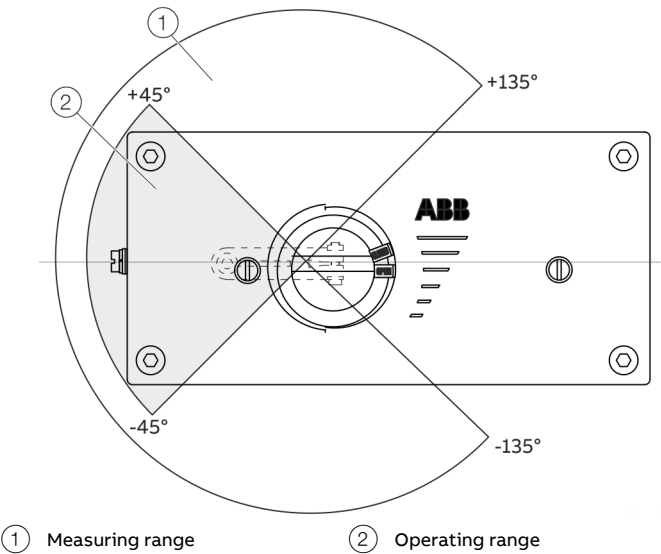


Figure 7: Measuring and operating ranges of the positioner

**Operating range for linear actuators:**  
The operating range for linear actuators is maximum  $\pm 45^\circ$  symmetrically to the longitudinal axis.  
The usable span within the operating range is ideally  $40^\circ$ , but at least  $25^\circ$ . The usable span should run as symmetrically to the longitudinal axis as possible.

**Operating range of rotary actuators:**  
The usable span is  $+57^\circ$  to  $-57^\circ$ , which must be entirely within the measuring range, but does not necessarily need to run symmetrically to the longitudinal axis.

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

### Mounting on linear actuators

For mounting on a linear actuator in accordance with DIN / IEC 60534 (lateral mounting as per NAMUR), the following attachment kit is available.

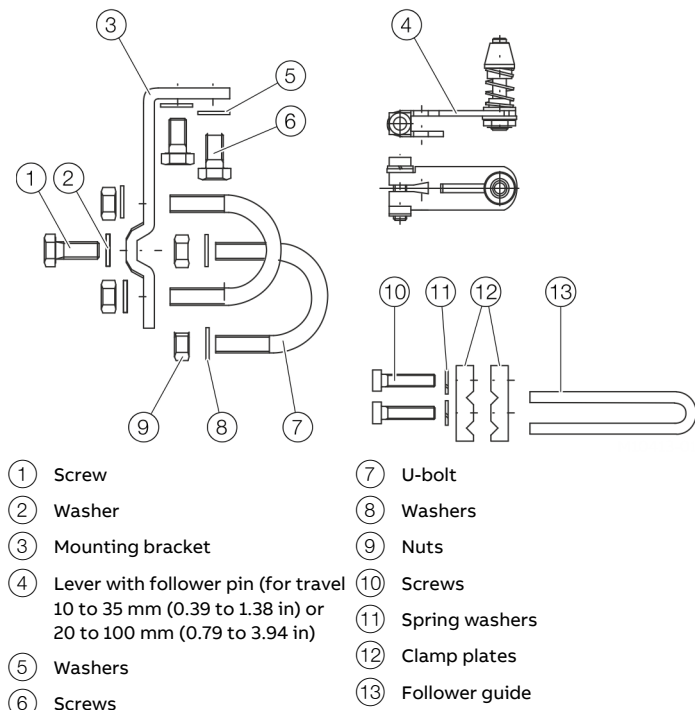


Figure 8: Components of attachment kit

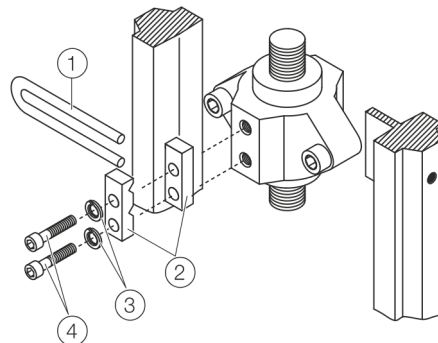


Figure 9: Attaching a follower guide to the actuator

1. Tighten the screws so that they are hand-tight.
2. Attach the follower guide ① and clamp plates ② with screws ④ and spring washers ③ to the actuator stem.

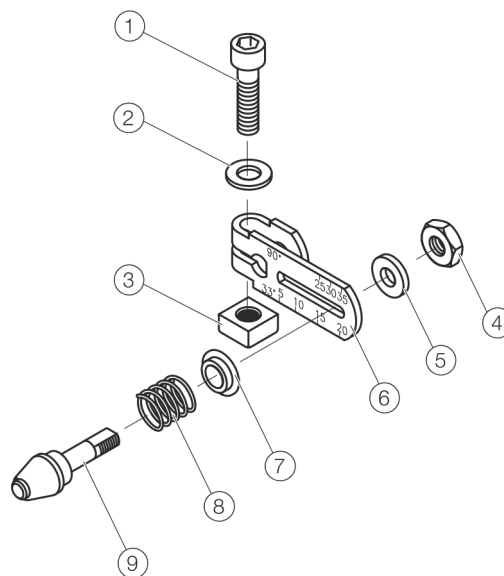


Figure 10: Assemble lever (if not pre-assembled)

1. Insert spring ⑧ on bolt with follower pin ⑨.
2. Slip the plastic washer ⑦ onto the bolt and compress the spring with it.
3. Insert the bolt with compressed spring into the oblong hole in the lever ⑥ and fasten it in the desired position using the plain washer ⑤ and nut ④ at the lever. The scale on the lever indicates the link point for the stroke range.
4. Place the washer ② on the screw ①. Insert the screw in the lever and lock with the nut ③.

## ... 6 Installation

### ... Mechanical mounting

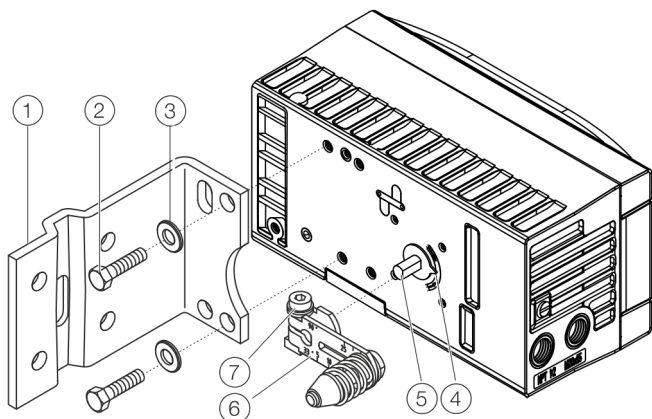


Figure 11: Mounting lever and bracket on the positioner

1. Attach the lever ⑥ to the feedback shaft ⑤ of the positioner (can only be mounted in one position due to the cut shape of the feedback shaft).
2. Using the arrow marks ④, check whether the lever moves within the operating range (between the arrows).
3. Hand-tighten the screw ⑦ on the lever.
4. Hold the prepared positioner with the mount bracket ① still loose on the actuator so that the follower pin for the lever enters the follower guide to determine which tap holes on the positioner must be used for the mount bracket.
5. Secure the mount bracket ① with screws ② and washers ③ using the relevant tap 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 arrow marks ④).

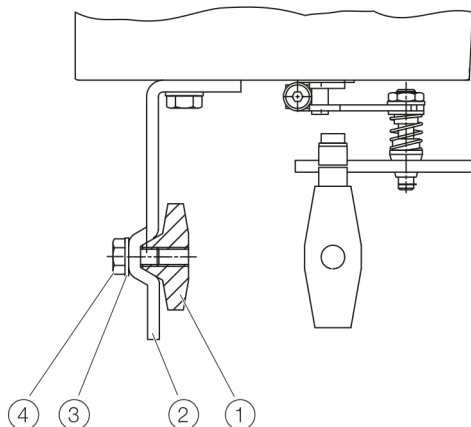


Figure 12: Mounting on a cast iron yoke

1. Attach the mount bracket ② with screw ④ and washer ③ to the cast iron yoke ①.

or

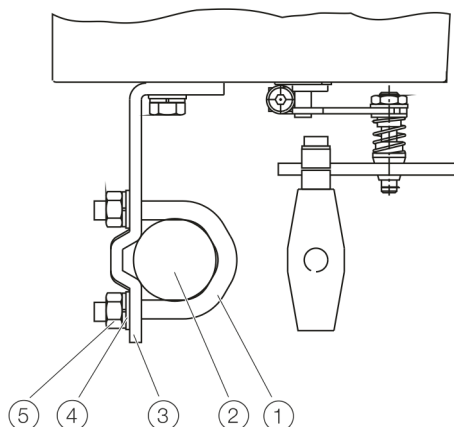


Figure 6: Mounting on a columnar yoke

1. Hold the mount bracket ③ in the proper position on the columnar yoke ②.
2. Insert the U-bolts ① from the inside of the columnar yoke ② through the holes of the mount bracket.
3. Add the washers ④ and nuts ⑤.
4. Tighten the nuts so that they are hand-tight.

#### Note

Adjust the height of the positioner on the cast iron yoke or columnar yoke until the lever is horizontal (based on a visual check) at half stroke of the valve.



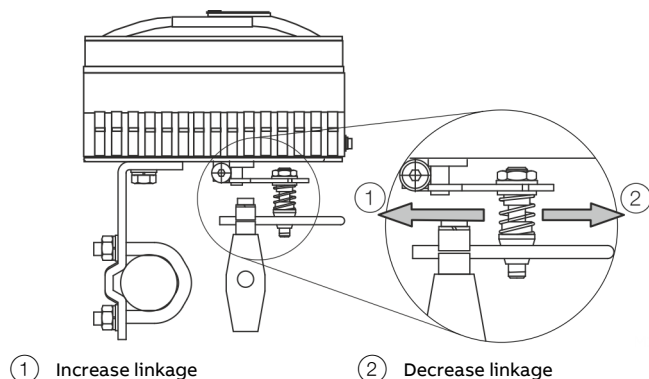


Figure 13: Positioner linkage

The scale on the lever indicates the link points for the various stroke ranges of the valve.

Move the bolt with the follower pin in the oblong hole of the lever to adjust the stroke range of the valve to the working range for the position sensor.

Moving the link point inwards increases the rotation angle of the position sensor. Moving the link point outwards reduces the rotation angle of the position sensor.

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

Recommended range for linear actuators:

40°

Minimum angle:

25°

#### Note

After mounting, check whether the positioner is operating within the measuring range.

#### Position of actuator bolt

The actuator bolt for moving the potentiometer lever can be mounted permanently on the lever itself or on the valve stem. Depending on the mounting method, when the valve moves the actuator bolt performs either a circular or a linear movement with reference to the center of rotation of the potentiometer lever. Select the chosen bolt position in the HMI menu in order to ensure optimum linearization. The default setting is actuator bolt on lever.

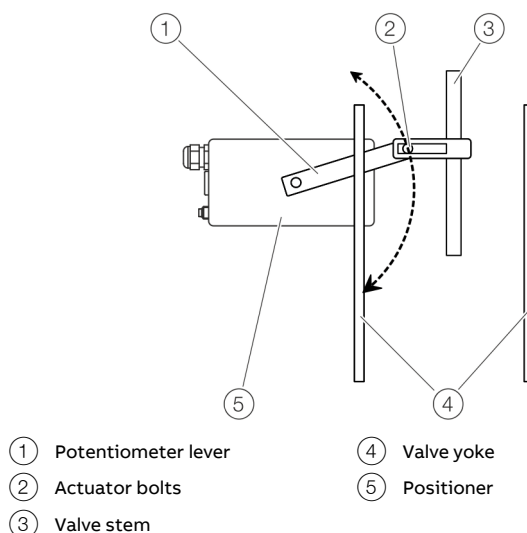


Figure 14: Actuator bolts on the lever

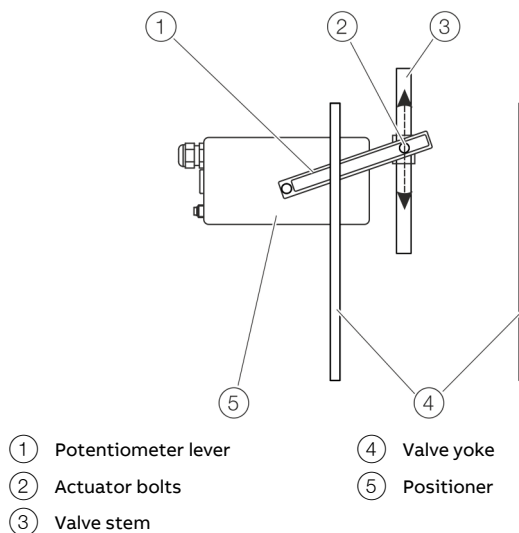


Figure 15: Actuator bolts on the valve

## ... 6 Installation

### ... Mechanical mounting

#### Mounting on rotary actuator

For mounting on part-turn actuators in accordance with VDI / VDE 3845, the following attachment kit is available:

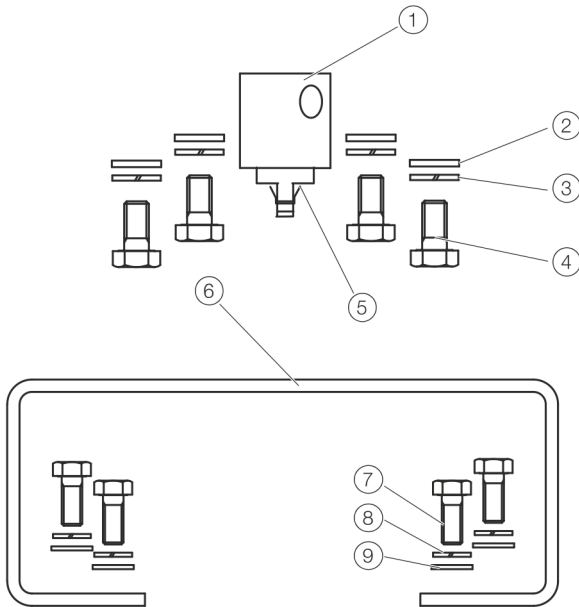


Figure 16: Components of attachment kit

- Adapter (1) with spring (5)
- four M6 screws each (4), spring washers (3) and washers (2) for fastening the attachment bracket (6) on the positioner
- four M5 screws each (7), spring washers (8) and washers (9) for fastening the attachment bracket to the actuator

#### Required tools:

- Wrench, size 8 / 10
- Allen key, size 3

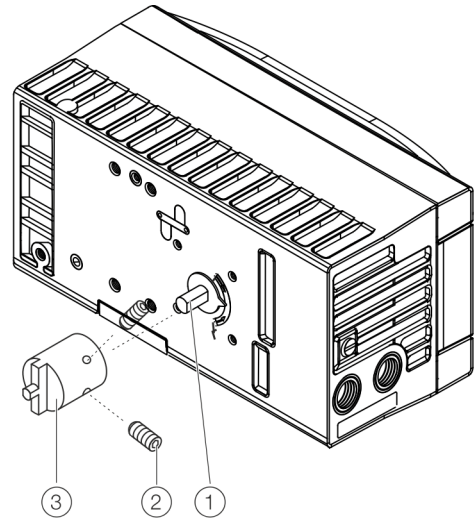


Figure 17: Mounting the adapter on the positioner

1. Determine the mounting position (parallel to actuator or at 90° angle)
2. Calculate the rotational direction of the actuator (right or left).
3. Move the part-turn actuator into the home position.
4. Pre-adjust feedback shaft.  
In order for the positioner to work within the working range (see **General** on page 38), the installation position as well as the basic position and direction of rotation of the actuator when determining the adapter position on the axis (1) should be considered. For this purpose, the axis can be adjusted by hand to set the adapter (3) accordingly in the correct position.
5. Place the adapter in the suited position on the axle and secure with threaded spuds (2). One of the threaded pins must be locked in place on the flat side of the feedback shaft.

## 7 Electrical connections

### Safety instructions

#### **WARNING**

##### **Risk of injury due to live parts!**

When the housing is open, contact protection is not provided and EMC protection is limited.

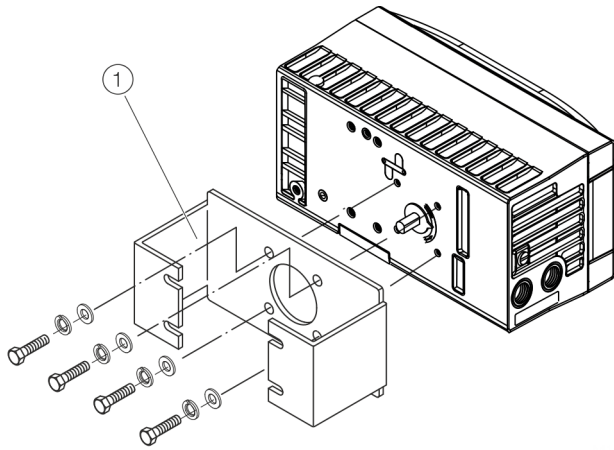
- Before opening the housing, switch off the power supply.

The electrical connection may only be established by authorized specialist personnel.

Notices on electrical connection in this instruction must be observed; otherwise, electric safety and the IP-rating may be adversely affected.

Safe isolation of electric circuits which are dangerous if touched is only guaranteed when the connected devices fulfill the requirements of EN 61140 (basic requirements for secure separation).

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 Attachment bracket

Figure 18: Screwing the attachment bracket onto the positioner

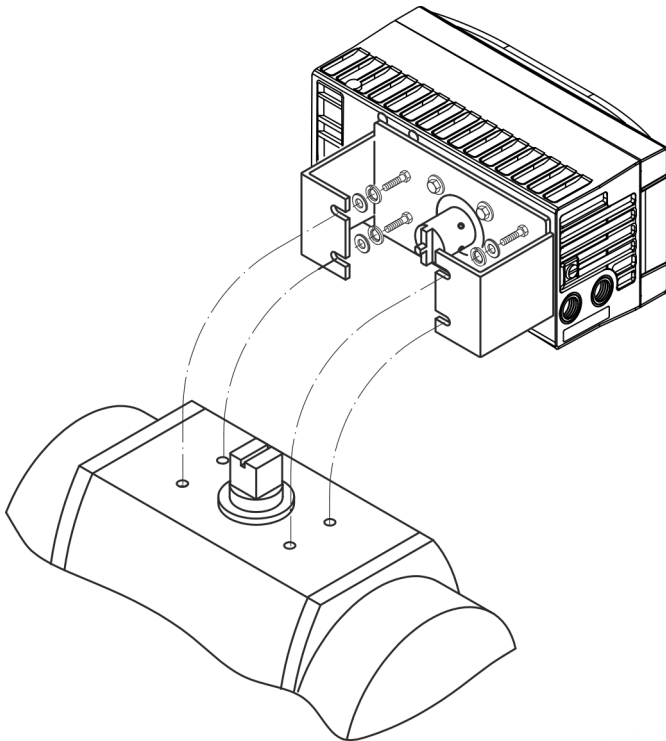


Figure 19: Screwing the positioner onto the actuator

#### **Note**

After mounting, check whether the operating range of the actuator matches the measuring range of the positioner, refer to **General** on page 38.

... 7 Electrical connections

TZIDC-210, TZIDC-220 terminal assignment



Figure 20: Electrical connection TZIDC-210, TZIDC-220

Connections for inputs and outputs

Terminal	Function/comments
+11 / -12	Fieldbus, bus feed
+51 / -52	Limit 1 – Feedback on the actuator position using proximity switches (optional)
+41 / -42	Limit 2 – Feedback on the actuator position using proximity switches (optional)
41 / 42 / 43	Limit 1 – Feedback on the actuator position using microswitches (optional)
51 / 52 / 53	Limit 2 – Feedback on the actuator position using microswitches (optional)

**Note**

The TZIDC-210, TZIDC-220 can be equipped **either** with feedback on the actuator position using proximity switches **or** using microswitches. It is not possible to combine both variants.

## Electrical data for inputs and outputs

### Note

When using the device in potentially explosive atmospheres, note the additional connection data in **Use in potentially explosive atmospheres** on page 6!

### Fieldbus input

Bus Connection	PROFIBUS PA®	FOUNDATION Fieldbus®
Terminals	+11 / -12	+11 / -12
Supply voltage (Power feed from the Fieldbus)	9 to 32 V DC	9 to 32 V DC
Max. permissible voltage	35 V DC	35 V DC
Input Current	10.5 mA	11.5 mA
Current in the event of an error	15 mA (10.5 mA + 4.5 mA)	15 mA (11.5 mA + 3.5 mA)

### Option modules

#### Note

These options are also available for retrofitting by Service.

#### Mechanical digital feedback

Two proximity switches or microswitches for independent signaling of the actuator position, switching points are adjustable between 0 bis 100 %.

Feedback on the actuator position using proximity switches Limit 1, Limit 2		
Terminals	+41 / -42, +51 / -52	
Supply voltage	5 to 11 V DC (Control circuit in accordance with DIN 19234/NAMUR)	
Direction of action	Metal tag in the proximity switch	Metal tag outside the proximity switch
Type S12-SN (NC; log 1)	< 1.2 mA	> 2.1 mA

Feedback on the actuator position using microswitches Limit 1, Limit 2	
Terminals	+41 / -42, +51 / -52
Supply voltage	maximum 24 V AC/DC
Load rating	Maximum 2 A
Contact surface	10 µm Gold (AU)

### Mechanical position indication

Indicator disk in enclosure cover linked with device feedback shaft.

# ... 7 Electrical connections

## Connection on the device

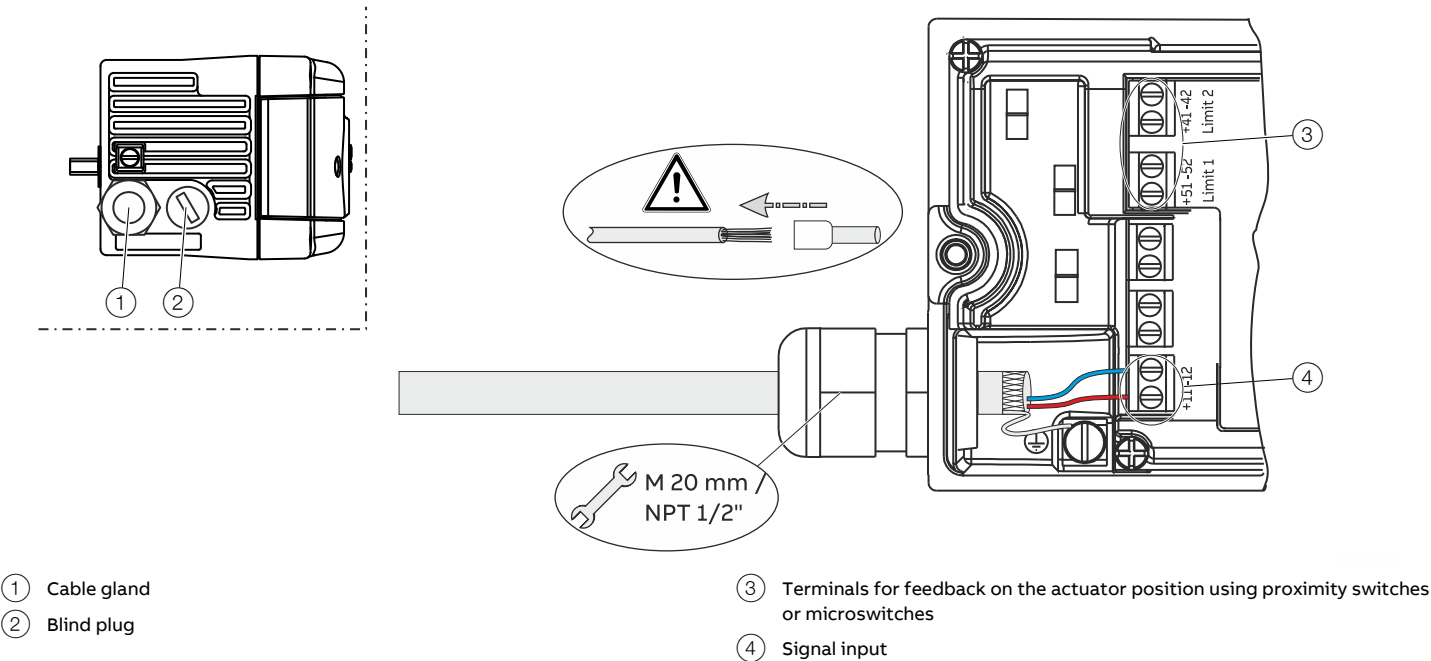


Figure 21: Connection on device (example)

2 tap holes ½- 14 NPT or M20 × 1.5 are provided on the left side of the housing for cable entry in the housing.

Cable glands should be selected and implemented by the operator in accordance with their use and application requirements.

The cable glands must comply with the requirements of EN 60079-1, EN 60079-7, EN 60079-11 or EN 60079-15. Especially in Ex applications, the requirements of the appropriate type of protection should be observed.

- Note**
- The connecting terminals are delivered closed and must be unscrewed before inserting the wire.
- Strip the wires to approximately 6 mm (0.24 in).
  - After stripping the cable end, fit the appropriate wire end sleeves and crimp
  - Connect the wires to the connecting terminals in line with the connection diagram.  
Tightening torque for the terminal screws:  
0.5 to 0.6 Nm

## Conductor cross-section

### Basic device

Electrical connections	
4 to 20 mA input	Screw terminals max. 2.5 mm <sup>2</sup> (AWG14)
Options	Screw terminals max. 1.0 mm <sup>2</sup> (AWG18)

### Cross section

Rigid / flexible wires	0.14 to 2.5 mm <sup>2</sup> (AWG26 to AWG14)
Flexible with wire end sleeve	0.25 to 2.5 mm <sup>2</sup> (AWG23 to AWG14)
Flexible with wire end sleeve no plastic sleeve	0.25 to 1.5 mm <sup>2</sup> (AWG23 to AWG17)
Flexible with wire end sleeve with plastic sleeve	0.14 to 0.75 mm <sup>2</sup> (AWG26 to AWG20)

### Multi-wire connection capacity (two wire with the same cross-section)

Rigid / flexible wires	0.14 to 0.75 mm <sup>2</sup> (AWG26 to AWG20)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.75 mm <sup>2</sup> (AWG23 to AWG20)
Flexible with wire end sleeve with plastic sleeve	0.5 to 1.5 mm <sup>2</sup> (AWG21 to AWG17)

### Option modules

#### Cross section

Rigid / flexible wires	0.14 to 1.5 mm <sup>2</sup> (AWG26 to AWG17)
Flexible with wire end sleeve no plastic sleeve	0.25 to 1.5 mm <sup>2</sup> (AWG23 to AWG17)
Flexible with wire end sleeve with plastic sleeve	0.25 to 1.5 mm <sup>2</sup> (AWG23 to AWG17)

#### Multi-wire connection capacity (two wire with the same cross-section)


Rigid / flexible wires	0.14 to 0.75 mm <sup>2</sup> (AWG26 to AWG20)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.5 mm <sup>2</sup> (AWG23 to AWG22)
Flexible with wire end sleeve with plastic sleeve	0.5 to 1 mm <sup>2</sup> (AWG21 to AWG18)

#### Feedback on the actuator position using proximity switches or microswitches

Rigid wire	0.14 to 1.5 mm <sup>2</sup> (AWG26 to AWG17)
Flexible wire	0.14 to 1.0 mm <sup>2</sup> (AWG26 to AWG18)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.5 mm <sup>2</sup> (AWG23 to AWG22)
Flexible with wire end sleeve with plastic sleeve	0.25 to 0.5 mm <sup>2</sup> (AWG23 to AWG22)

## 8 Pneumatic Connections

### Safety instructions

 **CAUTION**

**Risk of injury**  
Risk of injury from pressurized positioner / actuator.

- Before starting work on the positioner / actuator, switch off the air supply and vent the positioner / actuator.

**NOTICE**

**Damage to components!**  
Contamination in the air pipe and positioner can damage components.

- Dust, splinters, and any other particles of dirt must be blown-out before the pipe is connected.

**NOTICE**

**Damage to components!**  
Pressure above 6 bar (90 psi) can damage the positioner or actuator.

- Provisions must be made (e.g. by using a pressure reducer) to make sure that the pressure does not rise above 6 bar (90 psi)\*, even in the event of a fault.

\* 5.5 bar (80 psi) (marine version)

**Note**  
The positioner must only be supplied with instrument air that is free of oil, water, and dust.  
The purity and oil content must meet the requirements of Class 3 in accordance with DIN/ISO 8573-1.

**Information on double acting actuators with spring-return mechanism**  
On double-acting actuators with spring-return mechanism, a pressure that significantly exceeds the supply air pressure value can be generated during operation by the springs in the chamber opposite the springs.  
This may damage the positioner or adversely affect control of the actuator.  
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 (< 3.6 psi).

**Notes on ABB pressure gauge blocks**  
The pressure gauge blocks available as accessories from ABB have a restricted operating temperature range and a different IP rating than the positioner.  
The operator must take these restrictions into account when using ABB pressure gauge blocks.

ABB pressure gauge block specification	
Operating temperature range	–5 °C to 60 °C (23 to 140 °F)
IP rating	IP 30



Connection on the device

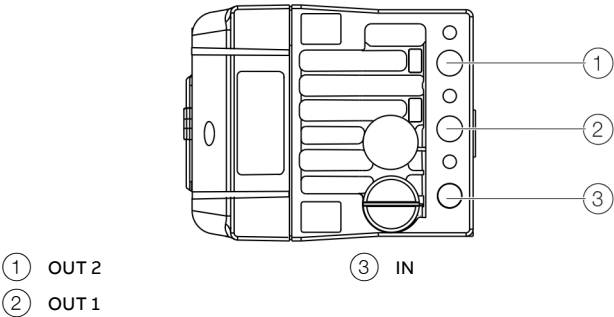


Figure 22: Pneumatic connections

Marking	Pipe connection
IN	Supply air, pressure 1.4 to 6 bar (20 to 90 psi) Marine version: <ul style="list-style-type: none"><li>Supply air, pressure 1.4 to 5.5 bar (20 to 80 psi)*</li></ul>
OUT1	Output pressure to the actuator
OUT2	Output pressure to the actuator (2. Connection with double acting actuator)

\* (Marine version)

Air supply

Instrument air*	
Purity	Maximum particle size: 5 µm Maximum particle density: 5 mg/m³
Oil content	Maximum concentration 1 mg/m³
Pressure dew point	10 K below operating temperature
Supply pressure**	Standard design: 1.4 to 6 bar (20 to 90 psi) Marine version: 1.6 to 5.5 bar (23 to 80 psi)
Air consumption***	< 0.03 kg/h / 0.015 scfm

\* Free of oil, water and dust in accordance with DIN / ISO 8573-1. Pollution and oil content n accordance with Class 3


\*\* Do not exceed the maximum output pressure of the actuator

\*\*\* Independent of supply pressure

- Join the pipe connections according to the designation, observing the following points:
- All pneumatic piping connections are located on the right-hand side of the positioner. G<sup>3</sup>/<sub>4</sub> or <sup>1</sup>/<sub>4</sub> 18 NPT tap holes are provided for the pneumatic connections. The positioner is labeled according to the tap holes available.
  - We recommend that you use a pipe with dimensions of 12 × 1.75 mm.
  - The supply air pressure required to apply the actuating force must be adjusted in line with the output pressure in the actuator. The working range for the positioner is between 1.4 and 6 bar (20 to 90 psi)\*\*.

\*\* 1.4 to 5.5 bar (20 to 80 psi) marine version

9 Commissioning

 **CAUTION**

**Risk of injury due to incorrect parameter values!**

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

- Before recommissioning a positioner that was previously in use at another location, always reset the device to its factory settings.
- Never start automatic adjustment before restoring the factory settings!

**Note**

The electrical power supply and supply air pressure data indicated on the name plate must be complied with during commissioning.







**Note**

Please observe the information in **Operation** on page 55 to operate the device!

Commissioning

- Commissioning the positioner:
1. Open the pneumatic power supply.
  2. Connect fieldbus or power supply to the bus connections.
- The following is now shown in the display:



3. Checking mechanical mounting:
  - Press and hold downMODE and ENTER; once the countdown has gone from 3 to 0, release MODE and ENTER . The device switches to the operating level n operating mode 1.x.
  - Press and hold MODE and ENTER, in addition 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  or  simultaneously.

Recommended rotational angle range	
Linear actuators	-20 to 20°
Rotary actuators	-57 to 57°
Minimum angle	25°

4. Go back to the bus level:
  - Press and hold downMODE and ENTER; once the countdown has gone from 3 to 0, release MODE and ENTER .

The following is now shown in the display:



5. Perform standard automatic adjustment in accordance with **Standard automatic adjustment** on page 52. Check that the device is on the bus level (REMOTE).
6. Adjust the dead zone and tolerance band. This step is only required for critical (e.g., very small) actuators. In normal cases this step can be omitted.

Commissioning of the positioner is now complete, and the device is ready for operation.

### Setting the bus address

- Switching to the configuration level:
  - Press and hold down **↑** and **↓** simultaneously,
  - additionally quickly press and release **ENTER**,
  - Wait for the countdown to go from 3 to 0,
  - Release **↑** and **↓**.

The following is now shown in the display:



- Switch to parameter group 1.5:
  - Press and hold down **MODE** and **ENTER** simultaneously,
  - In addition, press **↑** and **↓**.

The following is now shown in the display:



- Release **MODE**.

The following is now shown in the display:



- Setting the bus address:
  - Press **↑** or **↓** to set the correct value,
  - Press and hold down **ENTER** until the countdown goes from 3 to 0,
  - Release **ENTER**.

The new bus address is saved.

- Switching to parameter 1.6 (return to operating level) and saving the new settings:

- Press and hold down **Mode**,
- In addition, briefly press **↑** 2×,  
the following is now shown in the display:






- Release **MODE**,
- Quickly press and release **↑** to select **NV\_SAVE**,
- Press **ENTER** and hold down until the countdown goes from 3 to 0.

The new parameter setting is saved and the positioner automatically returns to the operating level. It continues in the operating mode that was active prior to the configuration level being called up.

## Request information

When the device is in BUS operation, the information shown below can be called up.

Press the following control buttons to access this information:






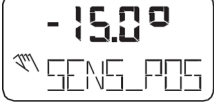
Control buttons	Action
	Cyclic communication: The set point in % and the set point status is displayed.
	Acyclic communication: Displays the communication status.
	Displays the bus address and operating mode
	Displays the software revision

## Operating modes

Selection from the operating level:

- Press and hold **MODE**.
- Also 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
1.1 Positioning with fixed set point. Adjust set point using <b>↑</b> or <b>↓</b> .		
1.2 Manual adjustment* in the operating range. Adjust with <b>↑</b> or <b>↓</b> **		
1.3 Manual adjustment* within the sensor range. Adjust with <b>↑</b> or <b>↓</b> **		

\* Positioning not active.

\*\* For high-speed mode: Press **↑** and **↓** simultaneously.

## ... 9 Commissioning

### Write protection and simulation mode

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:

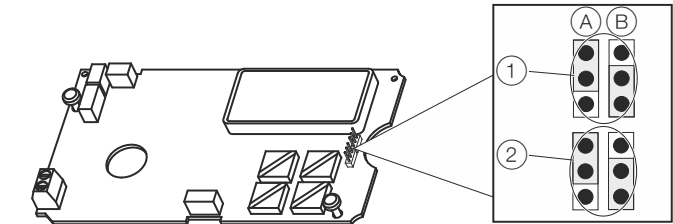


Figure 23: Jumpers

Jumper / position		Function
①	A	Simulation blocked*
	B	Simulation enabled
②	A	Write access disabled
	B	Write access released*

\* Default setting (in accordance with Fieldbus Foundation standard)

### Standard automatic adjustment

#### Note

Standard Auto Adjust does not always result in optimum control conditions.

#### Standard automatic adjustment for linear actuators\*

1. **MODE** Press and hold until ADJ\_LIN is displayed.
2. **MODE** Press and hold until the countdown ends.
3. Release **MODE**; this starts Autoadjust.

#### Standard automatic adjustment for rotary actuators\*

1. **ENTER** Press and hold until ADJ\_ROT is displayed.
2. **ENTER** Press and hold until the countdown ends.
3. 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.

Perform the following steps if an error occurs:

1. Press and hold down operating button or for approximately three seconds.

The unit will switch to the operating level, mode 1.3 (manual adjustment within the measuring range).

2. Check mechanical mounting in accordance with **Mechanical mounting** on page 38 and repeat the standard automatic adjustment.

\* The zero position is determined automatically and saved during standard automatic adjustment, counter-clockwise (CTCLOCKW) for linear actuators and clockwise (CLOCKW) for rotary actuators.

## Sample parameters

### 'Change the zero position of the LCD display from clockwise (CLOCKW) to counter-clockwise limit stop (CTCLOCKW)'

Initial situation: the positioner is in bus operation on the operating level.

- Switching to the configuration level:
  - Press and hold down **▲** and **▼** simultaneously,
  - additionally quickly press and release **ENTER**,
  - Wait for the countdown to go from 3 to 0,
  - Release **▲** and **▼**.

The following is now shown in the display:



- Switching to parameter group 3.\_:
  - Press and hold down **MODE** and **ENTER** simultaneously,
  - additionally quickly press and release **▲** 2x,

The following is now shown in the display:



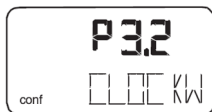
- Release **MODE** and **ENTER**.

The following is now shown in the display:



- Selecting parameter 3.2:
  - Press and hold down **MODE**,
  - additionally quickly press and release **▲** 2x,

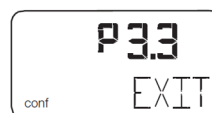
The following is now shown in the display:



- Release **MODE**.

- Changing parameter settings:
  - Quickly press and release **▲** to select **CTCLOCKW**.
- Switching to parameter 3.3 (Return to operating level) and saving the new settings:
  - Press and hold down **MODE**,
  - additionally quickly press and release **▲** 2x,

The following is now shown in the display:



- Release **MODE**,
- Quickly press and release **▲** to select **NV\_SAVE**,
- Press **ENTER** and hold down until the countdown goes from 3 to 0.

The new parameter setting is saved and the positioner automatically returns to the operating level. It continues in the operating mode that was active prior to the configuration level being called up.

## Setting the option modules

### Setting the mechanical position indication

- Loosen the screws for the housing cover and remove it.
- Rotate the position indicator on the shaft to the desired position.
- Attach the housing cover and screw it onto the housing. Tighten the screws so that they are hand-tight.
- Attach the symbol label to mark the minimum and maximum valve positions on the housing cover.

#### Note

The labels are located on the inside of the housing cover.

## ... 9 Commissioning

### ... Sample parameters

#### Setup of the feedback on the actuator position using proximity switches

1. Loosen the screws for the housing cover and remove it.

#### CAUTION

##### **Risk of injury!**

The device includes slot sensors with sharp edges.

- Adjust the metal tags using a screwdriver only!

2. Set the upper and lower switching points for binary feedback as follows:
  - Select the 'Manual Adjustment' operating mode and move the final control element by hand into the lower switching position.
  - Using a screwdriver, adjust the metal tag of proximity switch 1 (lower contact) on the axis until contact is made, i. e. just before it is inserted in the proximity switch. The metal tag enters proximity switch 1 when the axis is rotated clockwise (as viewed from the front).
  - Move the final control element by hand into the upper switching position.
  - Using a screwdriver, adjust the metal tag of proximity switch 2 (upper contact) on the axis until contact is made, i. e. just before it is inserted in the proximity switch. The metal tag enters proximity switch 2 when the axis is rotated counter-clockwise (as viewed from the front).
3. Attach the housing cover and screw it onto the housing.
4. Tighten the screws so that they are hand-tight.

#### Setup of the feedback on the actuator position using microswitches

1. Loosen the screws for the housing cover and remove it.
2. Select the 'Manual Adjustment' operating mode and move the final control element by hand into the desired switching position for contact 1.
3. Set maximum contact (①, lower washer).  
Fasten the upper washer with the special adjustment retainer and rotate the lower washer manually.
4. Select the 'Manual Adjustment' operating mode and move the final control element by hand into the desired switching position for contact 2.
5. Set minimum contact (②, upper washer);  
Fasten the lower washer with the special adjustment retainer and rotate the upper washer manually.
6. Connect the microswitch.
7. Attach the housing cover and screw it on to the housing.
8. Tighten the screws so that they are hand-tight.

## 10 Operation

### Safety instructions

#### ⚠ CAUTION

##### Risk of injury due to incorrect parameter values!

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

- Before recommissioning a positioner that was previously in use at another location, always reset the device to its factory settings.
- Never start automatic adjustment before restoring the factory settings!

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

### Parameterization of the device

The LCD display features operating buttons which enable the device to be operated with the housing cover open.

#### Menu navigation

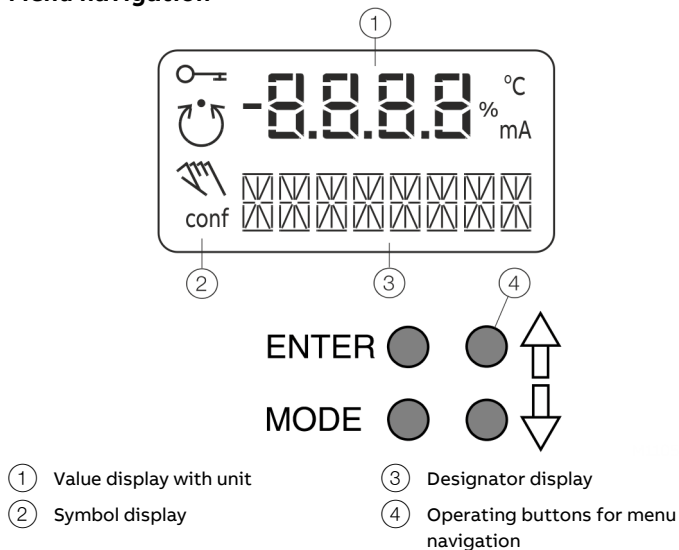


Figure 24: LCD display with operating buttons

#### Value display with unit

This 7-segment display with four digits indicates parameter values or parameter reference numbers. For values, the physical unit (°C, %, mA) is also displayed.

#### Designator display

This 14-segment display with eight digits indicates the designators of the parameters with their status, of the parameter groups, and of the operating modes.

#### Description of symbols

Symbol	Description
	Operation or access is restricted.
	Control loop is active. The symbol is displayed when the positioner is in operating mode 1.0 CTRL_ADP (adaptive control) or 1.1 CTRL_FIX (fixed control) at operating level. On the configuration level there are test functions for which the controller will be active as well. The control loop symbol will also be displayed when these functions are active.
	Manual adjustment. The symbol is displayed when the positioner is in operating mode 1.2 MANUAL (manual adjustment within the stroke range) or 1.3 MAN_SENS (manual adjustment within the measuring range) at operating level. At configuration level, manual adjustment is active when setting the valve range limits (parameter group 6 MIN_VR (min. of valve range) and 6 MAX_VR (max. of valve range)). The symbol will also be displayed when these parameters are being set.
conf	The configuration icon indicates that the positioner is at the configuration level. The control operation is inactive.

The four operating buttons **ENTER**, **MODE**, **↑** and **↓** are pressed individually or in certain combinations according to the function desired.

#### Operating button functions

Control button	Meaning
<b>ENTER</b>	<ul style="list-style-type: none"> <li>• Acknowledge message</li> <li>• Start an action</li> <li>• Save in the non-volatile memory</li> </ul>
<b>MODE</b>	<ul style="list-style-type: none"> <li>• Choose operating mode (operating level)</li> <li>• Select parameter group or parameter (configuration level)</li> </ul>
<b>↑</b>	UP direction button
<b>↓</b>	DOWN direction button
Press and hold all four buttons for 5 s	Reset

## ... 10 Operation

### Menu levels

The positioner has two operating levels.

#### Operating level

On the operating level the positioner operates in one of four possible operating modes (two for automatic control and two for manual mode). Parameters cannot be changed or saved on this level.

#### Configuration level

On this level most of the parameters of the positioner can be changed locally. The PC is required to change the limit values for the movement counter, the travel counter, and the user-defined characteristic curve.

On the configuration level the active operating mode is deactivated. The I/P module is in neutral position. The control operation is inactive.

### **NOTICE**

#### **Property damage**

During external configuration via a PC, the positioner no longer responds to the set point current. This may lead to process failures.

- Before any external parameterization, always move the actuator to the safety position and activate manual adjustment.



## Parameter overview

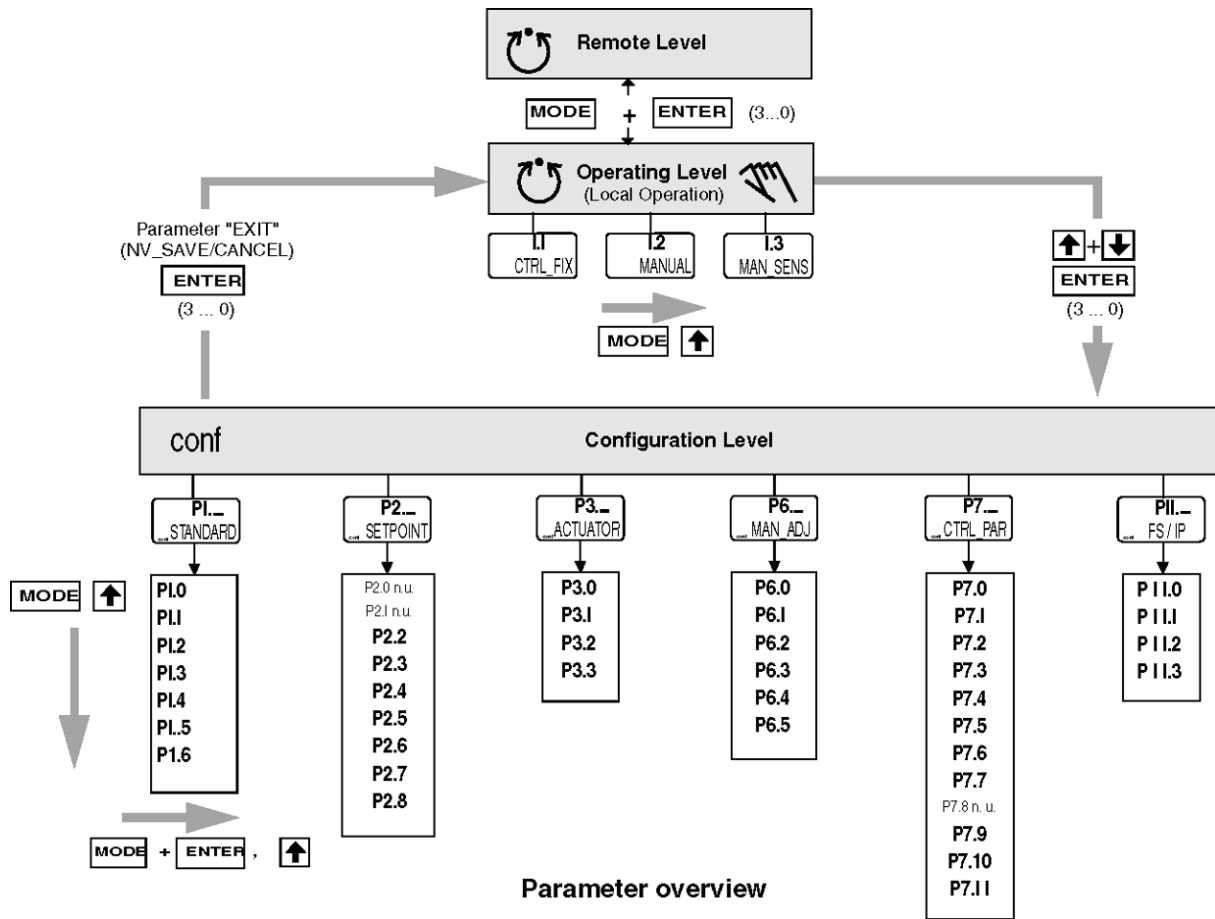


Figure 25: Parameter overview TZIDC-1x0, -2x0

## ... 10Operation

### ... Parameter overview

#### Parameter descriptions

Para-meter	Display	Function		Possible parameter setting	Unit	Factory setting
<b>P1._</b>	<b>STANDARD</b>					
<b>P1.0</b>	<b>ACTUATOR</b>	Actuator type	Actuator type	LINEAR, ROTARY	---	LINEAR
<b>P1.1</b>	<b>AUTO_ADJ</b>	Automatic adjustment	Autoadjust	Function	---	---
<b>P1.2</b>	<b>TOL_BAND</b>	Tolerance band	Tolerance band	0.30 bis 10.00	%	0.30
<b>P1.3</b>	<b>DEADBAND</b>	DEAD BAND	Dead band	0.10 bis 10.00	%	0.10
<b>P1.4</b>	<b>TEST</b>	Test	Test	Function	---	---
<b>P1.5*</b>	<b>ADRESS</b>	Bus address		1 bis 126	---	126
<b>P1.6</b>	<b>EXIT</b>	Return	Return to operating level	Function	---	---
<b>P2._</b>	<b>SETPOINT</b>					
<b>P2.0</b>					---	---
<b>P2.1</b>					---	---
<b>P2.2</b>	<b>CHARACT</b>	Charact. curve	Characteristic curve	LINEAR, 1:25, 1:50, 25:1, 50:1, USERD	---	LINEAR
<b>P2.3</b>	<b>ACTION</b>	Valve action	Direction of action	DIRECT, REVERSE	---	DIRECT
<b>P2.4</b>	<b>SHUT_CLS</b>	Shut-off value 0%	Shut-off value 0 %	OFF, 0.1 to 45.0	%	OFF
<b>P2.5</b>	<b>RAMP UP</b>	Set point ramp, up	Setpoint ramp (up)	0.1 to 999.9	sec	OFF
<b>P2.6</b>	<b>RAMP DN</b>	Set point ramp, down	Setpoint ramp (down)	0.1 to 999.9	sec	OFF
<b>P2.7</b>	<b>SHUT_OPN</b>	Shut off value 100%	Shut-off value 100%	OFF, 80.0 to 100	%	OFF
<b>P2.8</b>	<b>EXIT</b>	Return	Return to operating level	Function	---	---
<b>P3._</b>	<b>ACTUATOR</b>					
<b>P3.0</b>	<b>MIN_RGE</b>	Min. of stroke range	Operating range, min.	0.0 to 100.0	%	0.0
<b>P3.1</b>	<b>MAX_RGE</b>	Max. of stroke range	Operating range, max.	0.0 to 100.0	%	100
<b>P3.2</b>	<b>ZERO_POS</b>	Zero position	Zero position	CLOCKWISE, CTCLOCKWISE	---	CTCLOCKWISE
<b>P3.3</b>	<b>EXIT</b>	Return	Return to operating level	Function	---	---
<b>P4._, P5._</b>					---	---
<b>P6._</b>	<b>MAN_ADJ</b>					
<b>P6.0</b>	<b>MIN_VR</b>	Min. valve range	Operating range, min.	0.0 to 100.0	%	0
<b>P6.1</b>	<b>MAX_VR</b>	Max. valve range	Operating range, max.	0.0 to 100.0	%	100
<b>P6.2</b>	<b>ACTUATOR</b>	Actuator type	Actuator type	LINEAR, ROTARY	---	LINEAR
<b>P6.3</b>	<b>SPRNG_Y2</b>	Spring action (Y2)	Spring action (Y2)	CLOCKWISE, CTCLOCKWISE	---	CTCLOCKWISE
<b>P6.4</b>	<b>ADJ_MODE</b>	Auto adjust mode	Dead angle 0 %	FULL, STROKE, CTRL_PAR, ZERO_POS, LOCKED	---	FULL
<b>P6.5</b>	<b>EXIT</b>	Return	Return to operating level	Function	---	NV_SAVE
<b>P7._</b>	<b>CTRL_PAR</b>					
<b>P7.0</b>	<b>KP UP</b>	KP value, up	KP value (up)	1.0 to 100.0	---	1.0
<b>P7.1</b>	<b>KP DN</b>	KP value, down	KP value (down)	1.0 to 100.0	---	1.0
<b>P7.2</b>	<b>TV UP</b>	TV value, up	TV value (up)	0 to 1000	msec	100
<b>P7.3</b>	<b>TV DN</b>	TV value, down	TV value (down)	0 to 1000	msec	100
<b>P7.4</b>	<b>GOPULS UP</b>	Go pulse, up		0 to 200	msec	0

Parameter	Display	Function		Possible parameter setting	Unit	Factory setting
P7.5	GOPULS DOWN	Go pulse, down		0 to 200	msec	0
P7.6	Y-OFS UP	Y offset, up	Y offset (up)	Y-Min to 100.0	%	40.0
P7.7	Y-OFS DN	Y offset, down	Y offset (down)	Y-Min to 100.0	%	40.0
P7.8					---	---
P7.9	TOL_BAND	Tolerance band (zone)	Tolerance band (zone)	0.3 to 10.0	%	0.8
P7.10	TEST	Test	Test	Function	---	INACTIVE
P7.11	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P8._, P9._, P10._						
P11._	FS / IP					
P11.0	FAIL_POS	Save position	Safe position	ACTIVE, INACTIVE	---	INACTIVE
P11.1	FACT_SET	Factory setting	Factory setting	Function	---	---
P11.2	IP-TYP	I/P module type	Type of I/P module	NO_F_POS, F_SAFE_1, F_SAFE_2, F_FREEZE1, F_FREEZE2	---	NO_F_POS
P11.3	EXIT	Return	Return to operating level	Function	---	---

\* Activation by ABB Service only

#### Note

For detailed information on the parameterization of the device, consult the associated configuration and parameterization instructions.

## 11 Diagnosis / error messages

### Error codes

Error code	Possible cause	Impact	Troubleshooting the Instrument
NV_ERROR	Defective memory chip	Device does not boot up.	Return the device for repair.
TIMEOUT	Automatic adjustment function lasts too long.	Autoadjust function is aborted. .	Increase the supply pressure or use boosters.
OUTOFRNG	Mounting conditions not correct. Position outside sensor range.	Autoadjust function is aborted.	Check mounting conditions.
CALC_ERR	<ol style="list-style-type: none"> <li>1 Inconsistent data, e.g., low value &gt; than high value, or incorrect configuration.</li> <li>2 Data cannot be saved locally, as PROFIBUS saves data in the background.</li> </ol>	<ol style="list-style-type: none"> <li>1 Automatic adjustment is aborted.</li> <li>2 Saving is not possible.</li> </ol>	<ol style="list-style-type: none"> <li>1 Correct values or load factory settings.</li> <li>2 Try again at a later point.</li> </ol>
NO_F_POS	The device is not in the safe position.		Move the device to the safe position.
ERROR	Alarm message (can only be read out using the DTM). See DTM online help <ul style="list-style-type: none"> <li>• Temperature alarm</li> <li>• Automatic adjustment has failed</li> <li>• Zero point has shifted</li> <li>• Device reset</li> <li>• Maintenance required</li> <li>• Motion counter limit value up-scaled</li> <li>• Travel counter limit value up-scaled</li> <li>• Limit switch 1 up-scaled</li> <li>• Limit switch 2 up-scaled</li> <li>• Position outside operating range</li> <li>• Position outside sensor range</li> <li>• Invalid set point</li> <li>• Local operating mode requested</li> <li>• Local operating mode active</li> <li>• Simulation active</li> <li>• Controller deactivated</li> </ul>		See DTM online help
NO_COMM	No PROFIBUS communication.	No PROFIBUS communication.	Check bus address and status bit (128).
SENS_ERR	Position sensor defective	Device moves to safety position.	Return the device for repair.
MEM_ERR	Defective memory chip	Device does not boot up.	Return the device for repair.

## Alarm codes

Alarm code	Possible cause	Impact	Troubleshooting the Instrument
ALARM 1	Leakage between positioner and actuator	Depending on how well the leakage can be compensated, small control actions are required at regular intervals.	Check the piping.
ALARM 2	The setpoint current is outside the permissible range, i.e. it is < 3.8 mA or > 20.5 mA.	–	Check the power source.
ALARM 3	Alarm of the zero monitor. The zero position has shifted by more than 4%.	– In control mode, a position outside the valve range can only be reached by moving to the limit stops, as the setpoint is limited from 0 to 100 %	Correct the mounting.
ALARM 4	Controlling is inactive, because the device does not operate in control mode or the binary input is active.	The controller does not follow the setpoint.	Switch to control mode or switch off the binary input.
ALARM 5	Positioning timed out. The settling time needed exceeds the configured stroke time.	None, or adaptive control is performed (in adaptive mode).	<p>Ensure that</p> <ul style="list-style-type: none"> <li>the actuator is not blocked.</li> <li>the supply air pressure is adequately high.</li> <li>the specified time limit is higher than 1.5 times the longest stroke time of the actuator.</li> </ul> <p>If adaption cannot run uninterruptedly for an actuator, adaption should be switched on until the alarm does not occur anymore during controlling actions.</p>
ALARM 6	The defined limit value for the stroke counter has been exceeded.	–	Reset the counter (only possible via a connected PC with suitable software).
ALARM 7	The specified limit value for the travel counter has been exceeded.	–	Reset the counter (only possible via a connected PC with suitable software).

## ... 11 Diagnosis / error messages

### Message codes

Message codes	Message description
BREAK	Action stopped by operator.
CALC_ERR	Error during plausibility check.
COMPLETE	Action completed, acknowledgment required.
EEPROM_ERR	Memory error, data could not be saved.
FAIL_POS	Safe position is active, action cannot be executed.
NO_F_POS	Safe position required, but not active.
NO_SCALE	Valve range limits have not yet been determined; therefore, partial Autoadjust cannot be run.
NV_SAVE	Data is saved in the non-volatile memory.
OUTOFRNG	Measuring range is exceeded, Auto Adjust was automatically stopped.
LOAD	Data (factory settings) are being loaded.
RNG_ERR	Less than 10 % of the measuring range is used.
RUN	Action running.
SIMUL	Simulation has been started externally from a PC via HART® protocol; switch outputs, alarm output and analog position feedback are no longer influenced by the process.
SPR_ERR	Actual spring action is different from the adjusted one.
TIMEOUT	Time-out; parameter could not be determined within two minutes; Autoadjust was automatically stopped.

## 12 Maintenance

The positioner does not require any maintenance if it is used as intended under normal operating conditions.

### Note

Manipulation by users shall immediately render the warranty for the device invalid.

To ensure fault-free operation, it is essential that the device is supplied with instrument air that is free of oil, water, and dust.

## 13 Repair

### Safety instructions

#### **DANGER**

##### Explosion hazard

Explosion hazard due to improper repair of the device.

- Faulty devices may not be repaired by the operator.
- The device may only be repaired by the ABB Service Department.

Repair and maintenance activities may only be performed by authorized customer service personnel.

When replacing or repairing individual components, use original spare parts.

### Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.

Fill out the return form (see **Return form** on page 65) and include this with the device.

In accordance with the EU Directive governing 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 must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 5 for nearest service location.

## 14 Recycling and disposal

### Note



Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).

They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:

- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

## 15 Additional documents

### Note

All documentation, declarations of conformity, approvals, certificates and additional documentation are available in the ABB download area.

[www.abb.com/positioners](http://www.abb.com/positioners)

## Trademarks

FOUNDATION Fieldbus is a registered trademark of FieldComm Group, Austin, Texas, USA.

PROFIBUS and PROFIBUS PA are registered trademarks of PROFIBUS & PROFINET International (PI)



## 16 Appendix

### Return form

#### 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:

Email:

#### 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

Notes

## Notes

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## ABB Measurement & Analytics

For your local ABB contact, visit:  
**[www.abb.com/contacts](http://www.abb.com/contacts)**

For more product information, visit:  
**[www.abb.com/positioners](http://www.abb.com/positioners)**

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