

TZIDC-200

Digital positioner



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

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TZIDC-200

Introduction

The TZIDC-200 has an integral mount design, features a modular structure and offers an outstanding price-performance ratio. Fully automatic determination of the control parameters and adaptation to the final control element allow for considerable time savings as well as optimum control behavior.

Additional Information

Additional documentation on TZIDC-200 is available for download free of charge at 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 60079-1, 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.

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

[ABB Library – TZIDC-200 – Software downloads](#)



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Service address

Customer service center

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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-200 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

- ATEX Ex d / Ex i, UKEX Ex d / Ex i, for details, see page 10.
- IECEx Ex d / Ex i, for details, see page 12.
- cFMus, for details, see page 14.
- EAC TR-CU-012, for details see page 23.

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 left, 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: Marking (example)



Figure 2: Ex marking (example, UKEX)

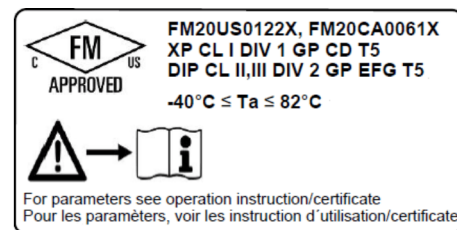


Figure 3: Additional plate Ex marking cFMus (example)



Figure 4: Ex marking (example, EAC Ex)

Note

Before the initial installation and commissioning, the operator decides whether to use the device:

- Either as a device with the intrinsically safe 'Ex i' type of protection or
- Or as a device with the 'Ex d' type of protection

The operator must 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

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-200 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-200 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-200 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.

NOTICE

Damage to components

If the sealing surface is damaged, 'Ex d' explosion protection is no longer guaranteed.

- Handle the housing cover carefully.
- Place the housing cover on a smooth and clean surface only!

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.

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
- Never operate the device without the splash guard.
- 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.

... 2 Use in potentially explosive atmospheres

ATEX / UKEX

Type of protection Ex d - flameproof (enclosure)

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

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 the 'Ex d' type of protection
 The selected type of use must be permanently marked 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.
- Only use suited cable entries that meet the requirements of EN 60079-1.
- 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 fall below 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.

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

Type of protection Ex i, intrinsic safety

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

Special conditions

- The power supply for the 'Feedback on the actuator position using proximity switches (Pepperl & Fuchs SJ2-SN)' circuit must be provided intrinsically safe in accordance with the PTB 00 ATEX 2049 X certificate according to application type 2.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs.

Note

It is considered very unlikely that a potentially hazardous atmosphere would be present in Zone 2 at the same time that installation or maintenance or repair work was being carried out.

- Only non-flammable gases must be used for pneumatic power supply.
- Only use suited cable entries that meet the requirements of EN 60079-11.

Temperature Data

Device group II 2 G / II 3 G	
Temperature class	Ambient temperature Ta
T4 to T1	-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.

Electrical Data

In type of protection 'Intrinsic safety Ex ib, Ex ia or Ex ic', only for connection to a certified intrinsically safe circuit.

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / -12)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 6.6 nF L _i = negligibly small
Contact input (+81 / -82)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 14.5 nF L _i = negligibly small
Switch output (+83 / -84)	U _i = 30 V I _i = 320 mA P _i = 500 mW	C _i = 14.5 nF L _i = negligibly small
Feedback on the actuator position using proximity switches, (Pepperl & Fuchs SJ2-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	
Plug-in module for digital feedback (+51 / -52) (+41 / -42)	U _i = 30 V I _i = 320 mA P _i = 250 mW	C _i = 3.7 nF L _i = negligibly small
Plug-in module for analog feedback (+31 / -32)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 6.6 nF L _i = negligibly small
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter (U _m ≤ 30 V DC) outside the hazardous area.	

... 2 Use in potentially explosive atmospheres

IECEX

Type of protection Ex d - flameproof (enclosure)

Ex-marking

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

Special conditions

- The positioner is designed for a maximum permissible ambient temperature range of –40 to 85 °C (–40 to 185 °F)
- 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
- 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.
- Only suited cable entries must be used that meet the requirements of 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

Type of protection Ex i, intrinsic safety

Ex marking

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

Special conditions

- The power supply for the ‘Feedback on the actuator position using proximity switches (Pepperl & Fuchs S32-SN)’ circuit must be provided intrinsically safe in accordance with the PTB 00 ATEX 2049 X certificate according to application type 2.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs.

Note

It is considered very unlikely that a potentially hazardous atmosphere would be present in Zone 2 at the same time that installation or maintenance or repair work was being carried out.

- Only non-flammable gases must be used for pneumatic power supply.
- Only use suited cable entries that meet the requirements of EN 60079-11.

Temperature Data

Temperature class	Ambient temperature Ta
T4 to T1	-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.

Electrical Data

In type of protection 'Intrinsic safety Ex ib, Ex ia or Ex ic', only for connection to a certified intrinsically safe circuit.

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / -12)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 6.6 nF L _i = negligibly small
Contact input (+81 / -82)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 14.5 nF L _i = negligibly small
Switch output (+83 / -84)	U _i = 30 V I _i = 320 mA P _i = 500 mW	C _i = 14.5 nF L _i = negligibly small
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter (U _m ≤ 30 V DC) outside the hazardous area.	

The following modules may be operated as an option:

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, see certificate IECEx PTB 11.0092X Pepperl & Fuchs Type 2 proximity switches	
Plug-in module for digital feedback (+51 / -52) (+41 / -42)	U _i = 30 V I _i = 320 mA P _i = 250 mW	C _i = 3.7 nF L _i = negligibly small
Plug-in module for analog feedback (+31 / -32)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 6.6 nF L _i = negligibly small

... 2 Use in potentially explosive atmospheres

cFMus

Ex marking

TZIDC-200

Model number: V18348-a0b2d3efghi

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

DIP / II, III / 1 / EFG / T5 Ta = -40°C to +82°C;

Type 4X

Certificate FM20US0122X and FM20CA0061X

Model number details

- a Housing / assembly: 1, 2, 3 or 4
- b Operation: 0 or 1
- d Set output / safety position: 1, 2, 3 or 4.
- d Optional upgrade with plug-in module for analog / digital feedback (option): 0, 1, 3 or 4
- f Optional upgrade with mechanical digital feedback 0, 1, 2, 3.
- g Parameterization / bus address: 1 or 2
- h Design (paint / marking): 1, H, P or 2
- i Measuring point tag plate: 0, 1 or 2

Electrical Data

Refer to **FM installation drawing No. 901265** on page 18.

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 4 of 5** on page 21 to **Page 5 of 5** on page 22.

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 4 of 5** on page 21 to **Page 5 of 5** on page 22. 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-200 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 mm² or
- Direct connection of fine wires of up to 1.5 mm² or
- Connection of cross-sections of up to 6 mm² 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-200 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-200 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.

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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”

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FM installation drawing No. 901265

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1. Entity concept / Ex ec (TZIDC, TZIDC-110/-120)								
	Concept	Groups	V _{max} (V)	I _{max} (mA)	P _{max} (W)	C _i (nF)	L _i (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 _{max} (V)	I _{max} (mA)	P _{max} (W)	C _i (nF)	L _i (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 _{max} (V)	I _{max} (mA)	P _{max} (W)	C _i (nF)	L _i (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 Feedback
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-
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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	<table border="1"> <tr> <td colspan="2">TZIDC-xxx</td> </tr> <tr> <td>+11</td> <td>Analog Input</td> </tr> <tr> <td>-12</td> <td>Analog Input</td> </tr> <tr> <td>+31</td> <td>Analog Position Feedback / Limit Switches</td> </tr> <tr> <td>-32</td> <td>Analog Position Feedback / Limit Switches</td> </tr> <tr> <td>+41</td> <td>Digital Position Feedback /</td> </tr> <tr> <td>-42</td> <td>Digital Position Feedback</td> </tr> <tr> <td>+51</td> <td>Digital Position Feedback/ Limit Switches</td> </tr> <tr> <td>-52</td> <td>Digital Position Feedback/ Limit Switches</td> </tr> <tr> <td>+81</td> <td>Digital Input</td> </tr> <tr> <td>-82</td> <td>Digital Input</td> </tr> <tr> <td>+83</td> <td>Digital Output</td> </tr> <tr> <td>-84</td> <td>Digital Output</td> </tr> </table> <p>→Any FM/ CSA Approved Terminator (maynot be necessary for Entity Installations)</p> <table border="1"> <tr> <td colspan="3">Ambient temperature dependent on temperature class</td> </tr> <tr> <td>Type and Marking</td> <td colspan="2">TZIDC, TZDIC-110/-120</td> </tr> <tr> <td>Ambient temperature</td> <td>Gas atmosphere</td> <td>Dust atmosphere</td> </tr> <tr> <td></td> <td>Temperature class</td> <td>Ambient temperature</td> </tr> <tr> <td>-40 °C to 85 °C</td> <td>T4</td> <td>T 125 °C</td> </tr> <tr> <td>-40 °C to 40 °C</td> <td>T6</td> <td>T 85 °C</td> </tr> </table>		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	Ambient temperature dependent on temperature class			Type and Marking	TZIDC, TZDIC-110/-120		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
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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 μ 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 μ 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 Ω /km
Inductance per unit length	L' : 0.4...1mH/km
Capacitance per unit length	C' : 80...200 nF / km
	$C' = C' \text{ line/line} + 0.5C' \text{ line/screen}$, if both lines are floating
	or
	$C' = C' \text{ line/line} + C' \text{ Line/screen}$, 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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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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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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EAC TR-CU-012

Type of protection Ex d - flameproof (enclosure)

Ex marking

Ex marking	
Marking	1Ex d IIC T6...T4 Gb X
Certificate	EAC TR-CU-012
Type	TZIDC-200 Doc. 901132
Standards	EN 60079-0. EN 60079-1

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 the 'Ex d' type of protection
 The selected type of use must be permanently marked 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.
- Only use suited cable entries that meet the requirements of EN 60079-1.
- 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 fall below 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.

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

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... EAC TR-CU-012

Type of protection Ex i, intrinsic safety

Ex marking

Ex marking	
Marking	1Ex ia IIC T6/T4 Gb X 1Ex ib IIC T6/T4 Gb X
Certificate	EAC TR-CU-012
Type	Intrinsically safe equipment
Standards	EN 60079-0, EN 60079-11

Special conditions

- The power supply for the 'Feedback on the actuator position using proximity switches (Pepperl & Fuchs SJ2-SN)' circuit must be provided intrinsically safe in accordance with the PTB 00 ATEX 2049 X / RU C-DE.AA87.B.00394 certificate according to application type 2.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs.

Note

It is considered very unlikely that a potentially hazardous atmosphere would be present in Zone 2 at the same time that installation or maintenance or repair work was being carried out.

- Only non-flammable gases must be used for pneumatic power supply.
- Only use suited cable entries that meet the requirements of EN 60079-11.

Temperature characteristic curves

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

- Equipment Category 1: Use in Zone 0
- Equipment Category 2: Use in Zone 1
- Equipment Category 3: Use in Zone 2

Temperature Data

Temperature class	Ambient temperature Ta
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.

Electrical Data

In type of protection 'Intrinsic safety Ex ia, Ex ib', only for connection to a certified intrinsically safe circuit.

Current circuit (terminal)	Electrical information (maximum values)	
Signal circuit (+11 / -12)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 6.6 nF L _i = negligibly small
Contact input (+81 / -82)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 14.5 nF L _i = negligibly small
Switch output (+83 / -84)	U _i = 30 V I _i = 320 mA P _i = 500 mW	C _i = 14.5 nF L _i = negligibly small
Feedback on the actuator position using proximity switches, Pepperl & Fuchs SJ2-SN (Limit1: +51 / -52), (Limit2: +41 / -42)	For maximum values, see EU-Type examination certificate PTB 00 ATEX 2049 X / RU C-DE.AA87.B.00394 Pepperl & Fuchs Type 2 proximity switches	
Plug-in module for digital feedback (+51 / -52) (+41 / -42)	U _i = 30 V I _i = 320 mA P _i = 250 mW	C _i = 3.7 nF L _i = negligibly small
Plug-in module for analog feedback (+31 / -32)	U _i = 30 V I _i = 320 mA P _i = 1.1 W	C _i = 6.6 nF L _i = negligibly small
Local communication interface (LCI)	Only for connection to a programming device using an ABB LCI adapter (U _m ≤ 30 V DC) outside the hazardous area.	

3 Design and function

Schematic diagram

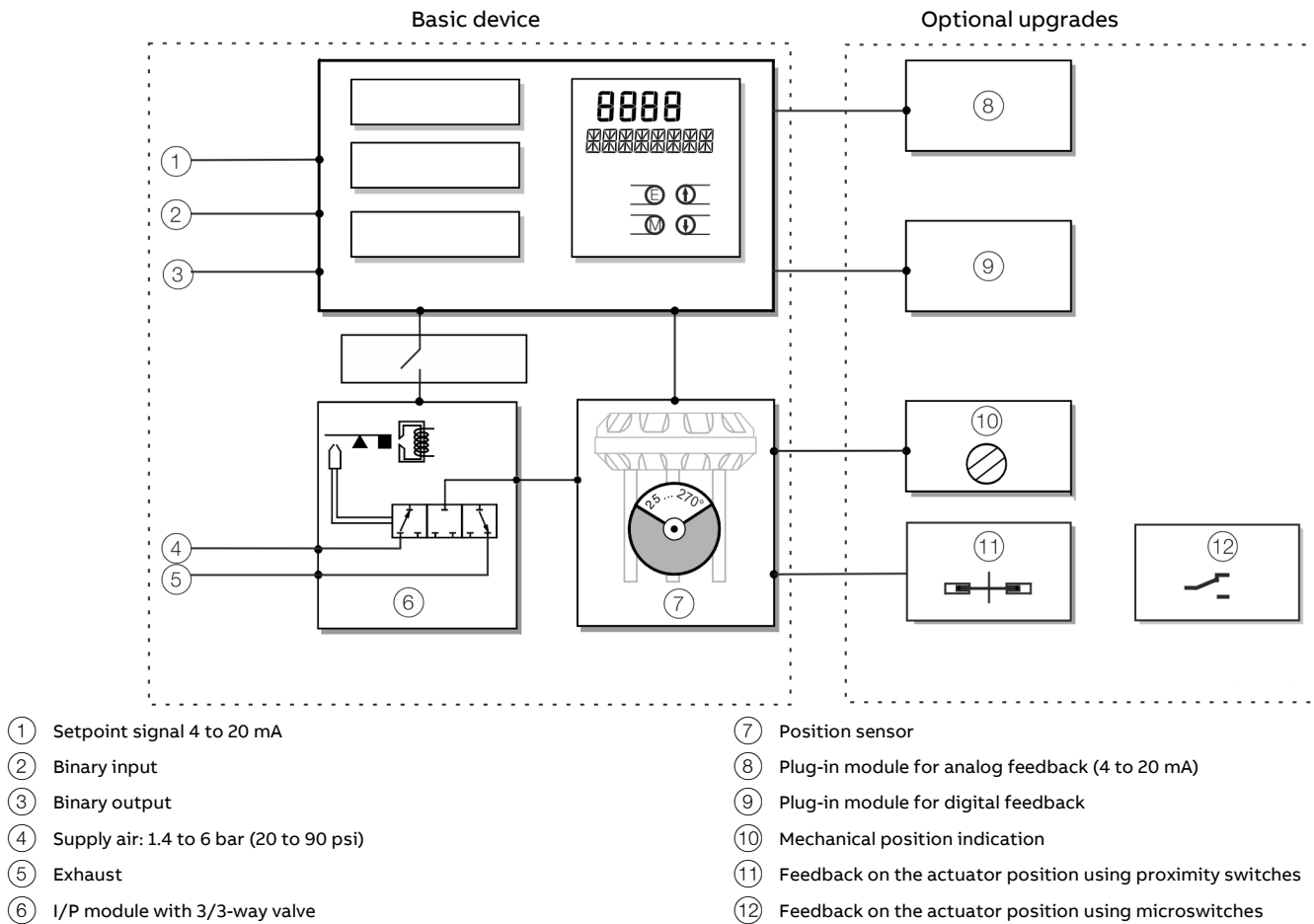


Figure 5: Schematic diagram of the positioner

Note

With optional extensions, either the 'Feedback on the actuator position using proximity switches' ⑪ or the 'Feedback on the actuator position using microswitches' ⑫ can be used. However, in both cases, the mechanical position indication ⑩ must be installed.

Principle of operation

The TZIDC-200 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

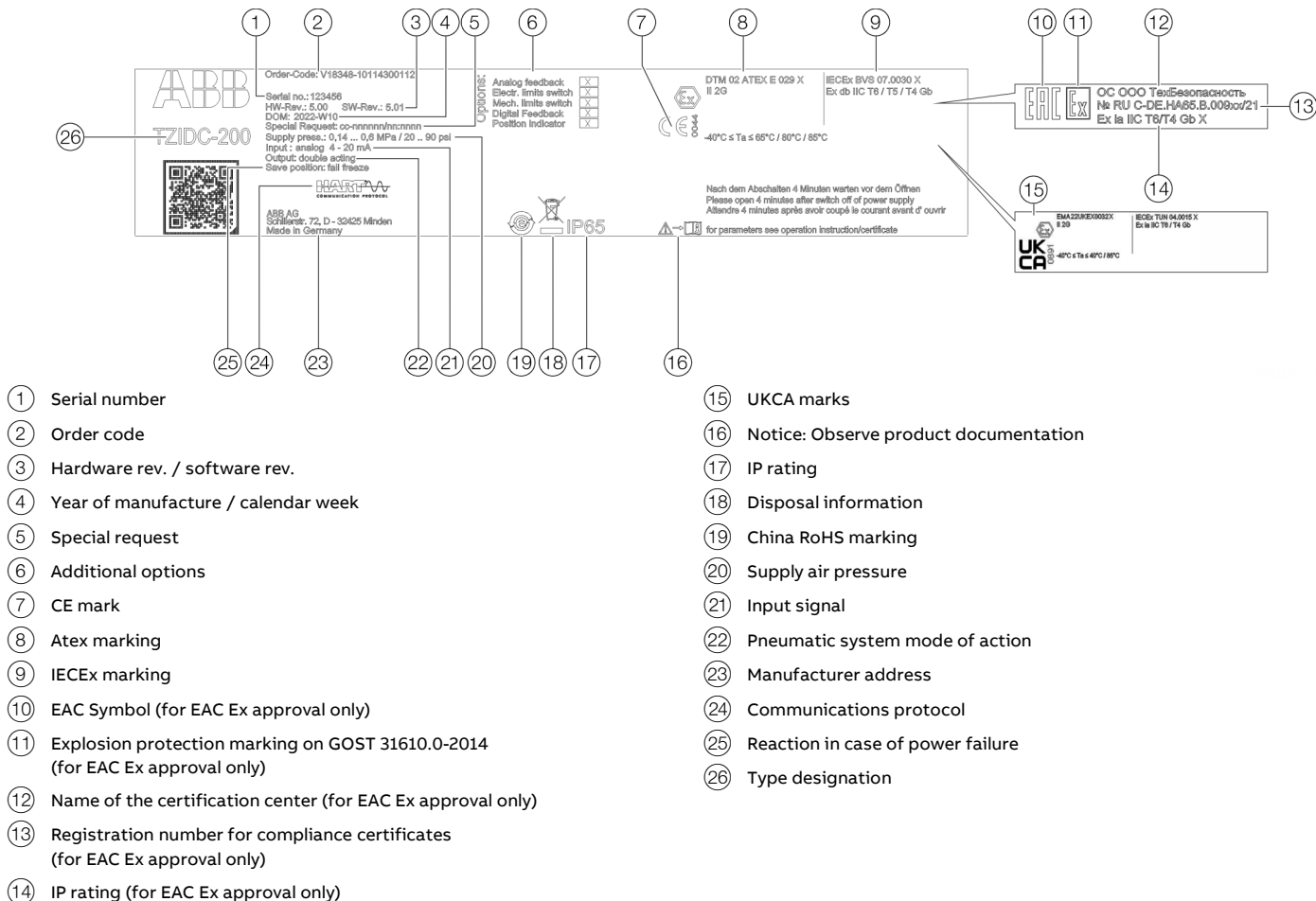


Figure 6: Name plate (sample)

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 55.

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

Measurement and operating range to HW-Rev.: 5.0

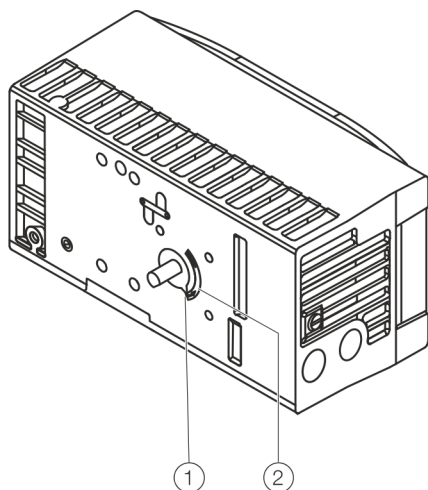


Figure 7: Operating range

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

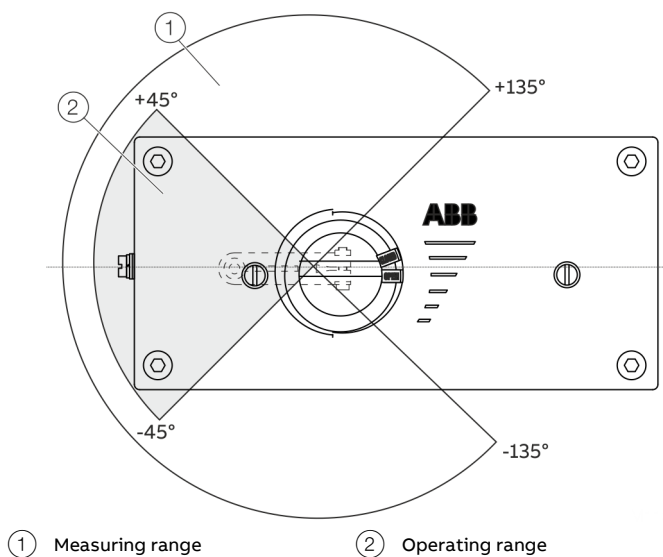


Figure 8: Measuring and operating ranges of the positioner

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° , but at least 25° . The usable span should run as symmetrically to the longitudinal axis as possible.

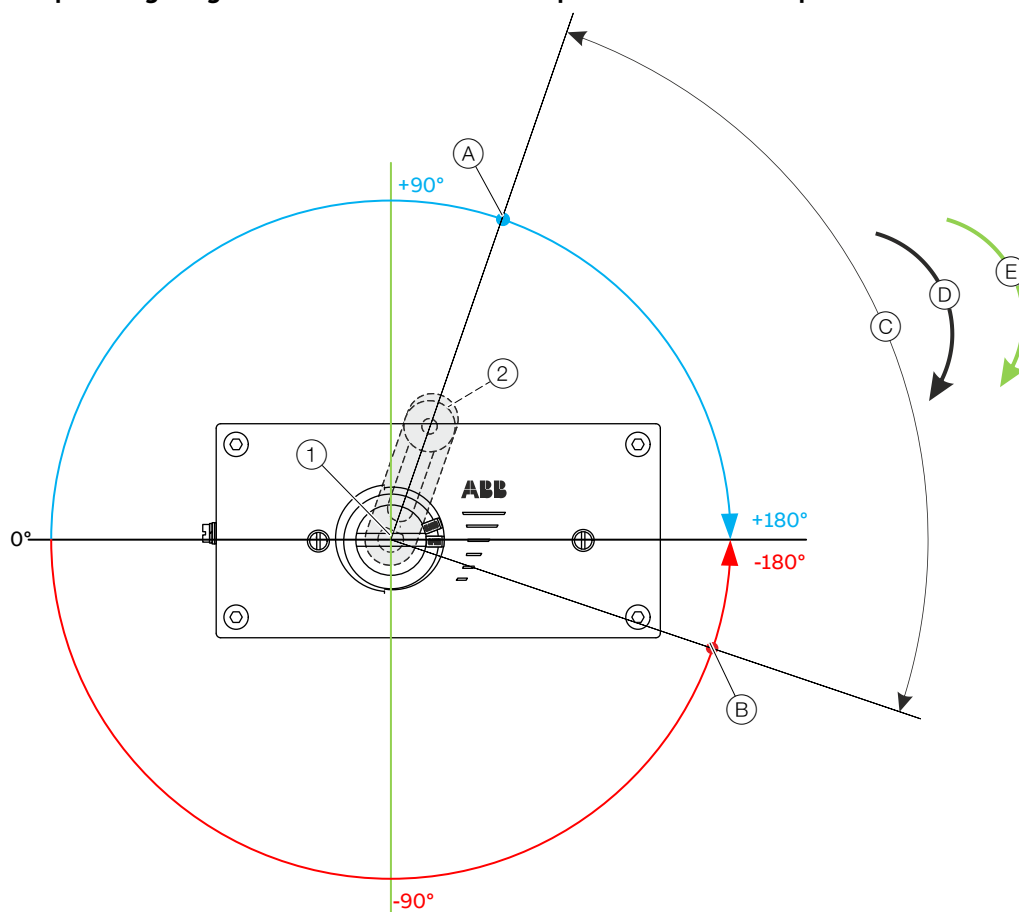
Operating range of rotary actuators:

The usable span is $+57^\circ$ to -57° , 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.

Measurement and operating range from HW-Rev.: 5.01 with optional contactless position feedback



- ① Device feedback shaft
- ② Lever
- (A) Operating range 100% opening degree, OUT1 = supply pressure
- (B) Operating range 0% opening degree, OUT1 = ambient pressure
- (C) Operating range detected by the valve's/actuator's standard automatic adjustment. For rotary actuators, the operating range within each position can be up to 340°.
- (D) Rotational direction for parameter "P6.3 – SPRNG_Y2" detected by the standard automatic adjustment (When venting OUT 1, the device feedback shaft 1 turns clockwise).
- (E) Rotational direction for parameter "P6.7 – ZERO_POS" set by the standard automatic adjustment (When venting OUT 1, the device feedback shaft 1 turns clockwise).

Figure 9: Measurement and operating range with contactless position feedback (example for rotary actuators)

Devices from HW rev.: 5.01 can be equipped with the order option "Contactless sensor – S1".
The position feedback then takes place via a 360° sensor without mechanical end stops.

This allows a wider operating range of up to 350°. The operating range can then be at any point in the sensor range.

Automatic adjustment

The standard automatic adjustment for rotary and linear actuators is performed as described in **Standard automatic adjustment** on page 43.

Requirements for automatic adjustment:

- Mechanical end stops on valves
- Close valve by turning it to the right

For different installation situations such as: gear rack actuators, further parameter settings are required. Observe the technical description "TD/TZIDC/TZIDC-200/NON-CONTACT_SENSOR" for detailed information.

... 6 Installation

... Mechanical mounting

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.

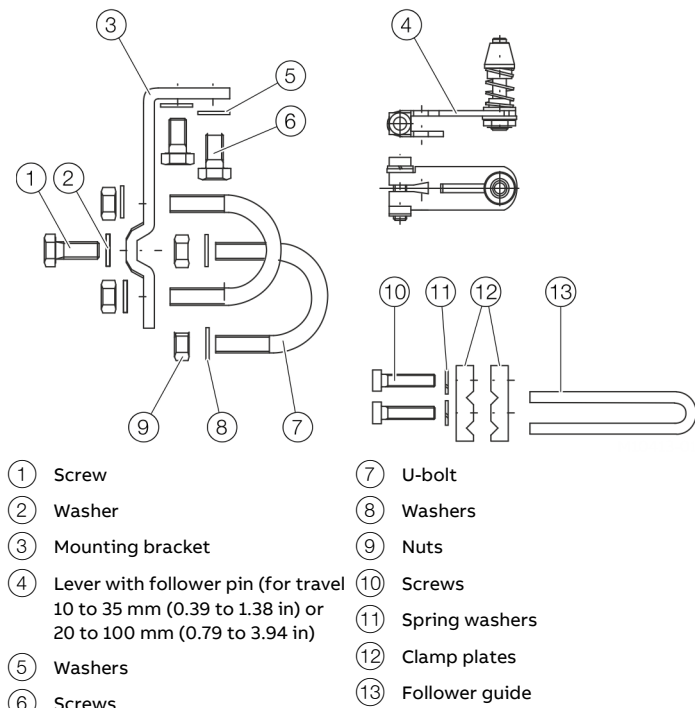


Figure 10: Components of attachment kit

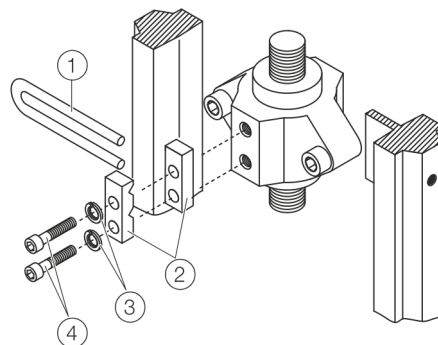


Figure 11: Attaching a follower guide to the actuator

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.

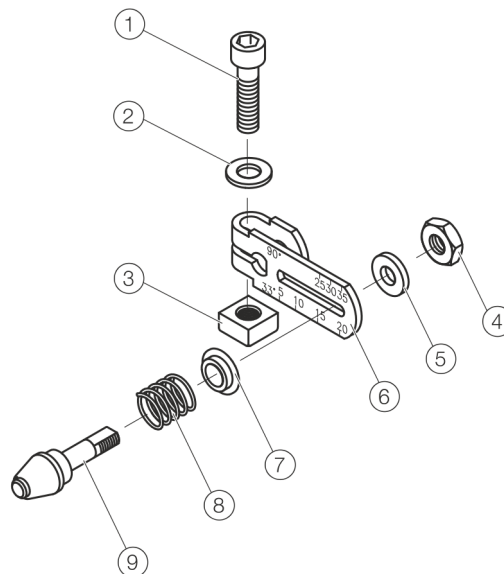


Figure 12: Assemble lever (if not pre-assembled)

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.

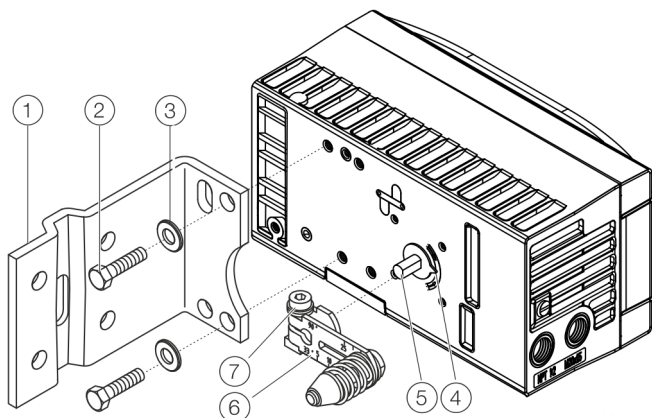


Figure 13: Mounting lever and bracket on the positioner

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)).

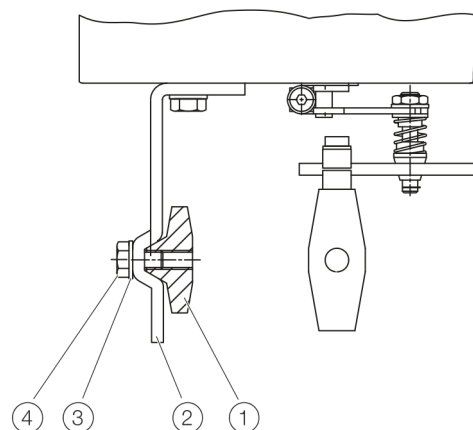


Figure 14: Mounting on a cast iron yoke

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

or

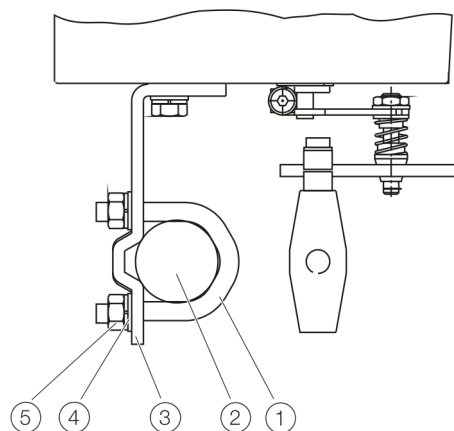


Figure 6: Mounting on a columnar yoke

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.

... 6 Installation

... Mechanical mounting

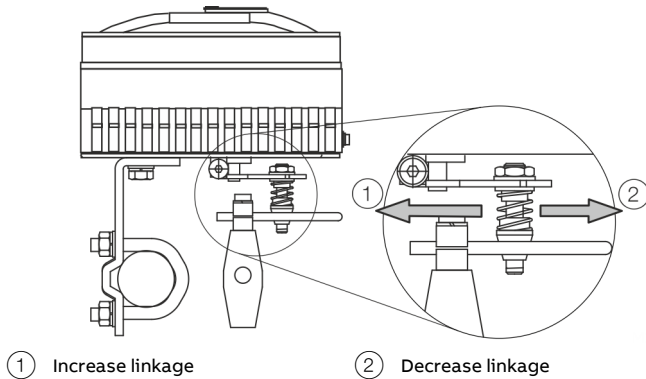


Figure 15: Positioner linkage

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.

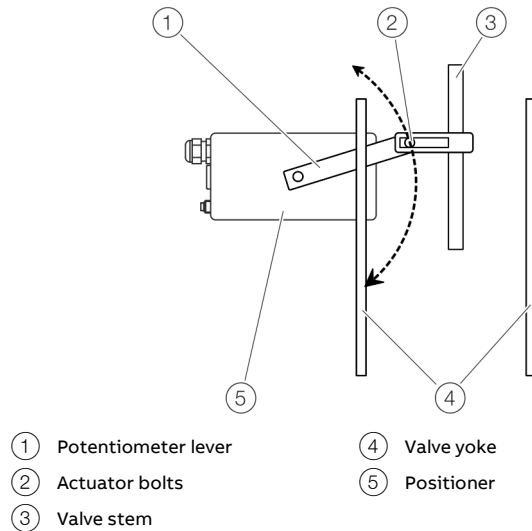


Figure 16: Actuator bolts on the lever

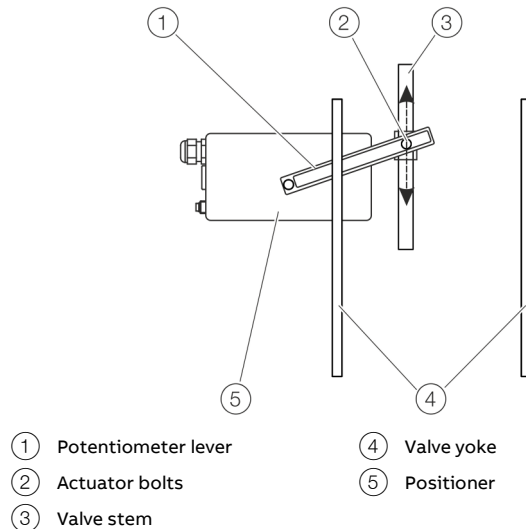


Figure 17: Actuator bolts on the valve

Mounting on rotary actuator

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

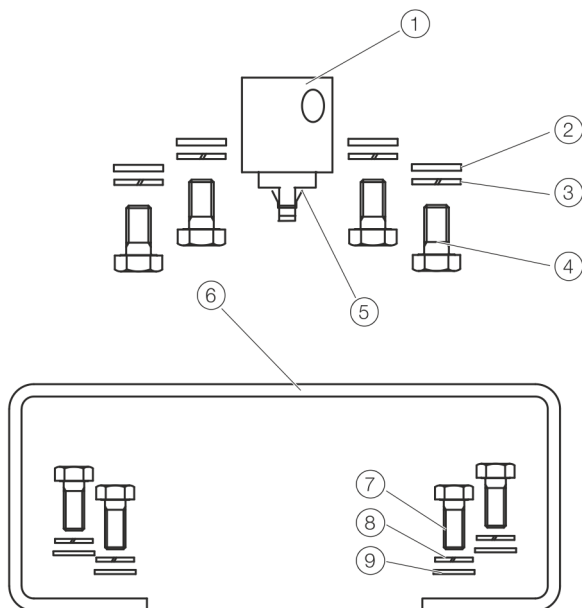


Figure 18: Attachment kit components

- 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

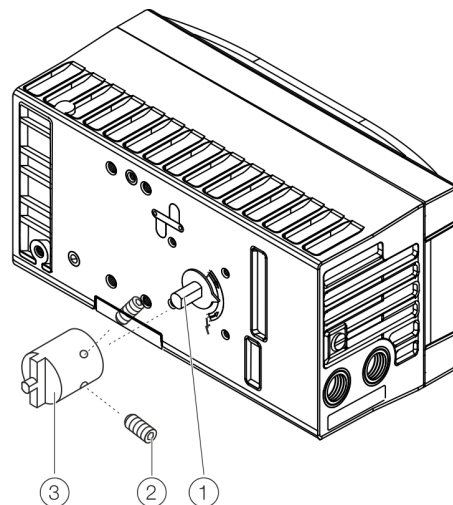
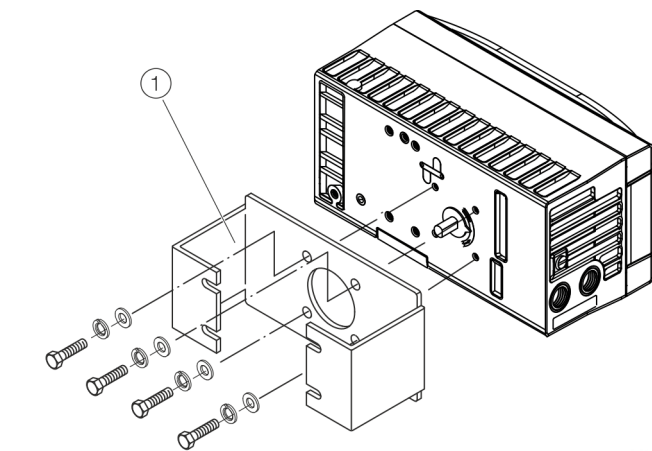


Figure 19: Mounting the adapter on the positioner

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 operating range (see **Measurement and operating range to HW-Rev.: 5.0** on page 28 or **Measurement and operating range from HW-Rev.: 5.01 with optional contactless position feedback** on page 29), the installation position as well as the basic position and rotational direction of the actuator when determining the adapter position on axis (1) must 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.

... 6 Installation

... Mechanical mounting



① Attachment bracket

Figure 20: Screwing the mounting bracket onto the positioner

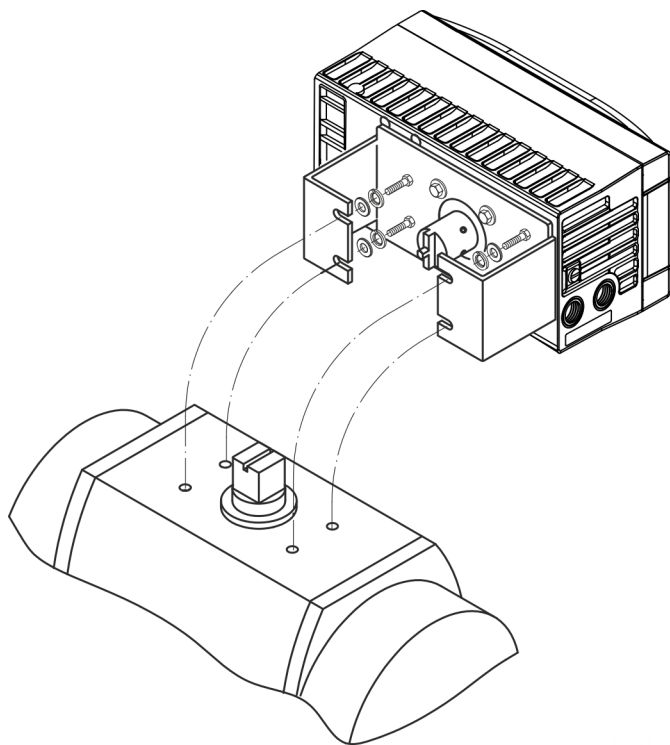


Figure 21: Screwing positioner onto actuator

Note

After mounting, check whether the operating range of the actuator matches the measurement range of the positioner, refer to **Measurement and operating range to HW-Rev.: 5.0** on page 28 or **Measurement and operating range from HW-Rev.: 5.01 with optional contactless position feedback** on page 29.

7 Electrical connections

Safety instructions

DANGER

Risk of explosion for devices with local communication interface (LCI)

A local communication interface (LCI) may not be operated in hazardous areas.

- Never use the local communication interface (LCI) on the main board in a hazardous area!

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.

... 7 Electrical connections

TZIDC-200 terminal assignment

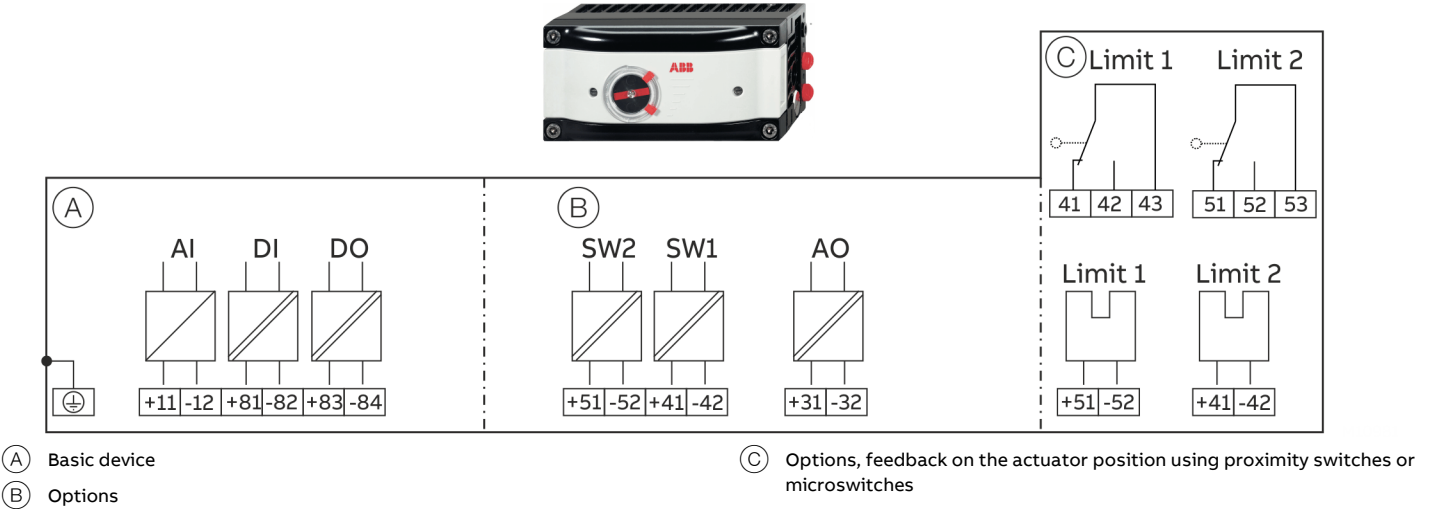


Figure 22: Electrical connection TZIDC-200

Connections for inputs and outputs

Terminal	Function/comments
+11 / -12	Analog input
+81 / -82	Binary input DI
+83 / -84	Binary output DO2
+51 / -52	Plug-in module for digital feedback SW1 (Option module)
+41 / -42	Plug-in module for digital feedback SW2 (Option module)
+31 / -32	Plug-in module for analog feedback AO (Option module)

Terminal	Function/comments
+51 / -52	Feedback on the actuator position using proximity switches Limit 1 (optional)
+41 / -42	Feedback on the actuator position using proximity switches Limit 2 (optional)
41 / 42 / 43	Feedback on the actuator position using microswitches Limit 1 (optional)
51 / 52 / 53	Feedback on the actuator position using microswitches Limit 2 (optional)

Note

The TZIDC-200 can be fitted either with proximity switches or microswitches for feedback on the actuator position.

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!

Analog input

Set point signal analog (two-wire technology)

Terminals	+11 / -12
Nominal operating range	4 to 20 mA
Split range configuration	20 to 100 % of the nominal operating range can be parameterized between
Maximum	50 mA
Minimum	3.6 mA
Starting at	3.8 mA
Load voltage	9.7 V at 20 mA
Impedance at 20 mA	485 Ω

Digital input

Input for the following functions:

- no function
- move to 0 %
- move to 100 %
- Hold previous position
- block local configuration
- block local configuration and operation
- block any access (local or via PC)

Binary input DI

Terminals	+81 / -82
Supply voltage	24 V DC (12 to 30 V DC)
Input 'logical 0'	0 to 5 V DC
Input 'logical 1'	11 to 30 V DC
Input Current	maximum 4 mA

Digital output DO

Output configurable as alarm output by software.

Binary output DO

Terminals	+83 / -84
Supply voltage	5 to 11 V DC (Control circuit in accordance with DIN 19234/NAMUR)
Output 'logical 0'	> 0.35 mA to < 1.2 mA
Output 'logical 1'	> 2.1 mA
Direction of action	Configurable 'logical 0' or 'logical 1'

Option modules

Plug-in module for analog feedback AO*

Without any signal from the positioner (e.g. 'no power' or 'initializing') the module sets the output to > 20 mA (alarm level).

Terminals	+31 / -32
Signal range	4 to 20 mA (split ranges can be parameterized)
• in the event of an error	> 20 mA (alarm level)
Supply voltage, two-wire technology	24 V DC (11 to 30 V DC)
Characteristic curve	rising or falling (configurable)
Deviation	< 1 %

Plug-in module for digital feedback SW1, SW2*

Two software switches for binary position feedback (position adjustable within the range of 0 to 100 %, ranges cannot overlap)

Terminals	+41 / -42, +51 / -52
Supply voltage	5 to 11 V DC (Control circuit in accordance with DIN 19234 / NAMUR)
Output 'logical 0'	< 1.2 mA
Output 'logical 1'	> 2.1 mA
Direction of action	Configurable 'logical 0' or 'logical 1'

* The module for analog feedback and the module for digital feedback have separate slots and can be used together.

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 SJ2-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 indicator

Indicator disk in enclosure cover linked with device feedback shaft.

These options are also available for retrofitting by Service.

... 7 Electrical connections

Connection on the device

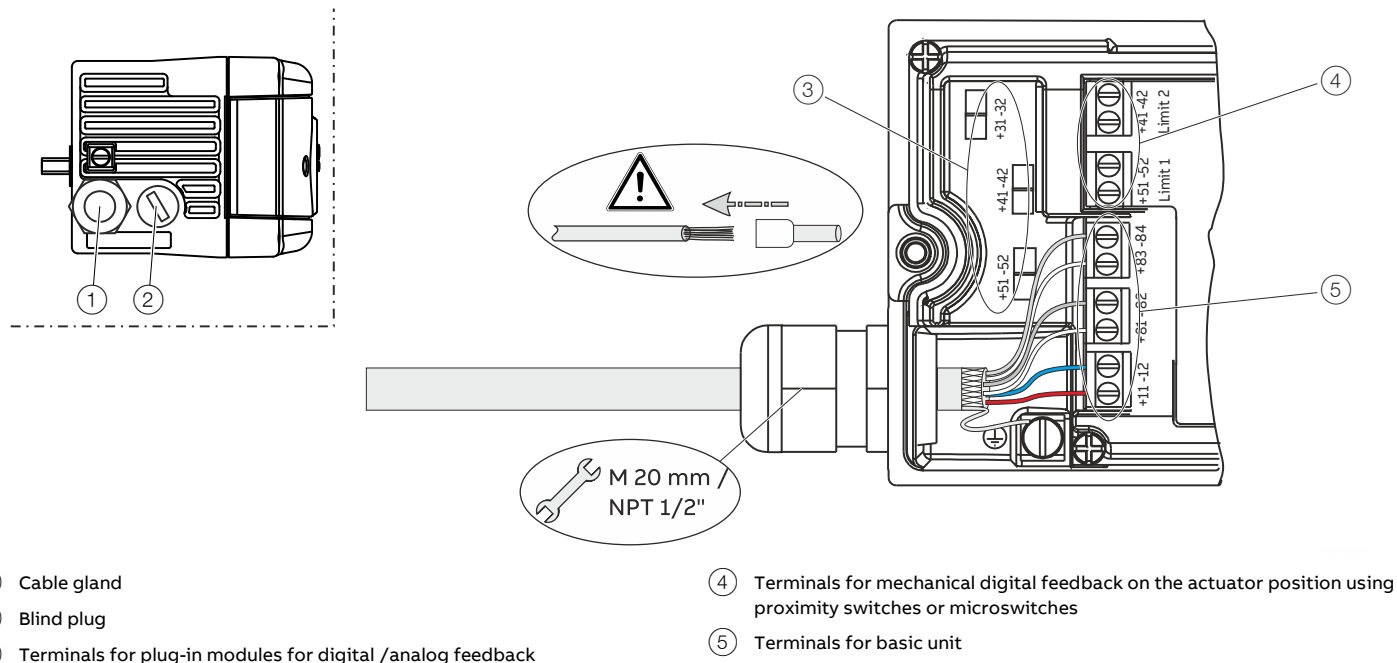


Figure 23: Connection on device (example)

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.

1. Strip the wires to approximately 6 mm (0.24 in).
2. After stripping the cable end, fit the appropriate wire end sleeves and crimp
3. 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 ² (AWG14)
Options	Screw terminals max. 1.0 mm ² (AWG18)
Cross section	
Rigid / flexible wires	0.14 to 2.5 mm ² (AWG26 to AWG14)
Flexible with wire end sleeve	0.25 to 2.5 mm ² (AWG23 to AWG14)
Flexible with wire end sleeve no plastic sleeve	0.25 to 1.5 mm ² (AWG23 to AWG17)
Flexible with wire end sleeve with plastic sleeve	0.14 to 0.75 mm ² (AWG26 to AWG20)
Multi-wire connection capacity (two wire with the same cross-section)	
Rigid / flexible wires	0.14 to 0.75 mm ² (AWG26 to AWG20)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.75 mm ² (AWG23 to AWG20)
Flexible with wire end sleeve with plastic sleeve	0.5 to 1.5 mm ² (AWG21 to AWG17)

Option modules

Cross section	
Rigid / flexible wires	0.14 to 1.5 mm ² (AWG26 to AWG17)
Flexible with wire end sleeve no plastic sleeve	0.25 to 1.5 mm ² (AWG23 to AWG17)
Flexible with wire end sleeve with plastic sleeve	0.25 to 1.5 mm ² (AWG23 to AWG17)
Multi-wire connection capacity (two wire with the same cross-section)	
Rigid / flexible wires	0.14 to 0.75 mm ² (AWG26 to AWG20)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.5 mm ² (AWG23 to AWG22)
Flexible with wire end sleeve with plastic sleeve	0.5 to 1 mm ² (AWG21 to AWG18)
Feedback on the actuator position using proximity switches or microswitches	
Rigid wire	0.14 to 1.5 mm ² (AWG26 to AWG17)
Flexible wire	0.14 to 1.0 mm ² (AWG26 to AWG18)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.5 mm ² (AWG23 to AWG22)
Flexible with wire end sleeve with plastic sleeve	0.25 to 0.5 mm ² (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

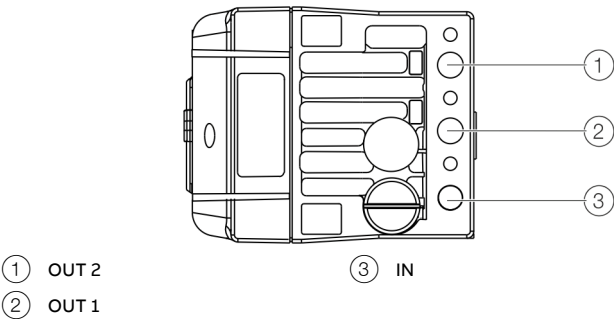


Figure 24: Pneumatic connections

Marking	Pipe connection
IN	Supply air, pressure 1.4 to 6 bar (20 to 90 psi) Marine version: <ul style="list-style-type: none">Supply air, pressure 1.4 to 5.5 bar (20 to 80 psi)*
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. G³/₄ or ¹/₄ 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

Note

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

Please observe the information in **Operation** on page 45 to operate the device!

Commissioning the positioner:

1. Open the pneumatic power supply.
2. Power-up the electric power supply and feed in the setpoint signal 4 to 20 mA.
3. Checking mechanical mounting:
 - Press **MODE** and hold; additionally press **↑** or **↓** until operating mode 1.3 (manual adjustment in the measuring range) is displayed. Release **MODE**.
 - Press **↑** or **↓** to move the actuator into the mechanical end position; check the end positions; rotational 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. Perform standard automatic adjustment in accordance with **Standard automatic adjustment** on page 43.

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

Operating modes

Selection from the operating level

1. Press and hold down **MODE**.
2. Also press and release **↑** rapidly as often as required. The selected operating mode is displayed.
3. Release **MODE**.

The position is displayed in % or as a rotation angle.

Operating mode	Mode indicator	Position indicator
1.0 Control mode* with adaptation of the control parameters		
1.1 Control mode* without adaptation of the control parameters		
1.2 Manual adjustment** in the operating range. Adjust*** using ↑ or ↓		
1.3 Manual adjustment** in the measuring range. Adjust*** using ↑ or ↓		

* Since self-optimization in operating mode 1.0 is subject to several factors during control operation with adaptation, incorrect adjustments could appear over an extended period.

** Positioning not active.

*** For high-speed mode, press **↑** and **↓** simultaneously.

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 \uparrow or \downarrow 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 28 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.

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

The following is now shown in the display:



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

The following is now shown in the display:



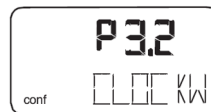
- Release **MODE** and **ENTER**.

The following is now shown in the display:



3. Selecting parameter 3.2:
 - Press and hold down **MODE**,
 - additionally quickly press and release \uparrow 2x,

The following is now shown in the display:



— Release **MODE**.

... 9 Commissioning

... Sample parameters

4. Changing parameter settings:
 - Quickly press and release **↑** to select **CTCLOCKW**.
5. 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

1. Loosen the screws for the housing cover and remove it.
2. Rotate the position indicator on the shaft to the desired position.
3. Attach the housing cover and screw it onto the housing. Tighten the screws so that they are hand-tight.
4. 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.

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

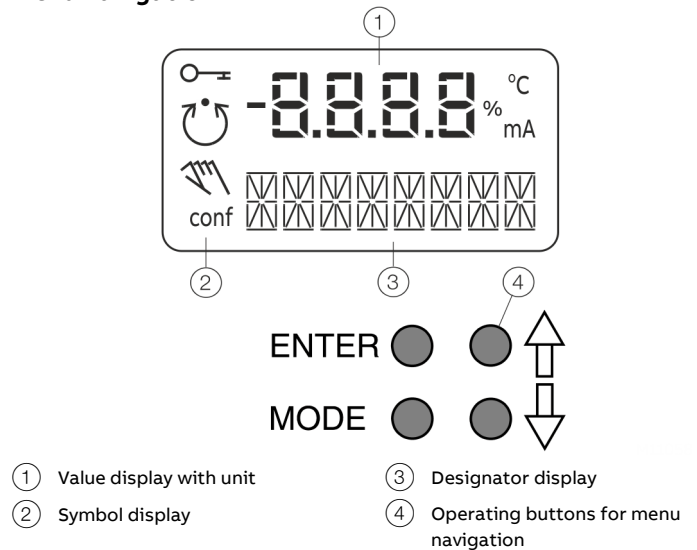


Figure 25: LCD display with operating buttons

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.

... 10Operation

... Parameterization of the device

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

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.

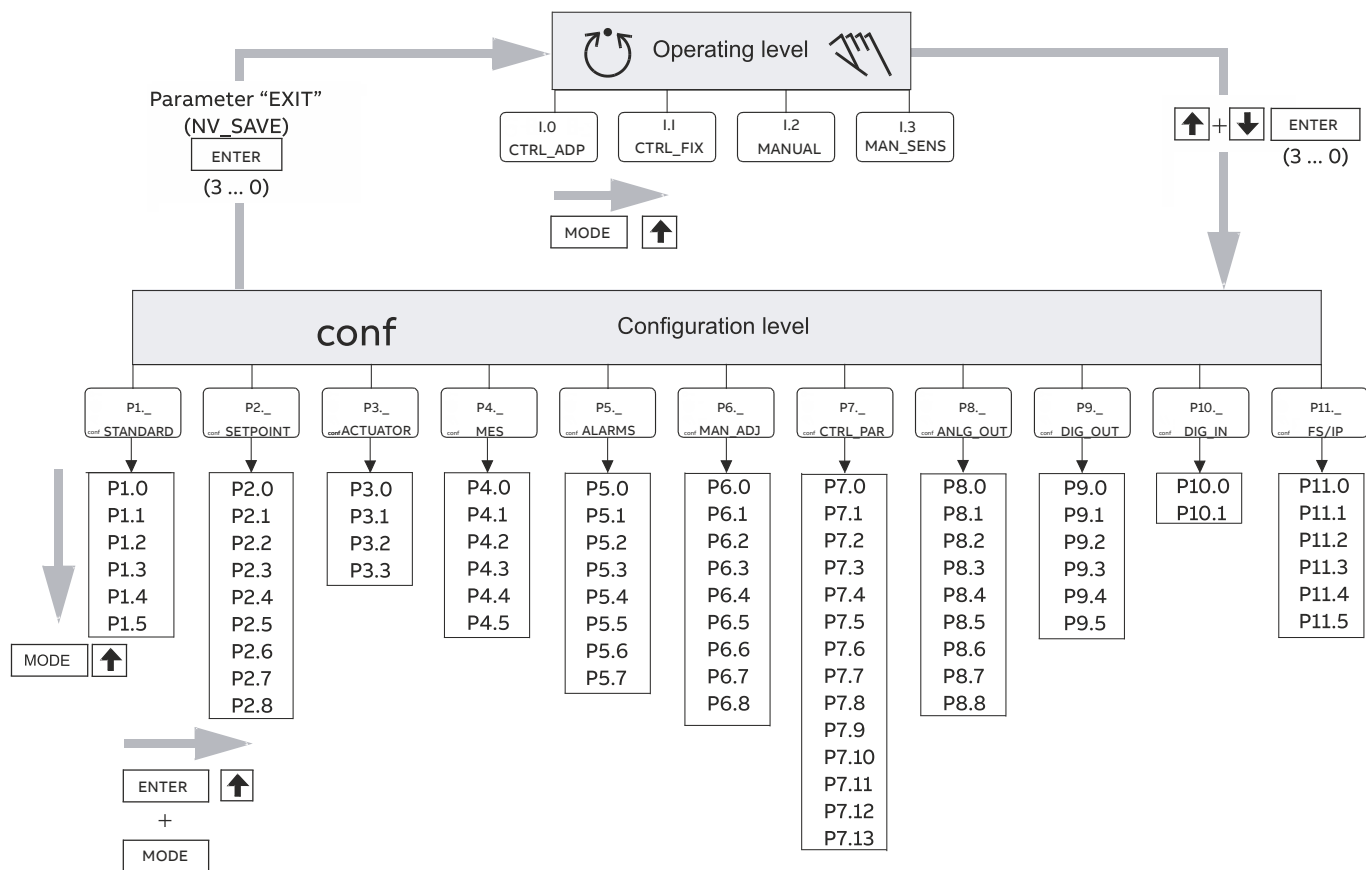


Figure 26: HART® parameter overview

... 10Operation

Parameter description HART®

ParameterDisplay		Function		Possible parameter setting	Unit	Factory setting
P1._	STANDARD					
P1.0	ACTUATOR	Actuator type	Actuator type	LINEAR, ROTARY	---	LINEAR
P1.1	AUTO_ADJ	Auto adjust	Autoadjust	Function	---	---
P1.2	ADJ_MODE	Auto adjust mode	Automatic adjustment mode	FULL,STROKE,CTRL_PAR, ZERO_POS, LOCKED		FULL
P1.3	TEST	Test	Test	Function	---	INACTIVE
P1.4	FIND_DEV	Find device	Find device	DISABLE, ONE TIME, CONTINOUS	---	DISABLE
P1.5	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P2._	SETPOINT					
P2.0	MIN_RGE	Min setpoint range	Min. setpoint range	4.0 to 18.4	mA	4.0
P2.1	MAX_RGE	Max setpoint range	Max. setpoint range	20.0 to 5.6	mA	20.0
P2.2	CHARACT	Charact. curve	Characteristic curve	LINEAR, 1:25, 1:50, 25:1, 50:1, USERD	---	LINEAR
P2.3	ACTION	Valve action	Direction of action	DIRECT, REVERSE	---	DIRECT
P2.4	SHUT_CLS	Shut-off value 0%	Shut-off value 0 %	OFF, 0.1 to 45.0	%	1.0
P2.5	SHUT_OPN	Shut off value 100%	Shut-off value 100%	55.0 to 100.0, OFF	%	OFF
P2.6	RAMP UP	Set point ramp, up	Setpoint ramp (up)	OFF, 0 to 200	---	OFF
P2.7	RAMP DN	Set point ramp, down	Setpoint ramp (down)	OFF, 0 to 200	---	OFF
P2.8	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P3._	ACTUATOR					
P3.0	MIN_RGE	Min. of stroke range	Operating range, min.	0.0 to 90.0	%	0.0
P3.1	MAX_RGE	Max. of stroke range	Operating range, max.	100.0 to 10.0	%	100
P3.2	ZERO_POS	Zero position	Zero position	CLOCKWISE, CTCLOCKWISE	---	CTCLOCKWISE
P3.3	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P4._	MESSAGES					
P4.0	TIME_OUT	Control time out	Dead band time limit	OFF, to 200	---	OFF
P4.1	POS_SW1	Position switch 1	Switching point SW1	0.0 to 100.0	%	0.0
P4.2	POS_SW2	Position switch 2	Switching point SW2	0.0 to 100.0	%	100.0
P4.3	SW1_ACTV	Switchpoint 1 enable	Active direction SW1	FALL_BEL, EXCEED	---	FALL_BEL
P4.4	SW2_ACTV	Switchpoint 2 enable	Active direction SW2	FALL_BEL, EXCEED	---	EXCEED
P4.5	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P5._	ALARMS					
P5.0	LEAKAGE	Leakage detection	Leakage to actuator	ACTIVE, INACTIVE	---	INACTIVE
P5.1	SP_RGE	Setpoint rng monitor	Outside the setpoint range	ACTIVE, INACTIVE	---	INACTIVE
P5.2	SENS_RGE	Sens. range monitor	Operating range exceeded	ACTIVE, INACTIVE	---	INACTIVE
P5.3	CTRLER	Controller monitor	Controller inactive	ACTIVE, INACTIVE	---	INACTIVE
P5.4	TIME_OUT	Control time out	Dead band time limit	ACTIVE, INACTIVE	---	INACTIVE
P5.5	STRK_CTR	Stroke counter	Movement counter	ACTIVE, INACTIVE	---	INACTIVE
P5.6	TRAVEL	Travel counter	Travel counter	ACTIVE, INACTIVE	---	INACTIVE
P5.7	EXIT	Return	Return to operating level	Function	---	NV_SAVE

Parameter	Display	Function		Possible parameter setting	Unit	Factory setting
P6._	MAN_ADJ					
P6.0	MIN_VR	Min. valve range	Operating range, min.	0.0 to 100.0	%	0
P6.1	MAX_VR	Max. valve range	Operating range, max.	0.0 to 100.0	%	100
P6.2	ACTUATOR	Actuator type	Actuator type	LINEAR, ROTARY	---	LINEAR
P6.3	SPRNG_Y2	Spring action (Y2)	Spring action (Y2)	CLOCKWISE, CTCLOCKWISE	---	CTCLOCKWISE
P6.4	DANG_DN	Dead angle close	Dead angle 0 %	0.0 to 45.0	%	0.0
P6.5	DANG_UP	Dead angle open	Dead angle 100%	55.0 to 100.0	%	100.0
P6.6	BOLT_POS	Bolt position	Actuator position	LEVER, STEM	---	LEVER
P6.7	ZERO_POS	Zero position	Rotational direction in relation to 0% position	CW (clockwise) CCW (counterclockwise)	---	CCW
P6.8	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P7._	CTRL_PAR					
P7.0	KP UP	KP value, up	KP value (up)	0.1 to 120.0	---	5.0
P7.1	KP DN	KP value, down	KP value (down)	0.1 to 120.0	---	5.0
P7.2	TV UP	TV value, up	TV value (up)	10 to 450	---	200
P7.3	TV DN	TV value, down	TV value (down)	10 to 450	---	200
P7.4	Y-OFS UP	Y offset, up	Y offset (up)	0.0 to 100.0	%	48.0
P7.5	Y-OFS DN	Y offset, down	Y offset (down)	0.0 to 100.0	%	48.0
P7.6	TOL_BAND	Tolerance band (zone)	Tolerance band (zone)	0.3 to 10.0	%	1.5
P7.7	DEADBAND	Deadband	Dead band	0.10 to 10.00	%	0.10
P7.8	DB_APPR	Deadband Approach	Dead-band approach	SLOW, MEDIUM, FAST		
P7.9	TEST	Test	Test	Function	---	INACTIVE
P7.10	DB_CALC	Deadband calculat.	Dead-band determination	ON, OFF	---	ON
P7.11	LEAK_SEN	Leakage sensivity	Leakage sensitivity	1 to 7200	S	30
P7.12	CLOSE_UP	Pos. time out	Position monitoring	0.0 to 100.0	%	30.0
P7.13	EXIT	Return	Return to operating level	Function	---	NV_SAVE

... 10Operation

... Parameter description HART®

Parameter	Display	Function		Possible parameter setting	Unit	Factory setting
P8._	ANLG_OUT					
P8.0	MIN_RGE	Min. range	Min. current range	4.0 to 18.4	mA	4.0
P8.1	MAX_RGE	Max. range	Max. current range	20.0 to 5.7	mA	20.0
P8.2	ACTION	Action	Direction of action of characteristic curve	DIRECT, REVERSE	---	DIRECT
P8.3	ALARM	Alarm current	Alarm message	HIGH_CUR, LOW_CUR	---	HIGH_CUR
P8.4	RB_CHAR	Readback character.	Converted characters	DIRECT, RECALC		DIRECT
P8.5	TEST	Test	Test	Function	---	NONE
P8.6	ALR_ENAB	Alarm function enabled	Alarm via analog output	ON, OFF	---	ON
P8.7	CLIPPING	Current signal Signal clipping range	Extension of signal output to 3.8 to 20.5 mA	4.0 to 20.0; 3.8 to 20.5 mA	mA	4.0 bis 20.5
P8.8	EXIT	Return	Return to operating level	Function	---	---
P9._	DIG_OUT					
P9.0	ALRM_LOG	Alarm logic	Alarm output logic	ACTIVE_HI, ACTIVE_LO	---	ACTIVE_HI
P9.1	SW1_LOG	Switchpoint 1 logic	Logic SW1	ACTIVE_HI, ACTIVE_LO	---	ACTIVE_HI
P9.2	SW2_LOG	Switchpoint 2 logic	Logic SW2	ACTIVE_HI, ACTIVE_LO	---	ACTIVE_HI
P9.3	ALARM DO	Relay output	Relay output	ACTIVE/INACTIVE	—	INACTIVE
P9.4	TEST	Test	Test	Function	---	NONE
P9.5	EXIT	Return	Return to operating level	Function	---	NV_SAVE
P10._	DIG_IN					
P10.0	FUNCTION	Function select	Function selection	NONE, POS_0 %, POS_100 %, POS_HOLD	---	NONE
P10.1	EXIT	Return	Return to operating level	Function	---	---
P11._	FS / IP					
P11.0	FAIL_POS	Save position	Safe position	ACTIVE, INACTIVE	---	INACTIVE
P11.1	FACT_SET	Factory setting	Factory setting	Function	---	START
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	---	[CUSTOM]
P11.3*	IP_COMP	IP compensation	IP compensation	ON, OFF	---	ON
P11.4	HART_REV	HART® revision	HART® Revision	5; 7	---	5
P11.5	EXIT	Return	Return to operating level	Function	---	NV_SAVE

* 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
ERROR 10	The supply voltage was interrupted for at least 20 ms. (This error is displayed after resetting the device to indicate the reason for the reset.)	–	Check the power source and the wiring.
ERROR 11	The supply voltage has fallen below the minimum voltage.	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset and starts up again with the message ERROR 10 . If a local communication interface (LCI) is plugged in, the device will enter the operating mode LCI supply.	Check the power source and the wiring.
ERROR 12	The position is outside the measuring range. Possible reason is a malfunction in the position sensor.	In control mode: <ul style="list-style-type: none"> The actuator is moved to the safe position. On the configuration level: <ul style="list-style-type: none"> The output is set to neutral until a button is pressed. After approx. 5 seconds the positioner is automatically reset in control mode and on the configuration level. 	Check the mounting.
ERROR 13	Invalid input current. This display indicates when the setpoint signal is overridden. The actuator is moved to the safe position.	–	Check the power source and the wiring.
ERROR 20	No access possible to the data in the EEPROM.	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset. Attempts are made to restore the data. This compensates for intermittent errors in the communication environment with the EEPROM.	If there is still no access to the EEPROM data after resetting the device, load the factory settings. If the error still persists, the device must be returned for repair to the manufacturer.

... 11 Diagnosis / error messages

... Error codes

Error code	Possible cause	Impact	Troubleshooting the Instrument
ERROR 21	Error while processing the measured values, pointing to an error in the working data (RAM).	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset and the RAM is reinitialized.	If the error persists even after the positioner has been reset, the device will need to be returned to the manufacturer for repair.
ERROR 22	Error during the table processing, pointing to an error in the working data (RAM).	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset and the RAM is reinitialized.	If the error persists even after the positioner has been reset, the device will need to be returned to the manufacturer for repair.
ERROR 23	Error when verifying the checksum of the configuration data (RAM).	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset and the RAM is reinitialized.	If the error persists even after the positioner has been reset, the device will need to be returned to the manufacturer for repair.
ERROR 24	Error in the processor function registers (RAM).	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset and the RAM is reinitialized.	If the error persists even after the positioner has been reset, the device will need to be returned to the manufacturer for repair.
ERROR 50 : :	Internal error.	The actuator is moved to the safe position. After approx. 5 seconds, the positioner is automatically reset.	If the error can be reproduced and occurs in the same position after resetting, the device must be returned for repair to the manufacturer.
ERROR 99			

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"> the actuator is not blocked. the supply air pressure is adequately high. the specified time limit is higher than 1.5 times the longest stroke time of the actuator. <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 56) 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

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

Trademarks

HART is a registered trademark of FieldComm Group, Austin, Texas, USA

Notes

Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/positioners

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