Operating Instructions
42/18-80 EN

Electro-Pneumatic Positioner TZIDC-200

for 4...20 mA two-wire technology,
with flameproof enclosure

Industrial IT enabled



HART FIELD COMMUNICATIONS PROTOCOL

ABB

Electro-Pneumatic Positioner TZIDC-200
for 4...20 mA two-wire technology, with flameproof enclosure

Operating Instructions

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Note

More information, e.g. regarding configuration, operation and ordering details, is available on CD.

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Important information

Symbols

In order that you can make the best use of this document and to ensure safety during commissioning, operation and maintenance of the equipment, please note the following explanation of the symbols used:

Symbol	Signal Word	Definitions
	**DANGER**	DANGER indicates an **imminently hazardous** situation which, if not avoided, **will result** in death or serious injury. (High level of risk.)
	**WARNING**	WARNING indicates a **potentially hazardous** situation which, if not avoided, **could result** in death or serious injury. (Medium level of risk.)
	**CAUTION**	CAUTION indicates a **potentially hazardous** situation which, if not avoided, **could result** in minor or moderate injury. (Low level of risk.)
	**NOTICE**	NOTICE indicates a **potentially harmful** situation which, if not avoided, **may result** in damage of the product itself or of adjacent objects. (Damage to property)
	IMPORTANT	IMPORTANT indicates useful hints or other special information which, if not observed, could lead to a decline in operating convenience or affect the functionality. (Does not indicate a dangerous or harmful situation.)

As well as the instructions in this document, you must also follow the generally applicable accident prevention and safety regulations.

If the information in this document is insufficient in any situation, please contact our service department, who will be happy to help you.

Please read this document carefully before installation and commissioning.

1 Safety summary

1.1 General safety instructions

This chapter provides important instructions for your safety. Thoroughly read and follow these instructions.

Proper and safe operation of the TZIDC-200 positioner requires:

- proper transportation and storage
- mounting, electrical and pneumatic installation and commissioning by qualified personnel (see chapter 1.5, page 10)
- correct operation according to the instructions in this manual
- correct use (see chapter 1.4, page 10)
- careful maintenance

The regulations, standards and directives referred to in this manual are applicable in Germany. When using the TZIDC-200 positioner outside the German jurisdiction, the relevant regulations, standards and directives applicable in the country where the device is used must be observed.

The TZIDC-200 positioner has been designed and tested in accordance with
DIN VDE 0411 Part 1 / EN 61 010 Part 1

"**Safety Requirements for Electronic Measuring Apparatus**"

(based on IEC Publication 348) and has been delivered in a safe condition.

In order to retain the device in a safe condition and ensure safe operation, attentively read and follow the instructions given in the sections marked with the respective symbols. (See "Important information" on page 5.) Otherwise, persons can be endangered or the device itself or other devices or equipment may be damaged or fail.

The device must be shut down and secured reliably against unintentional restart if it must be assumed that safe operation is no longer ensured. Possible reasons for this assumption can be:

- visible damage of the device
- failure of the electrical function
- exposure to a storage temperature of more than 85 °C for a longer time period
- exposure to considerable strain or wear during transport

Only the manufacturer is authorized to repair the device.

1.2 Device-specific safety instructions

1.2.1 General



WARNING

- Any user-made changes or manipulations of the device are prohibited! Only the manufacturer or an expert for explosion protection are authorized to modify the device.
- Before re-using a TZIDC-200 positioner that has already been used in another installation place **always** reset the device to the factory setting. Never start the autoadjustment function before having restored the factory setting! Otherwise, hazardous situations may occur due to improper settings.
- Do not use the internal communication interface (LKS) on the motherboard when the TZIDC-200 positioner is installed and used in the hazardous area.
- The (optional) safety shutdown module must be subject to a functional test every two years at the latest. Follow the instructions in chapter 3.5.1.

1.2.2 Special instructions for TZIDC-200 positioners of explosion protection type Ex d (type Doc. 901132, type examination certificate DTM 02 ATEX E 029 X)



WARNING

- Do not open a TZIDC-200 positioner installed and run in a hazardous area directly upon switch-off. **Always wait for at least five minutes**. Otherwise, some components inside the housing may still be hot and cause an explosion.
- Do not use flammable gas nor oxygen or oxygen-enriched gas as a pressure medium.
- Do not use variants which according to the certificate comply with type of protection “intrinsic safety” intrinsically safe once they have been used in type of protection “flameproof enclosure”.
- Handle the cover with care. Otherwise, the sealing surface may be damaged. This will void the explosion protection (Ex d). Place the removed cover on clean, even surfaces, only! Avoid any pollution of the sealing surface.
- Secure the cable entry against turning and loosening by using security adhesive of medium strength (see chapter 3.3.4, page 23).
- If the positioner is used at an ambient temperature above 60 °C (140 °F) or below -20 °C (-4 °F), use cable entries and cables approved for a service temperature corresponding to the maximum ambient temperature increased by 10 K or corresponding to the minimum ambient temperature, respectively.

1.2.3 Pneumatic safety



WARNING

- Observe the accident prevention rules of the Employers Liability Insurance Association.
- Observe the safety instructions for the pneumatic actuator used. The actuator's high actuating power may cause injuries !



NOTICE

- Take suitable precautions to ensure that even in case of malfunctions the positioner's max. admissible operating pressure of 6 bar (90 psi) is not exceeded. Otherwise, the positioner and/or the actuator may be damaged.
- The positioner must be supplied with instrument air exempt from oil, water and dust according to DIN/ISO 8573-1, Class 3
  - Purity: max. particle size 5 µm, max. particle density 5 mg/m^3
  - Oil content: max. concentration 1 mg/m^3
  - Pressure dew point: maximum value 10 K below operating temp.

  Before connecting the air pipes blow them out to remove dust, splinters and other particles.

1.2.4 Electrical safety



WARNING

- Observe the common VDE safety regulations and the accident prevention rules of the Employers Liability Insurance Association.
- Observe the common standards and safety regulations for the installation and operation of electrical systems.
- When connecting the device, observe all electrical specifications in these operating instructions or in the data sheet.
- For the electrical installation of explosion-protected devices, observe all standards, regulations and directives governing explosion protection and applicable for the construction and use of explosion-protected systems, especially the DIN/VDE directives, the directives for explosion protection (VDE 0165 or EN 60079), and the special requirements and specifications for your devices (see the following chapter "Explosion protection" and chapter "Certificates" starting on page 38).



NOTICE

Power supply

- Exclusively connect signal circuits with load-independent 4...20 mA current to terminals +11/-12. Direct connection of a power supply, e.g. a 24 V DC power supply unit, will damage the input.
- The maximum current must not exceed 500 mA, even in case of a malfunction or polarity reversal.

NOTICE

Electromagnetic interference

- Do not lay signal lines close to power lines. Power lines produce interference in their near vicinity, which may affect measured value transmission on the signal line.
- Keep the case closed. When the case is open the positioning action may be affected through electromagnetic interference. This may result in a permanent positioning error, especially when the autoadjustment function is run with the case open.

1.3 Explosion protection

One of the type plates seen below is attached to the positioner to the left of the main type plate, depending on the positioner's explosion protection. It indicates the degree of explosion protection and the certificate valid for your positioner. For details please refer to chapter "Certificates" starting on page 38.

WARNING

Always observe the specifications and special requirements for your positioner stipulated in the applicable certificate.

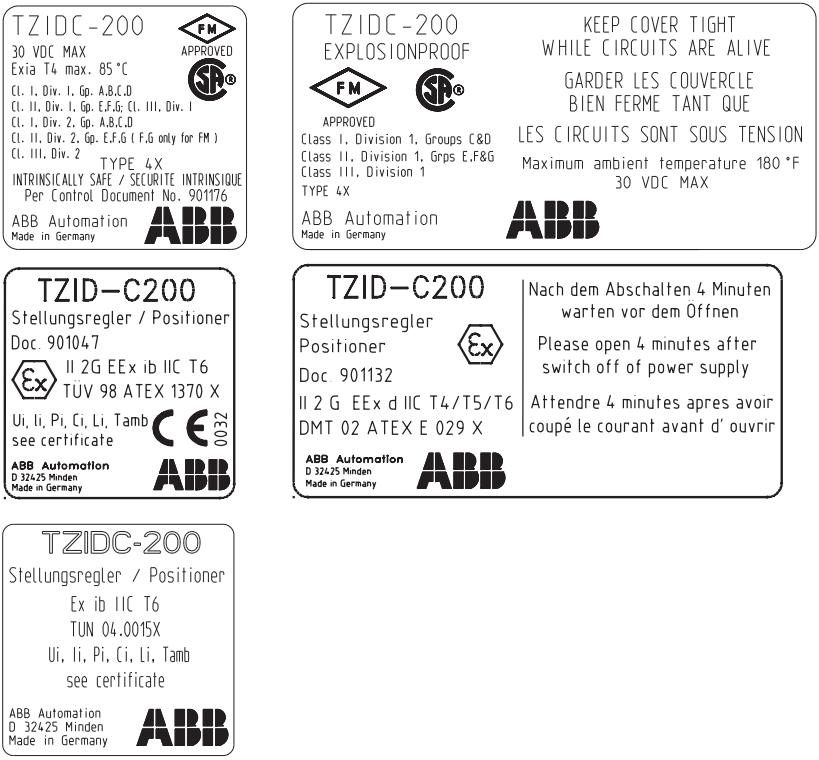


Fig. 1 Type plates indicating the degree of explosion protection

1.4 Correct use

The TZIDC-200 positioner is an electro-pneumatic positioner with flameproof enclosure for pneumatic final control elements. It is designed for being attached to linear and rotary actuators following the instructions in this manual. The positioner may be used only for the applications listed in these operating instructions or in the data sheet 18-0.32 EN. Any other use is considered as incorrect.

The signal current circuit and the input and output circuitry must meet the explosion protection requirements stipulated in the certificates (see chapter "Certificates" starting on page 38).

The maximum permissible ambient temperature range of -40 °C to +85 °C (when using proximity switches of type SJ2-S1N (NO): -25 °C to + 85 °C) must not be exceeded.

1.5 Qualified personnel

Only those persons familiar with the installation, commissioning, operation and maintenance of the TZIDC-200 positioner or similar instruments who have the required qualification and have read and understood the operating instructions are authorized to work on the TZIDC-200 positioner. These persons must be sufficiently trained and experienced and know the relevant standards and regulations to be able to judge their assigned tasks and recognize potential hazards. Only persons who are qualified or have been trained adequately and who have the required certificates are authorized to work on explosion-protected devices.

2 Manufacturer's information

2.1 Delivery

When receiving the delivery please immediately check items and scope for intactness and completeness. The scope of delivery is stated in the shipping documents. If ordered, the accessories (e.g. mounting material, pressure gauge block, filter regulator) are added to the delivery as individual items. Check items and scope of the delivery by means of the catalog numbers to see if types and quantities are in accordance with your order. If the positioner is delivered already mounted to the actuator, the positioner, accessories and actuator or final control element are considered as a common delivery item. A list of catalog numbers and details of the different versions and accessories can be found in data sheet 18-0.32 EN.

2.2 CE compliance information

We declare that we are the manufacturer of the TZIDC-200 positioner and that the product conforms with the EMC Directive 89/336/CEE as of May 1989 and meets the requirements of the following standards:

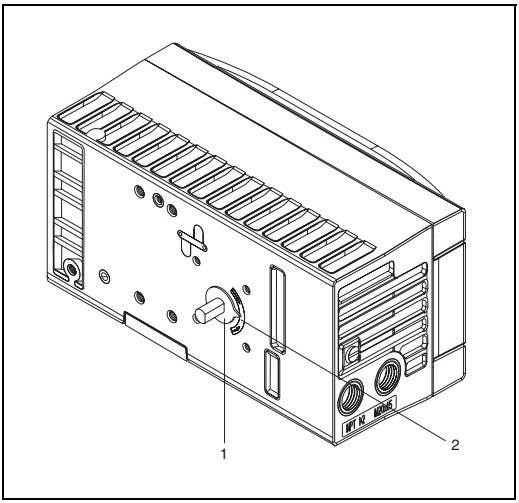
- EN 55022:1998 “Information technology equipment, Radio disturbance characteristics, Limits and methods of measurement”
- EN 61000-6-2:8/2002 ”Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-3:3/2000 “Electromagnetic compatibility (EMC) Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

The TZIDC-200 positioner complies with the EC directive for CE conformity certification.

3 Installing and commissioning

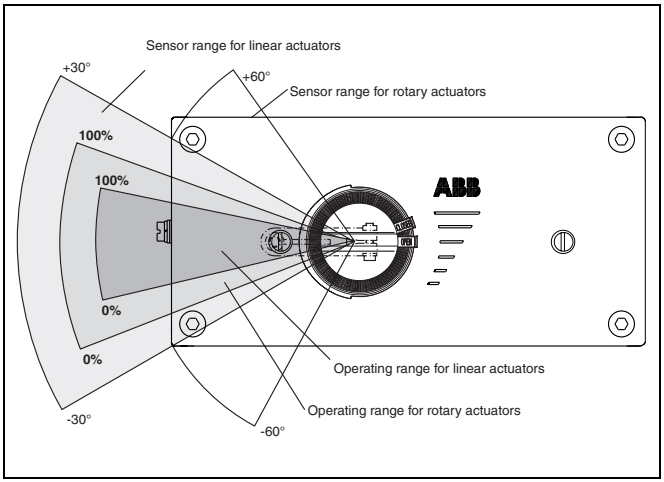
3.1 Mechanical mounting

3.1.1 General



The arrow (1) on the feedback shaft (and thus the lever) must travel within the area marked with the small arrows (2).

Fig. 2 Operating range



When mounting the positioner, ensure that the transfer of the stroke or rotation angle for the position feedback is correct. The maximum rotation angle is 60° for mounting to linear actuators and 120° for mounting to rotary actuators. The minimum angle is always 25°.

Fig. 3 Positioner ranges

3.1.2 Operating conditions at the installation site

WARNING

Before installing check to ensure that the specifications in terms of safety and control applicable to the TZIDC-200 positioner will not be exceeded at the installation site of the actuator or final control element.

Ambient temperature:	-40 °C ... +85 °C (-25 °C ... + 85 °C when using proximity switches of type SJ2-S1N (NO))
Relative humidity:	100 % (mean annual value), condensation permissible. Observe the specifications for protection class IP65 / NEMA 4X and the technical data in this manual.
Explosion protection:	Observe the technical data, and the specifications in the certificates (see the relevant sections of this manual).
Mounting orientation:	any orientation allowed

3.1.3 Mounting the positioner to linear actuators

A special attachment kit is available for mounting the positioner to a linear actuator according to DIN/IEC 534 (lateral mounting to NAMUR) comprising the following parts:

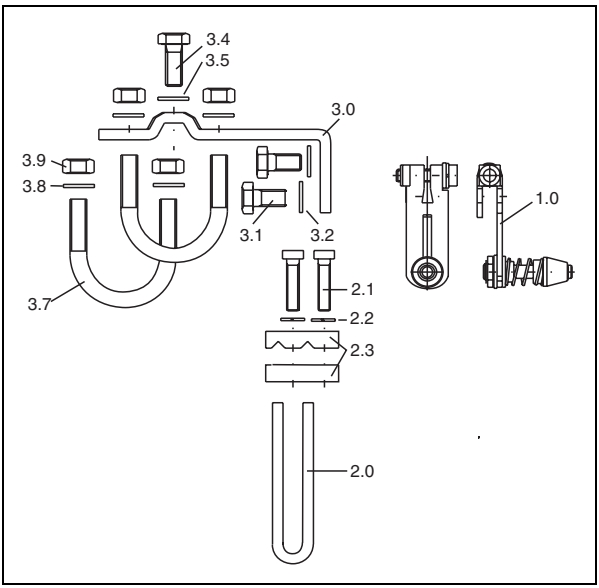


Fig. 4 Mounting kit for linear actuators

- Lever (1.0) with follower pin, for 10 ... 35 mm or for 20 ...100 mm actuator travel
- Follower guide (2.0) with two screws (2.1), spring washers (2.2), and clamp plates (2.3)
- Angle bracket (3.0) with two screws (3.1), and two plain washers (3.2)
- Screw (3.4) and plain washer (3.5) for mounting to cast iron yoke
- Two U-bolts (3.7), each with two plain washers (3.8), and two nuts (3.9) for mounting to columnar yoke

Tools required:	Wrench 10 mm /13 mm Allen key 4 mm

Follow the procedure (steps 1 - 5) below to attach the TZIDC-200 positioner to a linear actuator:

1. Mount the follower guide to the actuator

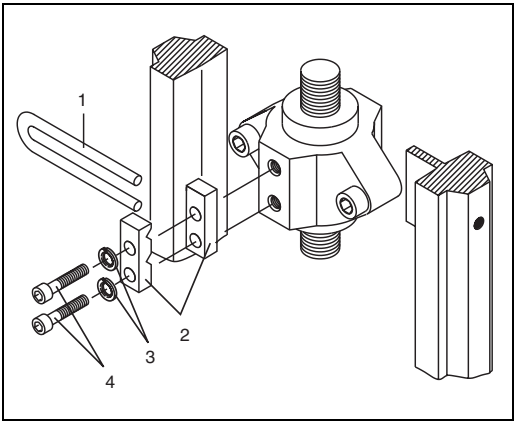


Fig. 5 Mounting follower guide to actuator

- Fasten the follower guide (1) and the clamp plates (2) with screws (4) and spring washers (3) to the spindle of the actuator; hand-tighten the screws.

2. Assemble the lever (if not yet pre-assembled)

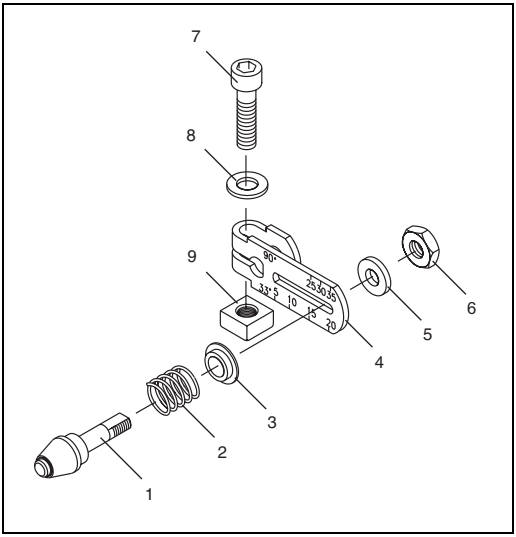


Fig. 6 Assembling the lever

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

3. Mount the lever and the angle bracket to the TZIDC-200 positioner

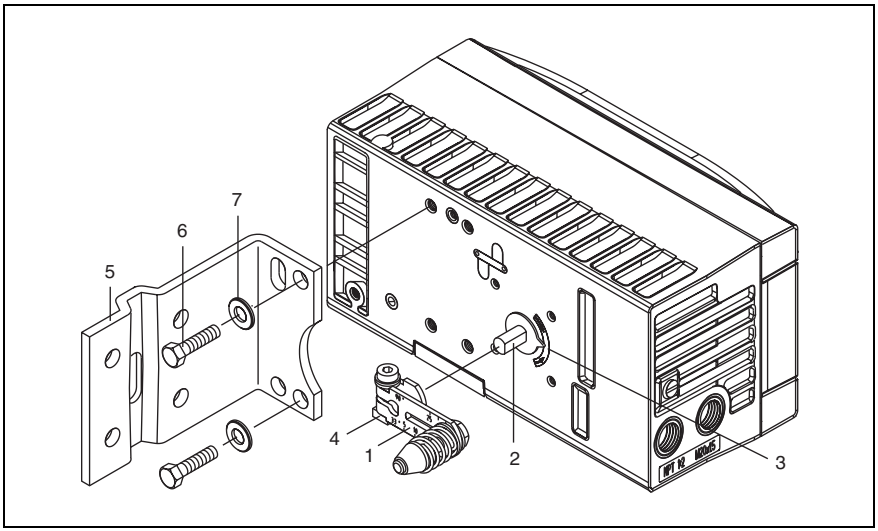
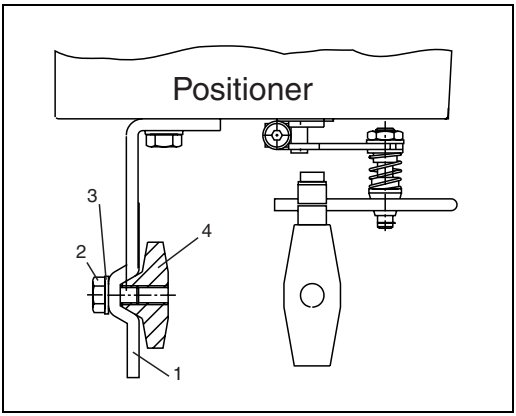


Fig. 7 Mounting lever and angle bracket to TZIDC-200

- Attach the lever (1) to the positioner's feedback shaft (2) (can only be mounted in one position due to the flat on the side of the feedback shaft).
- Check whether the lever travels within the operating range (between the arrows) by observing the arrow marks (3).
- Hand-tighten the screw (4) at the lever.
- Hold the preassembled TZIDC-200 with the angle bracket (5) still loose in such a way against the actuator that the follower pin on the lever introduces into the follower guide, in order to determine the bore holes of the TZIDC-200 to be used for the angle bracket.
- Fasten the angle bracket (5) with screws (6), and plain washers (7) to the corresponding bore holes in the TZIDC-200 case; if possible, tighten the screws evenly to ensure linearity during operation. Align the angle bracket in the oblong hole to achieve a symmetrical operating range (between the arrow marks (3)).

4.a Mount the positioner to a cast iron yoke

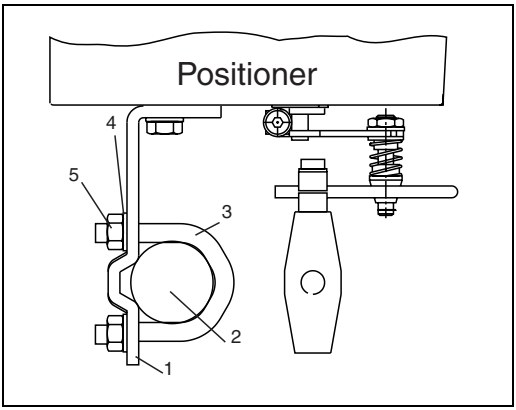


- Fasten the angle bracket (1) with screw (2), plain washer (3) to the cast iron yoke (4).

Fig. 8 Mounting to cast iron yoke

or

4.b Mount the positioner to a columnar yoke



- Hold the angle bracket (1) in the appropriate position against the columnar yoke (2).
- Insert the U-bolts (3) from the inner side of the columnar yoke through the holes in the angle bracket.
- Slip on the plain washers (4), and nuts (5). Hand-tighten the nuts evenly.

Fig. 9 Mounting to columnar yoke

IMPORTANT

Adjust the height of the TZIDC-200 positioner at the cast iron yoke or the columnar yoke until the lever is horizontal (at visual check) at half valve stroke.
Check the unit for proper mounting after having made the pneumatic and electrical connection (see chapter "Commissioning" on page 26).

5. Adjust the stroke

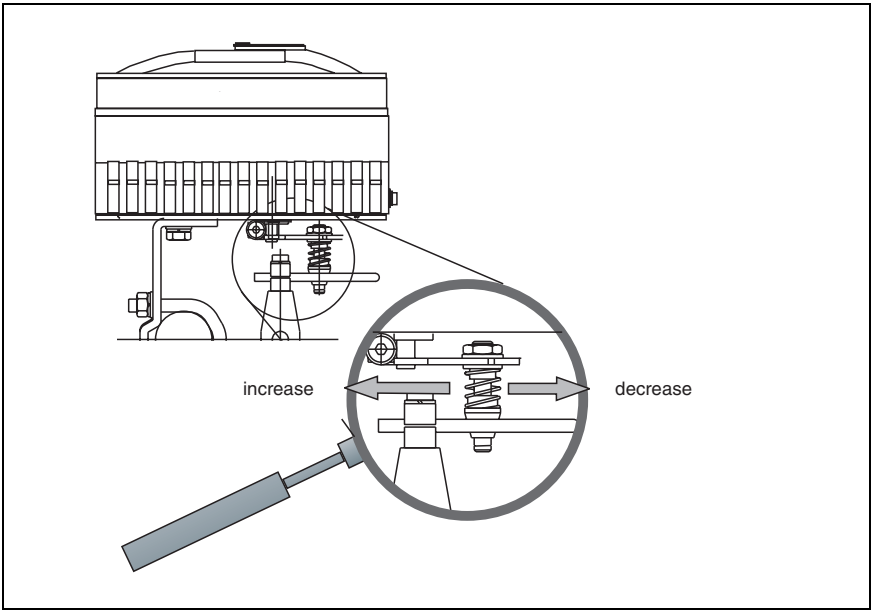


Fig. 10 Positioner linkage

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

You can adapt the valve stroke range to the operating range of the position sensor by shifting the bolt with follower pin in the oblong bore hole of the lever. When the link point is shifted to the inside, the position sensor's rotation angle is increased; shifting to the outside decreases the angle.

Set the stroke range in such a way that the used rotation angle of the position sensor is as great and as symmetrical around the center position as possible.

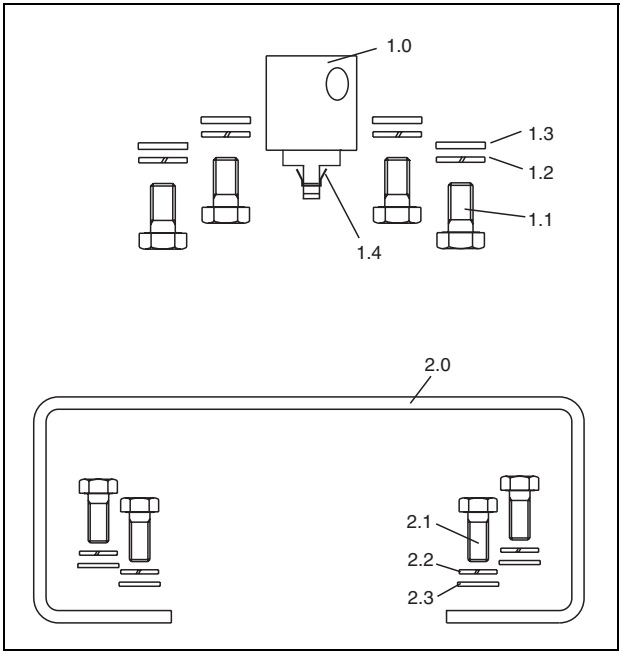
Recommended range for linear actuators: between -28° and +28°
Minimum angle: 25°

IMPORTANT

After mounting, check whether the positioner operates within the sensor range.
Check the unit for proper mounting after having made the pneumatic and electrical connection (see chapter "Commissioning" on page 26).

3.1.4 Mounting the positioner to rotary actuators

The following mounting kit is available for mounting to a rotary actuator according to VDI/ VDE 3845:



- Adapter (1.0) with spring (1.4)
- Four screws, M6 (1.1), four spring washers (1.2), and four plain washers (1.3) for fastening the bracket (2.0) to the positioner
- Mounting bracket (2.0)
- Four screws, M5 (2.1), four spring washers (2.2), and four plain washers (2.3) for fastening the bracket to the actuator

Fig. 11 Mounting kit for rotary actuators

Tools required: Wrench 10 mm /13 mm
Allen key 3 mm

Follow the procedure (steps 1 - 3) below to attach the TZIDC-200 positioner to a rotary actuator:

1. Mount the adapter to the positioner

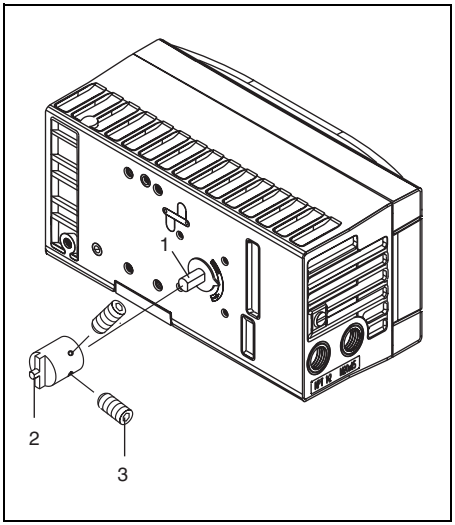


Fig. 12 Mounting the adapter

- Determine the mounting position (in parallel to the actuator or shifted by 90°).
- Determine the direction of rotation of the actuator (clockwise or counterclockwise).
- Move the rotary actuator to its home position.
- On the basis of the mounting position, the home position, and the direction of rotation it must be determined in which position the feedback shaft (1) of the positioner must be pre-adjusted and in which position the adapter (2) must be placed, to enable the positioner to travel within the correct range (the arrow on the rear of the device must travel within the admissible range, for details see Fig. 2 on page 11).
- Pre-adjust the feedback shaft.
- Place the adapter on the feedback shaft in the appropriate position and fix it by set-screws (3); ensure that one of the set-screws is engaged on the side of the feedback shaft with the flat.

2. Attach the mounting bracket (1) to the positioner

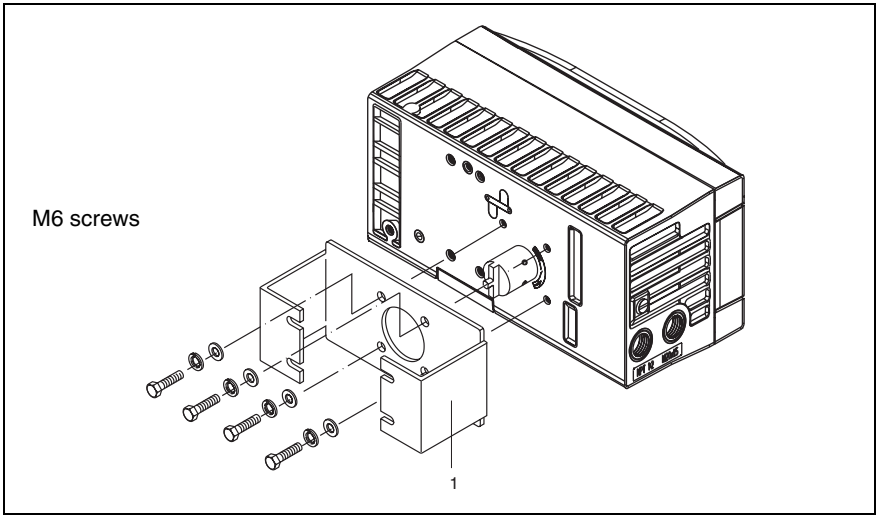


Fig. 13 Attaching the mounting bracket to the positioner

3. Attach the TZIDC-200 positioner to the actuator

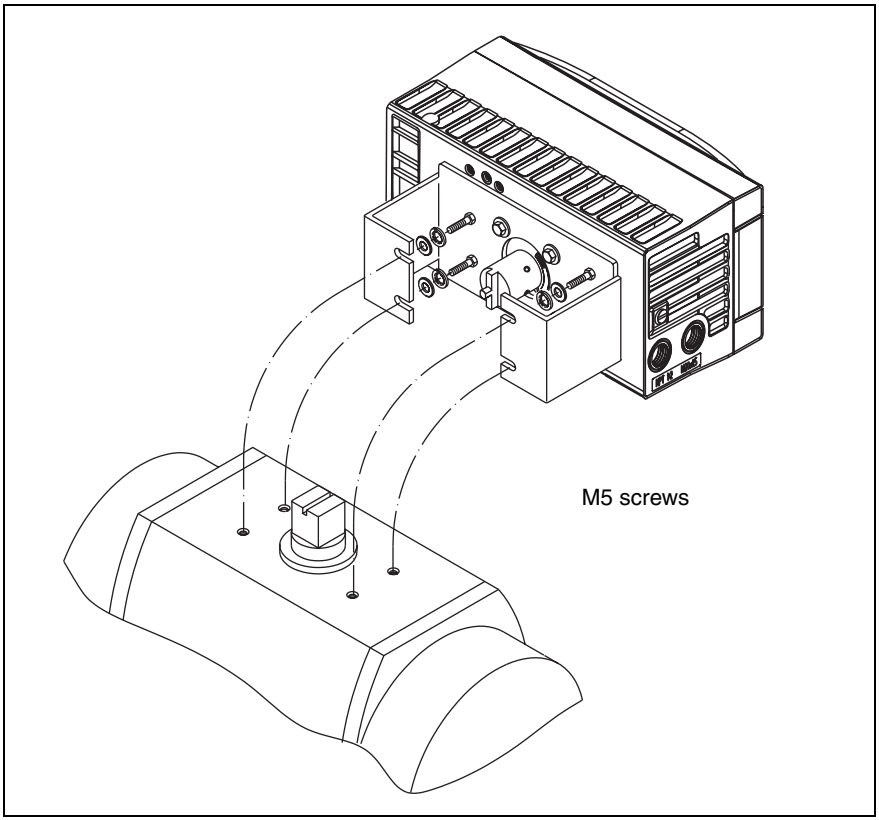


Fig. 14 Attaching the positioner to the actuator

After mounting, check whether the actuator's operating range is in accordance with the positioner's sensor range.

IMPORTANT Check the unit for proper mounting after having made the pneumatic and electrical connection (see chapter "Commissioning" on page 26).

3.2 Pneumatic connection

3.2.1 Safety instructions

WARNING

- Observe the accident prevention rules of the Employers Liability Insurance Association.
- Observe the safety instructions for the pneumatic actuator used. The actuator's high actuating power may cause injuries !

NOTICE

- Take suitable precautions to ensure that even in case of malfunctions the positioner's max. admissible operating pressure of 6 bar (90 psi) is not exceeded. Otherwise, the positioner and/or the actuator may be damaged.
- The positioner must be supplied with instrument air exempt from oil, water and dust according to DIN/ISO 8573-1, Class 3
  - Purity: max. particle size 5 µm, max. particle density 5 mg/m^3
  - Oil content: max. concentration 1 mg/m^3
  - Pressure dew point: maximum value 10 K below operating temp.

  Before connecting the air pipes blow them out to remove dust, splinters and other particles.

3.2.2 Making the pneumatic connections

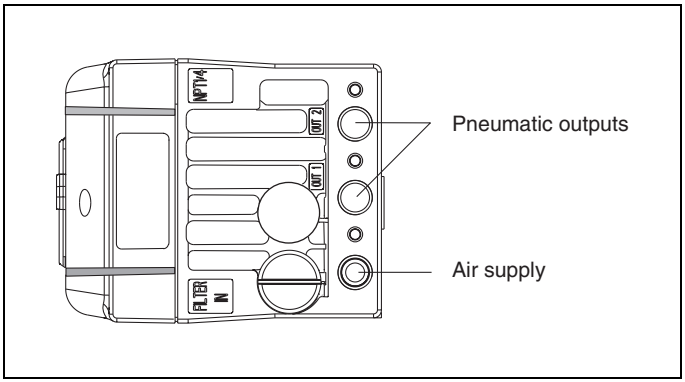


Fig. 15 Pneumatic connections

All pneumatic piping connections are located on the right-hand side of the positioner. Threaded bores G 1/4 or 1/4-18 NPT, respectively, are provided. The positioner is labeled according to the type of thread. The corresponding screwed pipe connections have to be supplied by the customer. We recommend pipes with the dimension 6 x 1 mm for the pneumatic piping.

The amount of supply pressure has to be matched to the working pressure necessary for the actuation. The positioner's operating range is between 1.4 and 6 bar.

The connections have to be arranged, according to their marks, in the following way:

Mark	Connection piping
-	Air supply, pressure 1.4...6 bar (20...90 psi)
OUT1	Output pressure, to actuator
OUT2	Output pressure, to actuator (second output, for double-acting actuators)

3.3 Electrical connection

3.3.1 Safety instructions



WARNING

- Observe the common VDE safety regulations and the accident prevention rules of the Employers Liability Insurance Association
- Observe the common standards and safety regulations for the installation and operation of electrical systems.
- When connecting the device, observe all electrical specifications in these operating instructions or in the data sheet.
- For the electrical installation of explosion-protected devices, observe all standards, regulations and directives governing explosion protection and applicable for the construction and use of explosion-protected systems, especially the DIN/VDE directives, the directives for explosion protection (VDE 0165 or EN 60079), and the special requirements and specifications for your devices (see chapter "Certificates" starting on page 38).

3.3.2 General installation instructions



NOTICE

Observe the following instructions. They are essential to proper operation and functionality of the positioner.

General

- Do not expose the terminals to strain.

Technical data

- When connecting the device, make sure that the electrical specifications in chapter 4 "Technical data" are observed.

Power supply

- Exclusively connect signal circuits with load-independent 4...20 mA current to terminals +11/-12. Direct connection of a power supply, e.g. a 24 V DC power supply unit, will damage the input.
- The maximum current must not exceed 500 mA, even in case of a malfunction or polarity reversal.

NOTICE

Electromagnetic interference

- Do not lay signal lines close to power lines. Power lines produce interference in their near vicinity, which may affect measured value transmission on the signal line.
- Keep the case closed. When the case is open the positioning action may be affected through electromagnetic interference. This may result in a permanent positioning error, especially when the autoadjustment function is run with the case open.

3.3.3 Overview

Two threaded bore holes 1/2 - 14 NPT or M20 x 1.5 are available on the left hand side as the cable entry into the case. One is equipped with a cable gland and in the other a pipe plug is mounted.

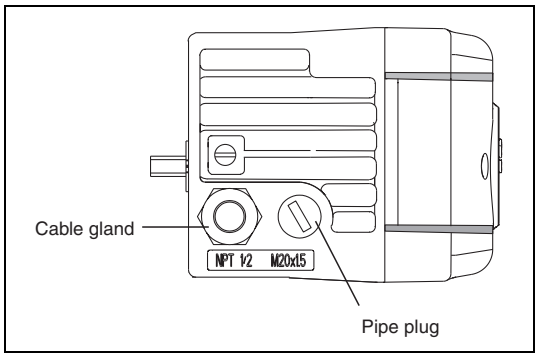


Fig. 16 Cable entry

The screw terminals inside the case are assigned as follows:

1 Module for analog position feedback

2 Module for digital position feedback (1st. terminal) or shutdown module

3 Module for digital position feedback (2nd. terminal)

4 Kit for digital position feedback, either proximity switches or 24 V microswitches

5 Same as 4

6 Digital output DO

7 Digital input DI

8 4...20 mA signal

9 Grounding screw

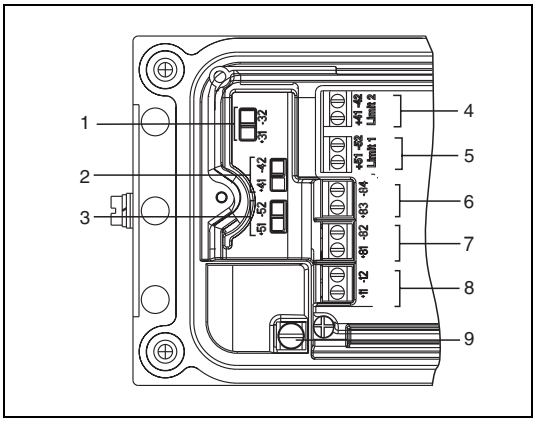


Fig. 17 Screw terminals

3.3.4 Making the electrical connections

1. Mount the cable gland



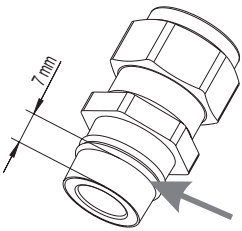
WARNING

Exclusively use cable glands with full Ex-d approval for EEx d operation. Do not use partly approved cable glands labeled "U". They are NOT sufficient.

Approved cable glands type A3F / NP / 20s are available from ABB for 1/2 NPT or M20 x 1.5 threads.

Screw in the appropriate Ex-d cable gland and fix it with glue to secure it against loosening. Loctite 242 or similar glues are suitable.

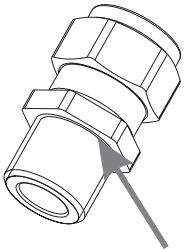
Proceed as seen in the illustrations below:



Apply the glue (Loctite 242 or similar) to the two last thread windings, approximately 7 mm from the end of the thread (see gray arrow in the illustration).

Insert the cable gland in the threaded hole of the positioner housing and fasten it with the appropriate tool.

Fig. 18 Fastening the cable gland type A3F / NP / 20s / 1/2 NPT



Apply the glue (Loctite 242 or similar) to the two last thread windings, seen from the end of the thread (see gray arrow in the illustration).

Screw the cable gland into the threaded hole of the positioner housing until reaching the end stop.

Fig. 19 Fastening the cable gland type A3F / NP / 20s / M20 x 1.5

2. Insert the cable in the housing

In order to provide for sufficient EMI/RFI shielding of the positioner to meet the requirements regarding electromagnetic compatibility (EMC), **all** electrical wires must be entered through a ferrite tube in the connection compartment. Proceed as described in the example below:

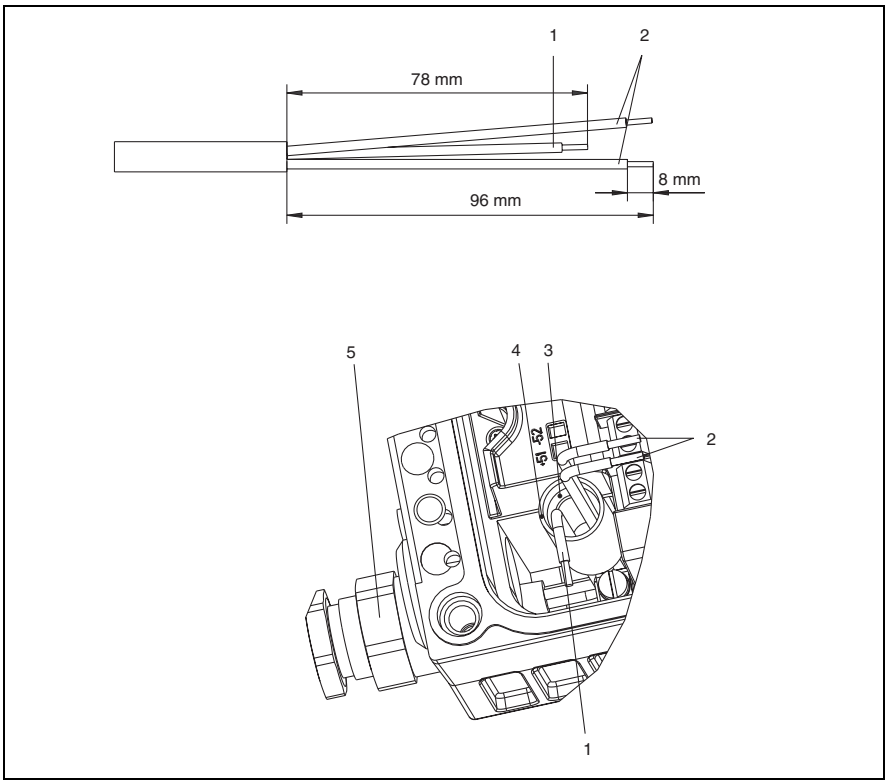


Fig. 20 Inserting the cable

1. Remove the cable sheath at the cable end. Cut the (green/yellow) protective ground conductor (1) and the two 4...20 mA signal lines (2) to the specified length and remove approx. 8 mm of the insulation.
2. Put the protective hose (4) on the ferrite tube (3).
3. Insert all wires through the cable gland (6) and the ferrite tube (3). Make sure that the end of the cable sheath protrudes into the connection compartment. Fasten the cable gland (5).
4. Fasten the protective ground conductor (1) with the grounding screw and connect the 4...20 mA signal lines (2) to the signal terminals +(11)/-(12) (see Fig. 21 on page 25).

3. Make the electrical connection

- Remove approximately 8 mm of the cable insulation.
- To connect the signal lines, the shutdown module, the proximity switches or the microswitches insert the wire ends from the left into the appropriate screw terminals and hand-tighten the screws (access from above). To connect a plug-in module insert the wire ends from the top into the corresponding screw terminals and hand-tighten the screws (access from the side).

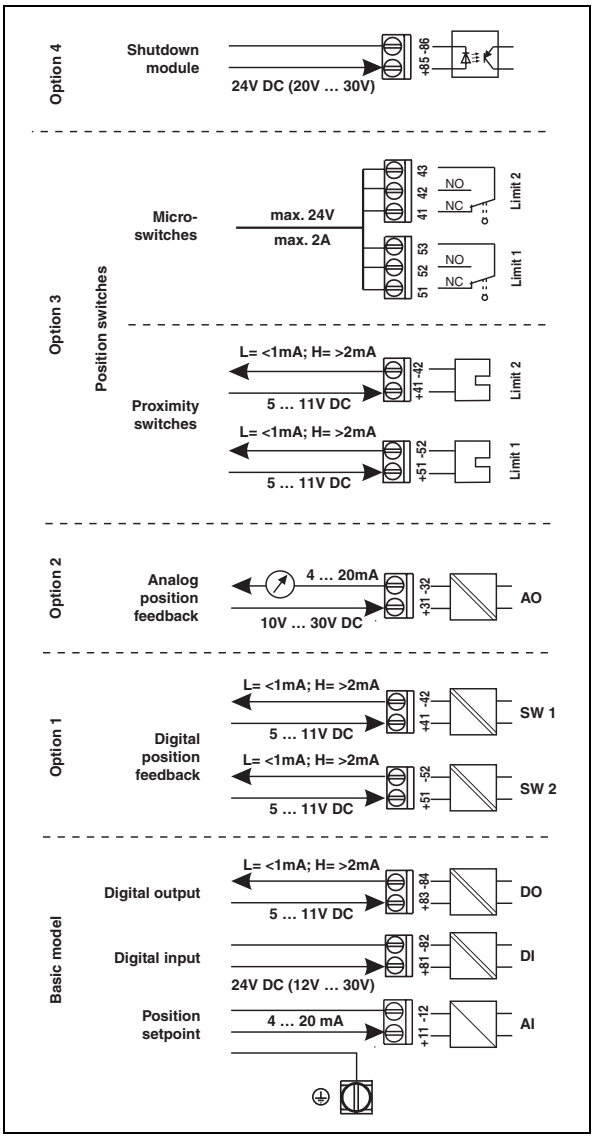


Fig. 21 Terminal assignment

3.4 Commissioning

3.4.1 Commissioning procedure

1. **Turn on the air supply to the positioner.**
2. **Turn on the electrical power supply to the positioner.**
   Apply the 4...20 mA signal to the analog input (terminals +11/-12).
3. **Check for proper mounting:**
   - Press and hold **MODE**; additionally briefly press ↑ or ↓ until mode **1.3** (manual adjustment within sensor range) is indicated, then release **MODE**.
   - Press ↑ or ↓ to move the actuator to its mechanical limit stops in both directions, and note the values. The angle of rotation is indicated in degrees.
     For quick motion: Press ↑ and ↓ together.
     Recommended range:
     between -28° and +28° for linear actuators
     between -57° and +57° for rotary actuators
     Minimum angle: 25°
4. **Run the standard autoadjustment function.**

Note: The standard autoadjustment function is only available with software revision level 2.XX and higher.

For linear actuators:[1]

- Press and hold **MODE** until **ADJ_LIN** is displayed, then release.
- Press **MODE** again and hold it down until the countdown is finished.
- Then release **MODE**.
  Standard autoadjustment is started.

or

For rotary actuators:[1]

- Press and hold **ENTER** until **ADJ_ROT** is displayed, then release.
- Press **ENTER** again and hold it down until the countdown is finished.
- Then release **ENTER**.
  Standard autoadjustment is started.

When the autoadjustment function is finished **successfully**, the parameter settings are **automatically** saved and the positioner returns to operating mode 1.1.

If standard autoadjustment should fail, the procedure is automatically interrupted, and an error code is indicated. In this case press and hold ↑ or ↓ for approx. 3 seconds. The positioner returns to mode **1.3** MAN_SENS (manual adjustment within sensor range). Check the assembly for proper mounting and, if required, readjust it. Repeat the standard autoadjustment function.

5. **If required: Adjust the dead band and tolerance band**
   This step is only necessary for critical actuators, e.g. very small ones. Usually, it can be skipped.

---

1. The zero position is automatically determined and saved by the standard autoadjustment function: turning counter-clockwise (CTCLOCKW) for linear and clockwise (CLOCKW) for rotary actuators.

3.4.2 Operating modes, overview and selection

Procedure for mode selection from the operating level:

- Press and hold **MODE**.
- Additionally briefly press ↑ as often as required.
  The selected mode is indicated.
- Release **MODE**.
- The position is indicated as a percentage or rotation angle.

Overview

Mode	Mode display	Position display
1.0 Control* with adaptation (of control parameters)		
1.1 Control without adaptation (of control parameters)		
1.2 Manual adjustment** within the operating range. Press ↑ or ↓ to adjust ***		
1.3 Manual adjustment** within the sensor range. Press ↑ or ↓ to adjust ***		

*) Self-optimization during "adaptive" control is subject to various influences during operation that may lead to mismatches in the long run. Therefore, it is recommended to use this operating mode for some hours only and then switch the positioner to mode 1.1 “Control without adaptation".

**) Positioning not active

***) For quick motion: Press ↑ and ↓ together.

3.4.3 Parameter setting example

An overview of the parameter settings that can be edited via the front panel keypad is found in Appendix A.

IMPORTANT

"Changing zero position (of the LCD) from clockwise to counter-clockwise"

Initial situation: the positioner is operating in mode 1.1.

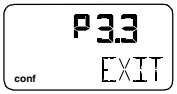
1. Change over to the configuration level:
   - Press and hold ↑ and ↓ at the same time.
   - Additionally, briefly press **ENTER**.
   - Wait until the countdown has run down from 3 to 0.
   - Release ↑ and ↓.
   - 

is displayed.
2. Change over to parameter group 3._:
   - Simultaneously press and hold **MODE** and **ENTER**.
   - Additionally 2 x briefly press ↑.
   - 

is displayed.
   - Release **MODE** and **ENTER**.
   - 

is displayed.
3. Select parameter 3.2 "Zero position":
   - Press and hold **MODE**.
   - Additionally 2 x briefly press ↑.
   - 

is displayed.
   - Release **MODE**.
4. Change parameter setting:
   - Briefly press ↑ to select "CTCLOCKW".

5. Change over to parameter 3.3 "EXIT" and save the new setting:
   - Press and hold **MODE**.
   - Additionally 1 x briefly press ↑.
   - 

     is displayed.
   - Release **MODE**.
   - Briefly press ↑ to select "NV_SAVE".
   - Press and hold **ENTER** until the countdown has run down from 3 to 0.

The positioner saves the new settings, automatically returns to the operating level and continues operation in the same mode that was active before the configuration level has been selected.

3.5 Functional test / maintenance



WARNING

Do not make any changes to devices <u>with</u> explosion protection.



IMPORTANT

If you should modify or manipulate the electronics of a positioner <u>without</u> explosion protection, the positioner's warranty will expire immediately.

The TZIDC-200 positioner is virtually maintenance free.

To ensure error-free and maintenance-free operation always supply the positioner with instrument air exempt from oil, water and dust according to DIN/ISO 8573-1 (purity and oil content acc. to Class 3, pressure dew point 10 K below the operating temperature).

We recommend to check the integrated air filter on a regular basis and replace it if required.

If the optionally installed filter regulator is installed, it has to be checked regularly as well.

Additionally, the control position should be checked periodically for conformity with the tolerance limit.

3.5.1 Functional test of the shutdown module

WARNING

If the optional shutdown module is used, it must be subject to a functional test every two years at the latest to ensure full operational reliability in compliance with DIN V 19250. Otherwise, the AK4 approval will lapse.

Do not perform this test in a potentially hazardous atmosphere, as the case must be opened for testing. Either test the positioner in the workshop or lab or make sure that there is no explosion hazard.

Proceed as described below:

- Remove the cover.

WARNING

Handle the cover with care! Otherwise,the sealing surface may be damaged. This will void the explosion protection (Ex d).

Grab the cover in the middle when opening. Do not cant! Place the cover on clean, even surfaces only! Avoid any pollution of the sealing surface.

- Alternately set the slide switch (1) from the "On" position in the middle to the top and bottom position ("Off1" or "Off2") and check that the actuator is depressurized properly.

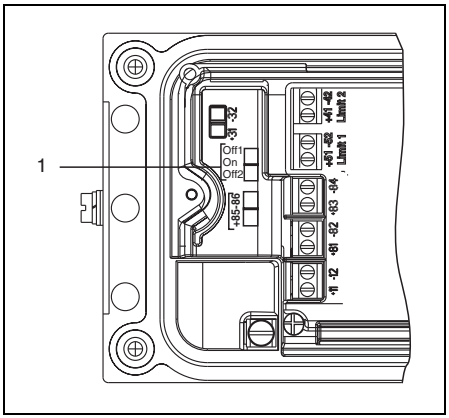


Fig. 22 Slide switch (service switch) of the shutdown module

- Set the slide switch to the "On" position in the middle again.
- Replace the cover.

4 Technical data

4.1 Basic model

Input

Signal

Nominal range 4...20 mA
Split range configuration betw. 20% and 100% of the nominal range
Max. 25 mA / 30 V
Two-wire technology

Load voltage at 20 mA	8.7 V DC with PCB that is not intrinsically safe
	9.7 V DC with intrinsically safe PCB
Impedance at 20 mA	435 ohms with PCB that is not intrinsically safe
	485 ohms with intrinsically safe PCB

Digital input

Control voltage	24 V DC (12...30 V DC)
Current	max. 4 mA

Digital output (control circuit to DIN 19234/NAMUR)

Supply voltage.	5...11 V DC
Current < 1.0 mA	Logical “0“
Current > 2.0 mA	Logical “1“
Effective direction:	normally logical “0“ or logical “1“ (configurable)

Output

Range

0...6 bar (0...90 psi)

Air capacity

at supply pressure of 1.4 bar (20 psi)
5.0 kg/h = 3.9 Nm^3/h = 2.3 scfm
at supply pressure of 6 bar (90 psi)
13 kg/h = 10 Nm^3/h = 6.0 scfm (Booster on request)

Output function

for single or double acting actuators,
air is vented from actuator or actuator is blocked in case of electrical power failure

Shut-off values

end position 0 %	=	0...45 %
end position 100 %	=	55...100 %

Travel

Angle of rotation

Used range	25...120 °	(rotary actuators, optionally 270 °)
	25...60 °	(linear actuators)

Travel limit

Min. and max. limits, freely configurable within 0...100 % of total travel
(min. range > 20 %)

Travel time prolongation

Range of 0...200 seconds, separately for each direction

Positioning time limit

Range 0...200 seconds (position monitoring)

Air supply

Instrument air

free of oil, water and dust to DIN/ISO 8573-1
pollution and oil content according to Class 3
purity: max. particle size 5 µm, max. particle density 5 mg/m^3
oil content: max. concentration 1 mg/m^3
pressure dew point: 10 K below operating temperature

Supply pressure

1.4...6 bar (20...90 psi)
NOTICE: Do not exceed the max. operating pressure of the actuator!

Air consumption

< 0.1 kg/h /0.05 scfm (independent of supply pressure)

Transmission data and influences

Output OUT 1

Increasing:	increasing signal 0...100 % increasing output pressure OUT 1
Decreasing:	increasing signal 0...100 % decreasing output pressure OUT 1

Action (signal)

Direct:	signal 4...20 mA = position 0...100 %
Reverse:	signal 20...4 mA = position 0...100 %

Characteristic curve (travel = f ⦚signal⦚)

linear, equal percentage 1:25 or 1:50 or 25:1 or 50:1
and freely configurable with 20 reference points

Characteristic deviation

≤ 0.5 %

Tolerance band

0.3...10 %, adjustable

Dead band

0.1...10 %, adjustable

Resolution (A/D conversion)

> 4000 steps

Sample rate

20 msec

Influence of ambient temperature

≤ 0.5 % for every 10 °C change in temperature

Influence of vibration

≤ ± 1 % up to 10 g and 80 Hz

Seismic requirements

Meets requirements of DIN/IEC 68-3-3 Class III for strong and strongest earthquakes

Influence of mounting orientation

No effect

Meets the requirements of the following directives

EMC Directive 89/336/EEC as of May 1989
EC Directive for CE conformity marking

Communication

HART Protocol 5.1

Communication connection

- Connector for LKS (local communication interface) adapter
- HART communication (FSK modem) via 20 mA signal line

Environmental capabilities

Ambient temperature

-40 °C to +85 °C for operation, storage and transport
-25 °C to +85 °C with proximity switches SJ2-S1N (NO)

Relative humidity

Operational (with closed housing and air supply switched on):
100 % (annual average), condensation permissible
Transport and storage:
75 % (annual average), non-condensing

Case

Material/Protections

Aluminum, protection class IP 65 / NEMA 4X

Surface/color

Electrostatic dipping varnish with epoxy resin, stove-hardened
Case varnished black, RAL 9005, matt,
Cap Pantone 420

Electrical connections

Screw terminals:
max. 1.0 mm^2 for options, max. 2.5 mm^2 for analog signal
NOTICE: Do not expose the terminals to strain!
Cable entry:
2 threads 1/2-14 NPT or M20x1.5
(cable gland or pipe plug must be ordered separately)

Pneumatic connections

Threads G 1/4 or 1/4-18 NPT

Weight

3.0 kg

Mounting orientation

any orientation allowed

Dimensions

see dimensional drawings

Safety Integrity Level SIL2

EXIDA report No.: ABB 03/09-13 R003, Revision R1.0

The positioner TZIDC-200 and the shutdown module for TZIDC-200 meet the requirements regarding
– functional safety in accordance with IEC 61508/IEC 61511-1
– explosion protection (depending on the model)
– electromagnetic compatibility in accordance with EN 61000

In case of a failure of electrical power or compressed air supply or when a positioner malfunction occurs, the actuator is depressurized by the TZIDC-200, and the return spring in the actuator moves the valve to a pre-defined, safe end position (either OPEN or CLOSED).

SIL specific safety-related characteristics

Device	Category	SFF	PFDav	λdd + λs	λdu
TZIDC-200	SIL2	85 %	7.52×10^{-4}	1011 FIT	172 FIT
Shutdown module for TZIDC-200	SIL2	94 %	1.76×10^{-4}	718 FIT	40 FIT

For details refer to the Management Summary in the SIL Safety Instructions 37/18-79XA

Explosion protection



WARNING

The values indicated here have been taken out of the respective approval certificates.
Always observe the specifications and supplements in the certificates (see chapter "Certificates" starting on page 38).

FM Approval HLC 8/02 3010829

Explosion proof; enclosure 4X; T5, max. 82°C
CL I, Div. 1, Group C, D

Intrinsically safe; enclosure 4X; T5, max. 82°C
CL I, II, III, Div. 1, Group A, B, C, D, E, F, G

Non-incendive, enclosure 4X; T4, max. 85°C
CL I, Div. 2, Group A, B, C, D
CL II, III, Div. 2, Group F, G

Dust ignition-proof; enclosure 4X; T5, max. 82°C
CL II, III, Div. 1, Group E, F, G

CSA Certificate **1393920**

Explosion proof; enclosure 4X; T5, max. 85°C
CL I, Div. 1, Group C, D
CL II, Div. 1, Group E, F, G
CL III

Intrinsically safe; enclosure 4X; T5, max. 82°C
CL I, Div. 1, Group A, B, C, D
CL II, Div. 1, Group E, F, G
CL III

ATEX **Ex II 2G EEx d IIC T4/T5/T6**

Examination certificate	DMT 02 ATEX E 029 X
Type:	**Flameproof enclosure**
Device class:	II 2G (EEx d IIC)
Temperature class:	T4, T5, T6
Perm. ambient temperature:	T4: -40 °C ≤ T_{amb} ≤ 85 °C
	T5: -40 °C ≤ T_{amb} ≤ 80 °C
	T6: -40 °C ≤ T_{amb} ≤ 65 °C

ATEX **Ex II 2G EEx ib IIC T6**

Examination certificate	TÜV 98 ATEX 1370 X
Type:	**Intrinsically safe**
Device class:	II 2G (EEx ib IIC)
Temperature class:	T4, T5, T6
Perm. ambient temperature:	T4: -40 °C ≤ T_{amb} ≤ 85 °C
	T5: -40 °C ≤ T_{amb} ≤ 50 °C
	T6: -40 °C ≤ T_{amb} ≤ 35 °C

IECEx **Ex ib IIC T6**

Examination certificate	IECEx TUN 04.0015X, Issue No.: 0
Type:	Intrinsically safe
Temperature class:	T4, T5, T6
Perm. ambient temperature:	T4: -40 °C ≤ T_{amb} ≤ 85 °C
	T5: -40 °C ≤ T_{amb} ≤ 50 °C
	T6: -40 °C ≤ T_{amb} ≤ 35 °C

4.2 Options

Module for analog position feedback[1]

Range 4 ... 20 mA (configurable split ranges)

Two-wire circuitry, power supply	24 V DC (10...30 V DC) (with explosion protection) 48 V DC (20...48 V DC) (without explosion protection)

Action direct or reverse (configurable)

Characteristic deviation ≤ 1 %

Note: Without a signal from the positioner (e.g. no energy or initializing) the module sets the output to > 20 mA (alarm level)

Module for digital position feedback[1]

2 switches for position signals (position adjustable between 0 and 100%, ranges cannot overlap)

Current circuits	to DIN 19234/NAMUR
Supply voltage	5...11 V DC
Control current < 1.0 mA	= Logical "0"
Control current > 2.0 mA	= Logical "1"
Eff. direction:	normally logical "0" or logical "1" (configurable)

Module for the shutdown function[2]

Supply voltage	24 V DC (20...30 V DC) (electrically isolated from the input signal)
Safe position is activated when	voltage < 5 V
AK approval	AK 4 to DIN V 19250
Test report No.	101/S01/148
Explosion protection	see certificates
SIL	SIL2 (see page 34)

A separate 24 V DC signal is applied to the shutdown module and connected through from the microprocessor to the I/P module. When the 24 V DC signal is interrupted, the positioner output OUT 1 is depressurized, and the valve is moved to the safe position. This function is independent of the motherboard functions.

1. The module for analog position feedback and the module for digital position feedback plug in separate slots and can be used together.
2. The module for the shutdown function uses the same space as the module for analog feedback and the module for digital feedback and cannot be plugged in and run together with any of them.

Digital position feedback with proximity switches

2 proximity switches for independent position signaling.
Switching points adjustable between 0 and 100 %
Current circuits to DIN 19234/NAMUR

Supply voltage	5...11 V DC
Control current	< 1 mA = logical "0"
	> 2 mA = logical "1"

Direction of action (logical state):

Proximity switch	Position			
	< min.	> min.	< max.	> max.
SJ2-SN (NC)	0	1	1	0
SJ2-S1N (NO)	1	0	0	1



NOTICE

When using proximity switch type SJ2-S1N (NO) the TZIDC-220 positioner may be exposed to an ambient temperature of -25 °C ... +85 °C, only.

Digital position feedback with 24 V microswitches



WARNING

Only approved for Ex d version!

Two microswitches for independent position signaling.
Switching points adjustable between 0 and 100 %

Voltage	max. 24 V AC / DC
Current load	max. 2 A
Contact surface	10 µm gold (AU)

Mechanical position indicator

Indicator disk in enclosure cover, linked with positioner feedback shaft through magnetic coupling

5 Certificates

FM Approvals
1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781 762 9375 www.fmglobal.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

V18348- a0b4d3efghi. TZID-C200 Positioner
IS/I, II, III/1/ABCDEFG/T4 Ta = 85 °C- 901176; Entity;
NI/I, II, III/2/ABCDFG/T4 Ta = 85 °C;
Type 4X

Max. Entity Parameters: Per Control 901176

a = Case/Mounting 1, 2, 3, 4, 5 or 6
b = Operator panel and display 0 or 1
d = Output/Safe protection 1, 2, 3, 4, 5 or 7
e = Option modules for analog or digital position feedback 0, 1, 3 or 4
f = Mechanical kit (proximity switches) for digital position feedback/Microswitches (only for XP) 0, 1, 2, 3
g = Parameter setting/bus address 1 or 2
h = Design (varnish/coding) 1 or 2
i = Device identification label 0, 1 or 2

V18348-a0b2d3efghi. TZID-C200 Positioner
XP/I /1/CD/T5 Ta = 82 °C;DIP/II,III/1/EFG/T5 Ta = 82ºC; Type 4X

a = Case/Mounting 1, 2, 3, 4, 5 or 6
b = Operator panel and display 0 or 1
d = Output/Safe protection 1, 2, 3, 4, 5 or 7
e = Option modules for analog or digital position feedback 0, 1, 3 or 4
f = Mechanical kit (proximity switches) for digital position feedback/Microswitches (only for XP) 0, 1, 2, 3
g = Parameter setting/bus address 1 or 2
h = Design (varnish/coding) 1 or 2
i = Device identification label 0, 1 or 2

An FM Global Enterprise

Equipment Ratings:

Explosion proof for Class I, , Division 1 Groups C & D, T5 Ta = 82ºC; dust-ignitionproof for Class II/III, Division 1, Groups E, F and G; T5 Ta = 82ºC; or as intrinsically safe for Class I, II, III, Division 1 groups A, B, C, D, E, F and G; Entity; non-incendive for use in Class I Division 2 Groups A, B, C and D, T4 Ta = 85ºC; suitable for Class II and III Division 2, Groups F and G, T4 Ta = 85ºC Hazardous (Classified) Locations indoor/outdoor (NEMA Type 4X

Approved for:

ABB AUTOMATION PRODUCTS GmbH
SCHILLERSTR. 72
32425 MINDEN, GERMANY

This certifies that the equipment described has been found to comply with the following FM Approval Standards and other documents:

Class 3600	1998
3610	1999
3611	1986
3810	1989
3615	1989

Original Project ID: 3010829 FM Approval Granted: November 12, 2002

Subsequent Revision Reports / Date FM Approval Amended

Report Number	Date	Report Number	Date

FM Global Technologies LLC

Nicholas P. Ludlam
Technical Team Manager

November 15, 2002
Date

An FM Global Enterprise

CSA INTERNATIONAL

Certificate of Compliance

Certification: 1393920
Project: 1393920
Issued to: **ABB Automation Products GmbH**
72 Schillerstrasse
Minden, 32425
GERMANY
Attention: Mr. Wolfgang Lasarzik

Master Contract: 203012
Date Issued: December 19, 2003

The products listed below are eligible to bear the CSA Mark shown

Issued by: J. Beacham

Authorized by: Nick Alfano for.
Operations Manager

PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

Class I, Div 1, Groups C and D; Class II, Div 1, Groups E, F and G; Class III

Model TZID-C200, Positioner; input rated 30V dc max, 4-20mA; control pressure 0 to 6 bars (0 to 90 psi); T 5, max ambient 85 Deg C.

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations

Class I, Div 1, Groups A, B, C and D; Class II, Div 1, Groups E, F and G; Class III

Series TZID-C200 Positioner; input rated 30V dc max, 4-20mA; control pressure 0 to 6 bars(0 to 90 psi); intrinsically safe with entity parameters of:
Terminals 11/12: V max = 30V, I max = 104mA, Ci = 6.6nF, Li = 0uH, Pi=1W;
Terminals 81/82: V max = 30V, I max = 110mA,Ci =3.7nF, Li = 0uH; Pi=1W;
Terminals 83/84: V max = 30V, I max = 96mA, Ci =3.7nF, Li =0uH; Pi=1W;
Terminals 31/32: V max = 30V, I max = 110mA, Ci =6.6nF, Li = 0uH; Pi=1W;
Terminals 41/42 and 51/52: V max = 30V, I max = 96mA, Ci =3.7nF, Li =0uH; Pi=1W;
Terminals Limit 2 41/42 and Limit 1 51/52: V max = 15.5V, I max = 52mA, Ci =20nF, Li =30uH; Pi=1W;
when installed per installation Drawing No 901176; Temperature Code T5; Max Ambient 180F (82 C).

DQD 507WD 2003/01/31

Certificate: 1393920 **Master Contract:** 203012
Project: 1393920 **Date:** December 19, 2003

Model V18348-a0b4d3efghi. TZID-C200 Positioner
Where a=Case/Mounting 1, 2, 3, 4, 5 or 6
b=Operation panel and display 0 or 1
d=Output/Safe Protection 1, 2, 3, 4,5 or 7
e= Option module for analog or digital position feedback 0, 1, 2, 3, or 4
f=Mechanical kit(prox switches) for digital position feedback 0, 1 and 2.
g=Parameter setting/bus address 1 or 2
h=Design(varnish/coding) 1 or 2
i=Device identification label 0, 1 or 2

Model V18348-a0b2d3efghi. TZID-C200 Positioner
Where a=Case/Mounting 1, 2, 3, 4, 5 or 6
b=Operation panel and display 0 or 1
d=Output/Safe Protection 1, 2, 3, 4,5 or 7
e=Option module for analog or digital position feedback 0, 1, 2, 3, or 4
f=Mechanical kit (prox switches) for digital position feedback/microswitches (only for XP) 0, 1, 2 and 3
g=Parameter setting/bus address 1 or 2
h=Design(varnish/coding) 1 or 2
i=Device identification label 0, 1 or 2

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 25-1966	-	Enclosures for use in Class II Groups E, F and G Hazardous Location
CSA Std C22.2 No. 30-M1986	-	Explosion-Proof Enclosures for Use in Class I Hazardous Locations
CAN/CSA-C22.2 No. 94-M91	-	Special Purpose Enclosures
CSA Std C22.2 No. 142-M1987	-	Process Control Equipment
CAN/CSA-C22.2 No. 157-92	-	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
CSA Std C22.2 No. 213-M1987	-	Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

MARKINGS

FOR EXPLOSION-PROOF PROTECTION
- CSA Monogram
- Submittor's Name
- Model Number
- Serial Number
- Electrical Rating
- Hazardous Location Designation
- Special Purpose Enclosure Designation, "Type 4X"
- Maximum Ambient
- Warning: Keep cover tight while circuits are live.

DQD 507WD 2003/01/31

Certificate: 1393920 **Master Contract:** 203012

Project: 1393920 **Date:** December 19, 2003

FOR INTRINSICALLY SAFE PROTECTION

- CSA Monogram
- Submittor's Name
- Model Number
- Serial Number
- Electrical Rating
- Hazardous Location Designation
- Entity Parameters (V max, I max, Ci, Li, Pi)
- Special Purpose Enclosure Designation, "Type 4X"
- Maximum Ambient
- The Symbol "Exia"
- The Words "INTRINSICALLY SAFE/SECURITE INTRINSEQUE"
- Reference to Installation Instructions
- A statement re: Substitution of components may impair intrinsic safety.
- Caution statement re: Disconnection of Circuits...

CSA INTERNATIONAL

Supplement to Certificate of Compliance

Certificate: 1393920 **Master Contract:** 203012

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
1393920	Dec. 19, 2003	Original Certification - Model TZID-C200 Positioner.

DQD 507WD 2003/01/31

Translation

(1) # EC-Type Examination Certificate

(2) **- Directive 94/9/EC -**
Equipment and protective systems intended for use in potentially explosive atmospheres

(3) ## DMT 02 ATEX E 029 X

(4) **Equipment:** **Stellungsregler Type Doc. 901132**

(5) **Manufacturer:** **ABB Automation Products GmbH**

(6) **Address:** **D 32425 Minden**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 02.2009 EG.

(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997 + A1 – A2	General requirements
EN 50018: 2000	Flameproof enclosure

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate

(12) The marking of the equipment shall include the following:

II 2G EEx d IIC T4/T5/T6

Deutsche Montan Technologie GmbH
Essen, dated 31. January 2002

Signed: Dill
DMT-Certification body

Signed: Eickhoff
Head of special services unit

This certificate may only be reproduced in its entirety and without change
Am Technologiepark 1, 45307 Essen, Telefon (0201)172-1416, Telefax (0201)172-1716

(13) Appendix to

(14) # EC-Type Examination Certificate

DMT 02 ATEX E 029 X

(15) 15.1 Subject and type
Positioner type Doc. 901132

15.2 Description
The positioner is designed for the transmission of an electrical signal into a pneumatic signal.

Certain variants of the electronics may be used intrinsically safe according to separate certification (see 7.3)

As pressure media neither flammable gases nor oxygen or oxygen enriched gases will be used.

15.3 Parameters

15.3.1	Electrical data				
	Voltage		≤ AC/DC	30	V
	Current		≤	20	mA
15.3.2	Pneumatic data				
	Supply pressure		≤	6	bar
15.3.3	Thermal data				
	Temperature class		T4	T5	T6
	Ambient temperature range	-40 °C ≤ Ta ≤	85 °C	80 °C	65 °C

(16) Test and assessment report
BVS PP 02.2009 EG as of 31.01.2002

(17) Special conditions for safe use

17.1 As per 4.3, the positioner is designed for use at an ambient temperature range of –40 °C up to 85 °C at maximum.

17.2 If the positioner is used at an ambient temperature above 60 °C or below –20 °C, cable entries and cable approved for a service temperature corresponding to the maximum ambient temperature increased by 10 K respectively corresponding to the minimum ambient temperature shall be used.

17.3 Variants which, according to separate certification, comply with type of protection intrinsic safety, shall not be used intrinsically safe once they have been used in type of protection flameproof enclosure.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

45307 Essen, 31.01.2002
BVS-We/Mi A 20010478

Deutsche Montan Technologie GmbH

DMT-Certification body

Head of special services unit

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Am Technologiepark 1, 45307 Essen, Telefon (0201)172-1416, Telefax (0201)172-1716

Translation

DMT

1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
DMT 02 ATEX E 029 X

Equipment: **Positioner type Doc. 901132**

Manufacturer: **ABB Automation Products GmbH**

Address: **D - 32425 Minden**

Description
The positioner can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report

Test and assessment report
BVS PP 02.2009 EG as of 11.07.2002

Deutsche Montan Technologie GmbH
Essen, dated 11. July 2002

Jockers
DMT-Certification body

Eickhoff
Head of special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

45307 Essen, 11.07.2002
BVS-We/Mi A 20020357

Deutsche Montan Technologie GmbH

DMT-Certification body

Head of special services unit

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Am Technologiepark 1, 45307 Essen, Telefon (0201)172-1416, Telefax (0201)172-1716

DMT

Deutsche
Montan Technologie GmbH

DIN EN ISO 9001 zertifiziert

Fachstelle für Sicherheit
elektrischer Betriebsmittel -
Bergbau-Versuchsstrecke

Prüfprotokoll - Test and Assessment Report

1. Nachtrag – 1st Supplement

BVS PP 02.2009 EG

EG - Baumusterprüfung für Geräte und Komponenten zur Verwendung in explosionsgefährdeten Bereichen (Richtlinie 94/9/EG)

EC - Type Examination for Equipment and Components Intended for Use in Potentially Explosive Atmospheres (Directive 94/9/EC)



DAR-Reg.-Nr.:
ZLS-P-359-2/01

Gegenstand: Gerät Typ Subject: Equipment type	**Stellungsregler Typ Doc. 901132** **Positioner type Doc. 901132**
Hergestellt und zur Prüfung vorgelegt Manufactured and submitted for examination	**ABB Automation Products GmbH**
Anschrift Address	**D-32425 Minden, Schillerstraße 32**
Prüfgrundlage Basis for verifications and tests	**Anhang II der Richtlinie 94/9/EG** **Annex II of Directive 94/9/EC**
Verwendete Normen Standard basis	EN 50014:1997+A1-A2 Allgemeine Bestimmungen General requirements EN 50018:2000 Druckfeste Kapselung Flameproof enclosure 'd'
Prüfgrundlage für Sicherheits- und Gesundheitsanforderungen, die nicht von den verwendeten Normen abgedeckt werden. Basis for those health and safety requirements not covered by the standard basis	**Entfällt** **Not relevant**
Schutzartkennzeichen Code for type of protection	**EEx d IIC T4/T5/T6**
Antragsnummer Project number	**A 20020357**

Dieses Prüfprotokoll darf nur vollständig und unverändert vervielfältigt werden
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Dinnendahlstraße 9 D-44809 Bochum Telefon-Phone 0201/172 3855 Telefax-Fax 0201/172 3924

DMT

1) **Gegenstand und Typ**

Stellungsregler Typ Doc. 901132

Subject and Type

Positioner type Doc. 901132

2) **Beschreibung**

Alternativ werden die Einführungsbohrungen geändert. Die Sintermetallscheibe Ø10 mm wird neu festgelegt.

Description

Alternatively, the entry threads are modified. The sinter disk Ø10 mm is re-defined.

3) **Dokumentation - Descriptive Documents**

Zeichnung Nr. - Drawing No.	vom - dated	unterschrieben am - signed
901137	15.01.02/14.06.02	14.06.02

4) **Kenngrößen - Parameters**

Unverändert - Without change

5) **Kennzeichnung - Marking**

Unverändert - Without change

6) **Stückprüfungen - Routine verifications and tests**

Unverändert - Without change

7) **Auflagen/Bedingungen für die sichere Anwendung - Special conditions for safe use**

Unverändert - Without change

8) **Sicherheitstechnisch relevante Informationen - Information relevant for safety**

Unverändert - Without change

44809 Bochum, den 11.07.2002
BVS-We/Mi A20020357

Deutsche Montan Technologie GmbH
Fachstelle für Sicherheit elektrischer Betriebsmittel
Bergbau-Versuchsstrecke

Der Sachverständige
The Testing Officer

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DMT

Hinweis: Der folgende Anhang bezieht sich nur auf die Bauartänderungen, die Gegenstand dieses Nachtrags sind. Er ändert bzw. ergänzt den entsprechenden Anhang des bestehenden Prüfberichts.

Note: The following annex is related only to the changes of the equipment which are subject for this supplement. It amends or supplements the respective annex of the existing test and assessment report.

Anhang - Annex

Protokoll Report	Druckfeste Kapselung EN 50018:2000 Flameproof enclosure EN 50018:2000	(P/N1 -EN 50018)

Dieses Prüfprotokoll darf nur vollständig und unverändert vervielfältigt werden
This test and assessment report may only be reproduced in its entirety and without change

DMT

Protokoll - Report

Elektrische Betriebsmittel für explosionsgefährdete Bereiche
Electrical Apparatus for potentially explosive atmospheres
EN 50018: 2000
Druckfeste Kapselung „d" - Flameproof enclosure „d"
Teil II: Kommentare - Part II: Comments

5.3 Gewindespalte - Threaded joints

Gewinde zwischen Thread between	Gewindelänge Thread engagement [mm]	Anzahl der Gewindegänge Threads engaged	Gewindeart und -güte Nature and quality of thread
Leitungseinführungsbohrungen Cable entry holes	> 20	> 13	M 20 x 1,5 ; mittel M 20 x 1,5; medium
Leitungseinführungsbohrungen Cable entry holes	> 20	>> 6	NPT 1/2

15.4 Prüfung von Atmungs- und Entwässerungseinrichtungen

Porengrößenbestimmung:

Bericht GB 6.3-S020503a: Sinter Ø10 mm; Porengröße 162 µm; zul. Porengröße 190 µm

Tests of breathing and draining devices

Pore size measurement:

Report GB 6.3-S020503a: sinter Ø10 mm; pore size 162 µm; permissible pore size 190 µm

Dieses Prüfprotokoll darf nur vollständig und unverändert vervielfältigt werden
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[redacted]

Translation

(1) # EC TYPE-EXAMINATION CERTIFICATE

(2) Equipment or Protective System intended for use in potentially explosive atmospheres - **Directive 94/9/EC**

(3) EC-Type Examination Certificate Number

TÜV 98 ATEX 1370 X

(4)	Equipment or Protective System:	Positioner Type Doc. 901047 (TZID-C)
(5)	Manufacturer:	Hartmann und Braun GmbH & Co. KG Geschäftsbereich Gerätetechnik
(6)	Address:	D-30179 Hannover, Hackethalstr. 7

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate.

(8) The TÜV Hannover/Sachsen-Anhalt e.V., TÜV Certification Body N° 0032 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Basic Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential report N° 98/PX25180.

(9) Compliance with the Basic Health and Safety Requirements has been assured by compliance with:

EN 50 014 : 1997 **EN 50 020 : 1994**

(10) If the sign "X" is placed after the certification number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design and construction of the specified equipment or protective system according to Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and placing on the market of this equipment or protective system.

(12) The marking of the equipment or protective system must include the following:

Ex II 2 G EEx ib IIC T6

TÜV Hannover/Sachsen-Anhalt e.V.
TÜV CERT-Zertifizierungsstelle
Am TÜV 1
D-30519 Hannover

i. A.

Head of the Certification Body

Hanover, 1998-12-08

10/014d TUV Nord © DAP 5.97

This certificate may only be reproduced without any change, schedule included. Excerpts or changes shall be allowed by the TÜV Hannover/Sachsen-Anhalt e.V.

(13) **SCHEDULE**

(14) **EC-TYPE EXAMINATION CERTIFICATE N° TÜV 98 ATEX 1370 X**

(15) Description of equipment or protective system

The Positioner Type Doc. 901047 (TZID-C) is used for the control resp. closed loop control of pneumatic driven valves by means of a impressed signal current of 4...20 mA. A integrated distance sensor measures the current position of the valve drive. A integrated current/pressure transformer (I/P) is used for the control of the pneumatic auxiliary energy.

The permissible ambient temperature area is depending on the temperature classification and is given in the following table:

Temperature classification	Ambient temperature area
T4	- 40 °C to + 85 °C
T5	- 40 °C to + 50 °C
T6	- 40 °C to + 35 °C

Electrical data

Signal circuit .....in type of protection "Intrinsic Safety" EEx ib IIC
Terminals 11(+), 12 (-) only for the connection to a certified intrinsically safe circuit with the maximal values of:
U_i = 30 V
I_i = 320 mA
P_i = 1,1 W

effective internal capacitance : C_i = 6,6 nF
The effective internal inductance is negligibly small.

Switch input.....in type of protection "Intrinsic Safety" EEx ib IIC
Terminals 81(+), 82 (-) only for the connection to a certified intrinsically safe circuit with the maximal values of:
U_i = 30 V

effective internal capacitance : C_i = 3,7 nF
The effective internal inductance is negligibly small.

Switch output.....in type of protection "Intrinsic Safety" EEx ib IIC
Terminals 83(+), 84 (-) only for the connection to a certified intrinsically safe circuit with the maximal values of:
U_i = 30 V
P_i = 500 mW

effective internal capacitance : C_i = 3,7 nF
The effective internal inductance is negligibly small.

Local Interface for Communication (LKS) ..... for the connection to a programmer outside of the explosive hazardous area

The intrinsically safe circuits themselves are safe galvanically separated up to an voltage of 60 V. The "Local Interface for Communication" (LKS) is connected with the signal circuit.

(16) Test documents are listed in the test report No. 98/PX25180.

(17) Special condition for safe use

The "Local Interface for Communication" (LKS) may only be used outside of the explosive hazardous area.

(18) Basic Health and Safety Requirements

no additional ones

Translation from the original document

1st Supplement to the

EEC Type Examination Certificate TÜV 98 ATEX 1370 X

Manufacturer: Hartmann & Braun GmbH & Co. KG
Geschäftsbereich Gerätetechnik
Hackethalstr. 7
D-30179 Hannover,

The positioner type Doc 901047 (TZID-C) may be produced in accordance with the documents compiled in the test report. Additional option cards are provided. The electrical specifications, the special requirements and further specifications of the type examination certificate continue to be valid. The electrical specifications of the new cards are listed below:

Mechanical kit for digital position feedback (Terminals Limit1 +51, -52 or Limit2 +41, -42)	refer to PTB Certificate No. Ex-95.D.2195 X for the maximum values
Digital position feedback card (Terminals +51, -52 or +41, -42	Explosion protection: intrinsically safe EEx ib IIC only for connection to approved intrinsically safe current circuits with the following max. values: V_i = 30 V P_i = 500 mW Effective internal capacitance C_i = 3.7 nF The effective internal inductance is negligible
Analog position feedback card (Terminals +31, -32	Explosion protection: intrinsically safe EEx ib IIC only for connection to approved intrinsically safe current circuits with the following max. values: V_i = 30 V P_i = 1100 mW Effective internal capacitance C_i = 6.6 nF The effective internal inductance is negligible

(16) The test documents are compiled in the Test Report No. 99/PX05990.

(17) Special Requirements:

No additional requirements

(18) Special Safety and Health Requirements

No additional requirements.

TÜV Hannover/Sachsen-Anhalt e.V.
TÜV CERT-Zertifizierungsstelle
Am TÜV 1
D-30519 Hannover

Hannover, April 9, 1999

Signature

Seite 1/2

Important

Only the 7th. Supplement to the certificate TÜV 98 ATEX 1370 X is shown here, since the Supplements 2 to 6 do not contain information that is relevant for these operating instructions.

Translation

7. SUPPLEMENT to

EC TYPE-EXAMINATION CERTIFICATE No. TÜV 98 ATEX 1370 X

of the company: ABB Automation Products GmbH
Schillerstraße 72
D-32425 Minden

In the future the Positioner type Doc.901047 (TZID-C) may also be manufactured according to the test documents listed in the test report. The modifications refer to the internal construction, the enclosure as well as the "Electrical data".

Electrical data

Mechanical digital feedback (Terminals Limit1 +51, -52 resp. Limit2 +41, -42)	Maximum values see EC-Type Examination Certificate No. PTB 00 ATEX 2049 X (proximity switches of the company Pepperl & Fuchs)
Shutdown-switching input (Terminals +51 and –52 resp. +85 and -86)	in the type of protection Intrinsic Safety EEx ib IIC only for the connection to a certified intrinsically safe circuit with the maximum values of: U_i = 30 V C_i = 3.7 nF L_i negligibly small

All other data remain unchanged.

(16) Test documents are listed in the test report N° 03 YEX 550212.

(17) Special conditions for safe use

Variants, which also comply with the type of protection „Flameproof Enclosure" according to a separate certificate, may not be operated intrinsically safe after use as apparatus in the type of protection „Flameproof Enclosure".

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH & Co. KG
TÜV CERT-Certification Body
Am TÜV 1
D-30519 Hannover
Tel.: 0511 986-1470
Fax: 0511 986-2555

Hanover, 2003-03-21

Head of the Certification Body

BA 02.11.03

page 1/1

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx TUN 04.0015X** Issue No.: **0**

Status: **Current**

Date of Issue: **2004-07-29** Page **1** of **4**

Applicant: **ABB Automation Products GmbH**
Schillerstraße 72
32425 Minden
Germany

Electrical Apparatus: **Positioner type TZIDC-xxx**
Optional accessory:

Type of Protection: **Intrinsic safety; Type of protection "n"**

Marking: **Ex ia IIC T6 resp. Ex nA II T6**

Approved for issue on behalf of the IECEx Certification Body: Herbert Stürwold

Position: Head of IECExCB

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

TÜV NORD CERT GmbH & Co. KG
Am TUV1
D-30519 Hannover
Germany

IECEx Certificate of Conformity

Certificate No.: **IECEx TUN 04.0015X**

Date of Issue: **2004-07-29** Issue No.: **0**

Manufacturer: **ABB Automation Products GmbH**
Schillerstraße 72
32425 Minden
Germany

Manufacturing location(s):

ABB
Automation Products GmbH
Schillerstraße 72
32425 Minden
Germany

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture'rs quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2000 Edition: 3.1	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'
IEC 60079-15 : 2001 Edition: 2	Electrical apparatus for explosive gas atmospheres - Part 15: Type of protection 'n'

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

IECEx ATR: **DE/TUN/04/551542**

File Reference: **04 YEX 551542**

IECEx Certificate of Conformity

Certificate No.: **IECEx TUN 04.0015X**

Date of Issue: **2004-07-29** Issue No.: **0**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The Positioner type TZIDC-xxx is used for the control resp. closed loop control of pneumatic driven valves.
The Positioner type TZIDC resp. TZIDC-200 transfers the reference value by means of an impressed signal current of 4…20 mA.
The Positioner type TZIDC-110, TZIDC-210, TZIDC-120 resp. TZIDC-220 transfers the reference value via a field bus signal.
An integrated distance sensor measures the current position of the valve drive. An integrated current/pressure transformer (I/P) is used for the pneumatic auxiliary power.

The permissible ambient temperature range in dependence on the type, the type of protection and the Temperature Classes has to be taken from the following table:

Type and marking	TZIDC resp. TZIDC-200 Ex ib IIC	TZIDC-110/-210/ -120/-220 Ex ia IIC	TZIDC resp. TZIDC-110/-120 Ex nA II
Temperature Class	Ambient temperature range		
T4	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
T5	-40°C to +50°C	-40°C to +55°C	-40°C to +65°C
T6	-40°C to +35°C	-40°C to +40°C	-40°C to +50°C

Additional technical data see EQUIPMENT (continued)

CONDITIONS OF CERTIFICATION: YES as shown below:

Special condition for safe use of intrinsically safe Positioners:

The operation of the local communication interface (LKS) and of the programming interface (X5) is only allowed outside of the hazardous explosive area.

Special conditions for safe use of Positioners marked Ex nA II T6:

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 “Mechanical digital feedback” 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.

IECEx Certificate of Conformity

Certificate No.: **IECEx TUN 04.0015X**

Date of Issue: **2004-07-29** Issue No.: **0**

Page **4** of **4**

Additional information:

Electrical data for type TZIDC resp. TZIDC-200 with marking Ex ib IIC T6	
Signal circuit (terminals 11(+), 12(-))	in type of protection “Intrinsic Safety” Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V I_i = 320 mA P_i = 1.1 W effective internal capacitance: C_i = 6.6 nF The effective internal inductance is negligibly small.
Switch input (terminals 81(+), 82(-))	in type of protection “Intrinsic Safety” Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V effective internal capacitance: C_i = 3.7 nF The effective internal inductance is negligibly small.
Switch output (terminals 83(+), 84(-))	in type of protection “Intrinsic Safety” Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V P_i = 500 mW effective internal capacitance: C_i = 3.7 nF The effective internal inductance is negligibly small.
Local interface for communication (LKS)	For the connection to a programmer outside of the explosive hazardous area.
Optionally the following modules are allowed to be used:	
Mechanical digital feedback (terminals Limit1 +51, -52 resp. Limit2 +41, -42)	in type of protection “Intrinsic Safety” Ex ib IIC Maximum values see IEC Certificate No. (proximity switches of the company Pepperl + Fuchs GmbH)
Digital feedback (terminals +51, -52 resp. +41, -42)	in type of protection “Intrinsic Safety” Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V P_i = 500 mW effective internal capacitance: C_i = 3.7 nF The effective internal inductance is negligibly small.
Analogue feedback (terminals +31, -32)	in type of protection “Intrinsic Safety” Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V P_i = 1.1 W effective internal capacitance: C_i = 6.6 nF The effective internal inductance is negligibly small.
Shutdown-switch-input (terminals +51, -52 resp. +85, -86)	in type of protection “Intrinsic Safety” Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V effective internal capacitance: C_i = 3.7 nF The effective internal inductance is negligibly small.
The intrinsically safe circuits themselves are safe galvanically separated up to a voltage of 60 V. The “Local interface for communication (LKS)” is connected with the signal circuit.	

TÜV NORD CERT

Electrical data for type TZIDC-110, TZIDC-210, TZIDC-120 resp. TZIDC-220 with marking Ex ia IIC T6			
Input circuit (terminals +11, -12 resp. +, -)	in type of protection “Intrinsic Safety” Ex ia IIC resp. Ex ib IIC only for the connection to a certified intrinsically safe circuit (e.g. FISCO power supply) with the maximum values according to the following table:		
	FISCO power supply ia/ib for group IIB/IIC	FISCO power supply ia/ib for group IIB/IIC	Barrier or power supply ia/ib for group IIB/IIC
Voltage	17.5 V	17.5 V	24 V
Current	380 mA	360 mA	250 mA
Power	5.32 W	2.52 W	1.2 W
Characteristic line	rectangular	Trapezoidal	linear
Local interface for communication (LKS) and programming interface (X5)	For the connection to a programmer resp. a PC outside of the explosive hazardous area.		
Optionally the following modules are allowed to be used:			
Shutdown-switch-input (terminals +51, -52 resp. +85, -86)	in type of protection “Intrinsic Safety” Ex ia IIC resp. Ex ib IIC only for the connection to a certified intrinsically safe circuit with the following maximum values: U_i = 30 V effective internal capacitance: C_i = 3.7 nF The effective internal inductance is negligibly small.		
Mechanical digital feedback (terminals Limit1 +51, -52 resp. Limit2 +41, -42)	in type of protection “Intrinsic Safety” Ex ib IIC Maximum values see IEC Certificate No. (proximity switches of the company Pepperl + Fuchs GmbH)		
The intrinsically safe circuits themselves are safe galvanically separated up to a voltage of 60 V. The “Local interface for communication (LKS) and programming interface (X5)” is connected with the signal circuit.			

Electrical data for type TZIDC, TZIDC-110 resp. TZIDC-120 with marking Ex nA II T6	
Type TZIDC resp. TZIDC-200	
Signal circuit (terminals 11(+), 12(-))	U = 8.7 VDC; 4...20 mA, max. 21.5 mA
Switch input (terminals 81(+), 82(-))	U = 12…24 VDC; 4 mA
Switch output (terminals 83(+), 84(-))	U = 11 VDC
Optionally the following modules are allowed to be used with type TZIDC:	
Digital feedback (terminals +51, -52 resp. +41, -42))	U = 5…11 VDC
Analogue feedback (terminals +31, -32)	U = 10…30 VDC; 4…20 mA, max. 21.5 mA
Type TZIDC-110	
Input circuit (terminals +11, -12)	U = 9..32 VDC; 10.5 mA
Type TZIDC-120	
Input circuit (terminals +11, -12)	U = 9..32 VDC; 11.5 mA
Additionally the following modules are allowed to be used with all types marked Ex nA II T6:	
Shutdown-switch-input (terminals +51, -52 resp. +85, -86)	U = 20…30 VDC
Mechanical digital feedback (terminals Limit1 +51, -52 resp. Limit2 +41, -42)	U = 5…11 VDC

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) # EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 00 ATEX 2049 X

(4) Equipment: SN-sensors, types NJ... and SJ...

(5) Manufacturer: Pepperl + Fuchs GmbH

(6) Address: D-68307 Mannheim

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 00-29268.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 **EN 50020:1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

Ex II 2 G EEx ia IIC T6

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, October 05, 2000

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

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(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2049 X

(15) Description of equipment

The SN-sensors, types NJ... and SJ... are used to convert displacements into electrical signals.

The SN-sensors, types NJ... and SJ... may be operated with intrinsically safe circuits certified for categories and explosion groups [EEx ia] IIC or IIB resp. [EEx ib] IIC or IIB. The category as well as the explosion group of the SN-sensors depends on the connected supplying intrinsically safe circuit.

Electrical data

Evaluation and
supply circuit..... type of protection Intrinsic Safety EEx ia IIC/IIB
resp. EEx ib IIC/IIB
only for connection to certified intrinsically safe circuits
maximum values:

type 1	type 2	type 3	type 4
U_i = 16 V	U_i = 16 V	U_i = 16 V	U_i = 16 V
I_i = 25 mA	I_i = 25 mA	I_i = 52 mA	I_i = 76 mA
P_i = 34 mW	P_i = 64 mW	P_i = 169 mW	P_i = 242 mW

The assignment of the type of the connected circuit to the maximum permissible ambient temperature and the temperature class as well as the effective internal reactances for the individual types of SN-sensors is shown in the following table:

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SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2049 X

types	C_i	L_i	type 1			type 2			type 3			type 4		
			maximum permissible ambient temperature in °C for application in temperature class											
	[nF]	[µH]	T6	T5	T4-T1	T6	T5	T4-T1	T6	T5	T4-T1	T6	T5	T4-T1
NJ 2-11-SN...	50	150	73	88	100	66	81	100	45	60	89	30	45	74
NJ 2-11-SN-G...	50	150	76	91	100	73	88	100	62	77	81	54	63	63
NJ 2-12GK-SN...	50	150	73	88	100	69	84	100	51	66	80	39	54	61
NJ 3-18GK-S1N...	70	200	73	88	100	69	84	100	51	66	80	39	54	61
NJ 4-12GK-SN...	70	150	73	88	100	69	84	100	51	66	80	39	54	61
NJ 5-18GK-SN...	120	200	73	88	100	69	84	100	51	66	80	39	54	61
NJ 5-30GK-S1N...	100	200	73	88	100	69	84	100	51	66	80	39	54	61
NJ 6-22-SN...	110	150	73	88	100	69	84	100	51	66	80	39	54	61
NJ 6-22-SN-G...	110	150	76	91	100	73	88	100	62	77	81	54	63	63
NJ 6S1+U.+N...	180	150	73	88	100	69	84	100	51	66	80	39	54	61
NJ 8-18GK-SN...	120	200	73	88	100	69	84	100	51	66	80	39	54	61
NJ 10-30GK-SN...	120	150	73	88	100	69	84	100	51	66	80	39	54	61
NJ 15-30GK-SN...	120	180	73	88	100	69	84	100	51	66	80	39	54	61
NJ 15S-U.-N...	180	150	73	88	100	66	81	100	45	60	89	30	45	74
NJ 20S-U.-N...	200	150	73	88	100	66	81	100	45	60	89	30	45	74
NJ 40-FP-SN...	370	300	73	88	100	66	81	100	45	60	89	30	45	74
SJ 2-SN...	30	100	73	88	100	66	81	100	45	60	78	30	45	57
SJ 2-S1N...	30	100	73	88	100	66	81	100	45	60	78	30	45	57
SJ 3,5-S1N...	30	100	73	88	100	66	81	100	45	60	89	30	45	74
SJ 3,5-SN...	30	100	73	88	100	66	81	100	45	60	89	30	45	74

(16) Test report PTB Ex 00-29268

(17) Special conditions for safe use

1. For the application within a temperature range of -60 °C to -20 °C the SN-sensors, types NJ... and SJ... must be protected against damage due to impact by mounting into an additional housing.
2. The connection facilities of the SN-sensors, types NJ... and SJ... shall be installed as such that at least a degree of protection of IP20 according to IEC-publication 60529:1989 is met.
3. The assignment of the type of the connected circuit to the maximum permissible ambient temperature and the temperature class as well as the effective internal reactances for the individual types of SN-sensors is shown in the table given under item (15) of this EC-type-examination certifcate.

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
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4. With the application in group IIC inadmissible electrostatic charge of the plastic housing has to be avoided for following types of SN-sensors (warning label on the device).:

   NJ 40-FP-SN...

5. Inadmissible electrostatic charge of parts of the metal houising has to be avoided for the following types of SN-sensors. Dangerous electrostatic charges of parts of the metal housing can be avoided by grounding of these parts whereas very small parts of the metal housing (e.g. screws) don't need to be grounded:

   NJ 2-11-SN-G...
   NJ 6-22-SN-G...
   NJ 6S1+U3+N...
   NJ 6S1+U4+N...
   NJ 15S+U3+N...
   NJ 15S+U4+N...
   NJ 20S+U3+N...
   NJ 20S+U4+N...
   NJ 40-FP-SN-P3...
   NJ 40-FP-SN-P4...

(18) Essential health and safety requirements

Met by the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, October 05, 2000

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In case of dispute, the German text shall prevail.

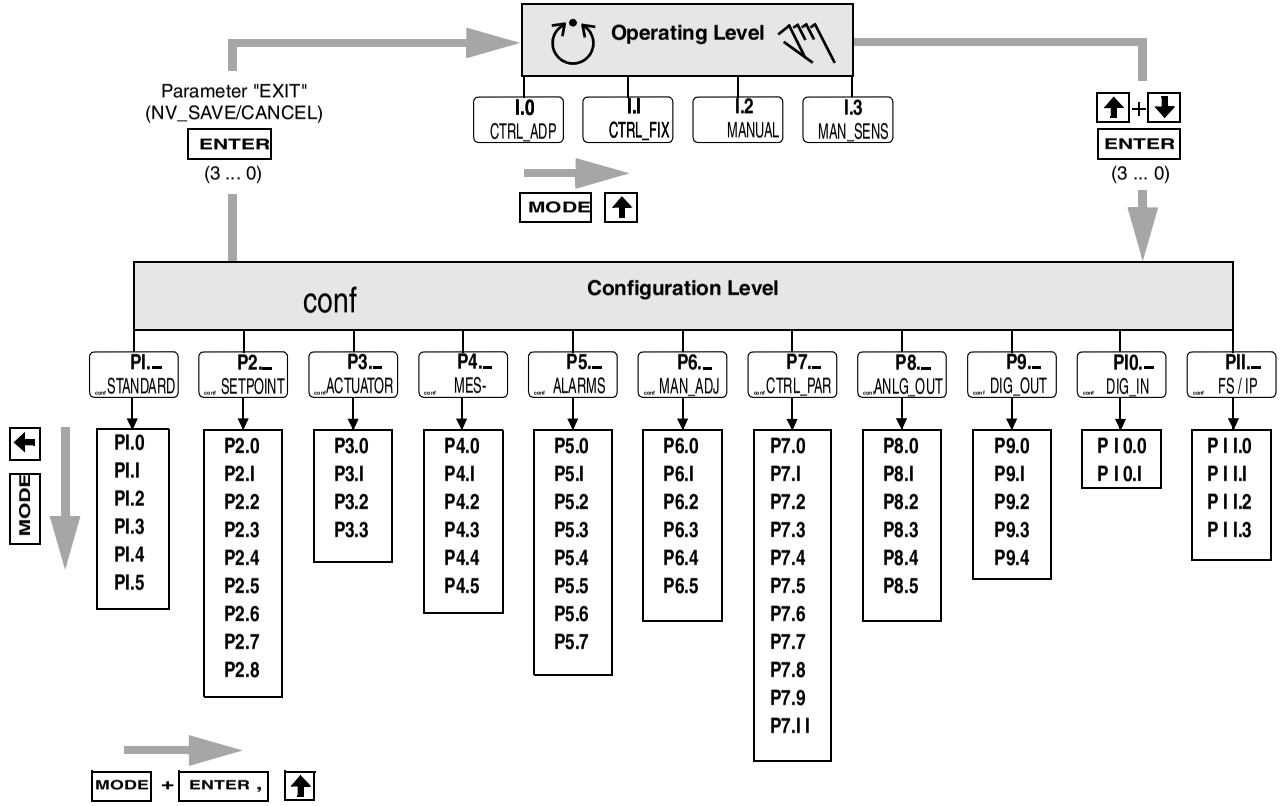
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Appendix A: Parameter overview

Param.	Display	Function	Possible parameter settings	Unit	Fact. setting
P1._	**STANDARD**				
P1.0	**ACTUATOR**	Actuator type	LINEAR, ROTARY	-	LINEAR
P1.1	**AUTO_ADJ**	Autoadjustment	*Command/function is being executed*	-	-
P1.2	**TOL_BAND**	Tolerance band	0.3...10.0	%	0.3
P1.3	**DEADBAND**	Dead band	0.1...10.0	%	0.1
P1.4	**TEST**	Test	*Command/function is being executed*	-	-
P1.5	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P2._	**SETPOINT**				
P2.0	**MIN_RGE**	Min. of setpoint range	4.0...20.0	mA	4.0
P2.1	**MAX_RGE**	Max. of setpoint range	4.0...20.0	mA	20.0
P2.2	**CHARACT**	Characteristic curve	LINEAR, EP 1:25, 1:50, 25:1, 50:1, USERDEF,	-	LINEAR
P2.3	**ACTION**	Action of the output	DIRECT, REVERSE	-	DIRECT
P2.4	**SHUT_CLS**	Shut-off range 0%	OFF, 0.1...45.0	%	1.0
P2.5	**RAMP^**	Setpoint ramp, up	OFF, 1...200	sec	OFF
P2.6	**RAMP v**	Setpoint ramp, down	OFF, 1...200	sec	OFF
P2.7	**SHUT_OPN**	Shut-off range 100%	OFF, 55.0...100		OFF
P2.8	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P3._	**ACTUATOR**				
P3.0	**MIN_RGE**	Min. of operating range	0.0...100.0	%	0.0
P3.1	**MAX_RGE**	Max. of operating range	0.0...100.0	%	100.0
P3.2	**ZERO_POS**	Zero position	CLOCKWISE, CTCLOCKWISE	-	CTCLOCKWISE
P3.3	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P4._	**MESSAGES**				
P4.0	**TIME_OUT**	Deadband time limit	OFF, 1....200	sec	OFF
P4.1	**POS_SW1**	Switching point SW 1	0.0...100.0	%	0.0
P4.2	**POS_SW2**	Switching point SW 2	0.0...100.0	%	100.0
P4.3	**SW1_ACTV**	Active direction SW1	EXCEEDED, FALL_BEL	-	FALL_BEL
P4.4	**SW2_ACTV**	Active direction SW2	EXCEEDED, FALL_BEL	-	EXCEEDED
P4.5	**EXIT**	Return to operating level	*Command/function is being executed*	-	-

Param.	Display	Function	Possible parameter settings	Unit	Fact. setting
P5._	**ALARMS**				
P5.0	**LEAKAGE**	Leakage to actuator	ACTIVE, INACTIVE	-	INACTIVE
P5.1	**SP_RGE**	Outside setpoint range	ACTIVE, INACTIVE	-	INACTIVE
P5.2	**SENS_RGE**	Zero error	ACTIVE, INACTIVE	-	INACTIVE
P5.3	**CTRLER**	Controller inactive	ACTIVE, INACTIVE	-	INACTIVE
P5.4	**TIME_OUT**	Positioning time-out	ACTIVE, INACTIVE	-	INACTIVE
P5.5	**STRK_CTR**	Stroke counter	ACTIVE, INACTIVE	-	INACTIVE
P5.6	**TRAVEL**	Travel counter	ACTIVE, INACTIVE	-	INACTIVE
P5.7	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P6._	**MAN_ADJ**				
P6.0	**MIN_VR**	Min. of valve range	0.0...100.0	%	0.0
P6.1	**MAX_VR**	Max. of valve range	0.0...100.0	%	100.0
P6.2	**ACTUATOR**	Actuator type	LINEAR, ROTARY	-	LINEAR
P6.3	**SPRNG_Y2**	Spring action (Y2)	CLOCKWISE, CTCLOCKWISE	-	CTCLOCKWISE
P6.4	**ADJ_MODE**	Autoadjustment mode	FULL, STROKE, CTRL_PAR, ZERO_POS, LOCKED	-	FULL
P6.5	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P7_	**CTRL_PAR**				
P7.0	**KP ^**	KP value, up	1.0...400.0	-	5.0
P7.1	**KP v**	KP value, down	1.0...400.0	-	5.0
P7.2	**TV ^**	TV value, up	10...800	msec	200
P7.3	**TV v**	TV value, down	10...800	msec	200
P7.4	**GOPLS ^**	Go pulse, up	0...200	msec	0
P7.5	**GOPLS v**	Go pulse, down	0...200	msec	0
P7.6	**Y-OFS ^**	Output offset, up	Y-Min...100.0	%	48.0
P7.7	**Y-OFF v**	Output offset, down	Y-Min...100.0	%	48.0
P7.8	**SENSITIV**	Sensitivity	0.03...0.10	-	0.03
P7.9	**TOL_BAND**	Tolerance band	0.3...10.0	%	0.3
P7.10	**TEST**	Test	*Command/function is being executed*	-	-
P7.11	**EXIT**	Return to operating level	*Command/function is being executed*	-	-

Param.	Display	Function	Possible parameter settings	Unit	Fact. setting
P8._	**ANLG_OUT**				
P8.0	**MIN_RGE**	Min. of current range	4.0...20.0	mA	4.0
P8.1	**MAX_RGE**	Max. of current range	4.0...20.0	mA	20.0
P8.2	**ACTION**	Action (charact. curve)	DIRECT/REVERSE	-	DIRECT
P8.3	**ALARM**	Alarm message	HIGH_CUR, LOW_CUR	-	HIGH_CUR
P8.4	**TEST**	Test	NONE, FAILED, ALRM, CUR, CURRENT	-	NONE
P8.5	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P9._	**DIG_OUT**				
P9.0	**ALRM_LOG**	Logic level alarm output	ACTIV_HI, ACTIV_LO	-	ACTIV_HI
P9.1	**SW1_LOG**	SW1 logic level	ACTIV_HI, ACTIV_LO	-	ACTIV_HI
P9.2	**SW2_LOG**	SW2 logic level	ACTIV_HI, ACTIV_LO	-	ACTIV_HI
P9.3	**TEST**	Test	ALARM_ON, SW1_ON, SW2_ON, ALL_ON, NONE	-	NONE
P9.4	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P10._	**DIG_IN**				
P10.0	**FUNCTION**	Function selection	NONE, POS_O%, POS_100%, POS_HOLD, CNF_LOCK, OP_LOCK, ALL_LOCK	-	NONE
P10.1	**EXIT**	Return to operating level	*Command/function is being executed*	-	-
P11._	**FS / IP**				
P11.0	**FAIL_POS**	Safe position	ACTIVE, INACTIVE	-	INACTIVE
P11.1	**FACT_SET**	Factory setting	*Command/function is being executed*	-	-
P11.2	**IP_TYP**	I/P module type	NO_F_POS, F_SAFE_1, F_SAFE_2, F_FREEZE1, F_FREEEZE_2	-	NO_F_POS
P11.3	**EXIT**	Return to operating level	*Command/function is being executed*	-	-



Parameter overview

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