Operating Instructions

41/18-79 EN

Field IT

Electro-Pneumatic Positioner TZIDC

Industrial IT enabled

Software Revision 2.00

ABB

Electro-Pneumatic Positioner TZIDC
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 positioner requires:

- proper transportation and storage
- mounting, electrical and pneumatic installation and commissioning by qualified personnel (see chapter 1.4, page 9)
- correct operation according to the instructions in this manual
- correct use (see chapter 1.3, page 9)
- careful maintenance

The regulations, standards and directives referred to in this manual are applicable in Germany. When using the TZIDC 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 positioner has been designed and tested in accordance with DIN VDE 0411 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 an ambient temperature of more than 85 °C for a longer timer 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 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 local communication interface (LKS) on the motherboard when the TZIDC 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 "Functional test of the shutdown module".

CAUTION

- Protection class IP 65 / NEMA 4 X is achieved only when the splash guard cap is in place. Do not use the positioner without the cap.

1.2.2 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 !

CAUTION

- 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.

1.2.3 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 37).

CAUTION

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 in case of a malfunction or polarity reversal.

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.

1.2.4 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 37.

WARNING

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

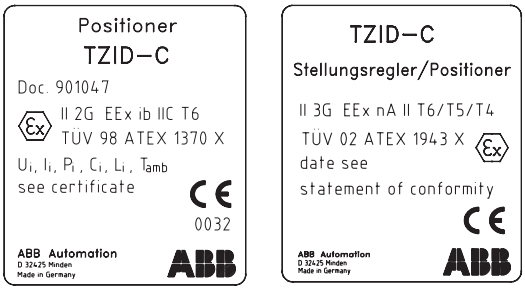


Fig. 1 Type plate indicating the degree of explosion protection

1.3 Correct use

The TZIDC positioner is an electro-pneumatic positioner 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 18-0.22 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 37).

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.

1.4 Qualified personnel

Only those persons familiar with the installation, commissioning, operation and maintenance of the TZIDC positioner or similar instruments who have the required qualification and have read and understood the operating instructions are authorized to work on the TZIDC 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 18-0.22 EN.

2.2 CE compliance information

We declare that we are the manufacturer of the TZIDC 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:

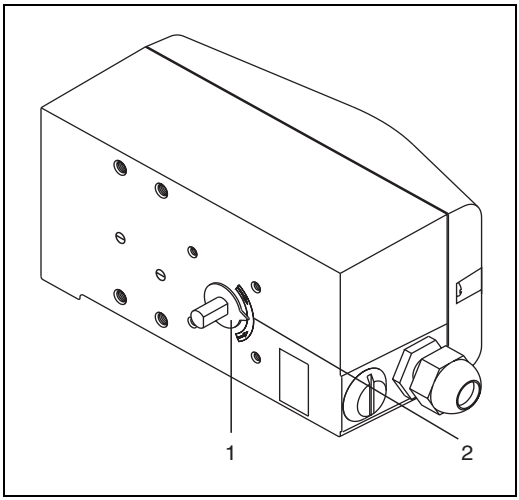
- EN 55022:1998 “Information technology equipment, Radio disturbance characteristics, Limits and methods of measurement”
- EN 61000-6-2:8/2002 ”Electromagnetic compatibility (EMC)
  Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-3:3/2000 “Electromagnetic compatibility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

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

3 Installing and commissioning

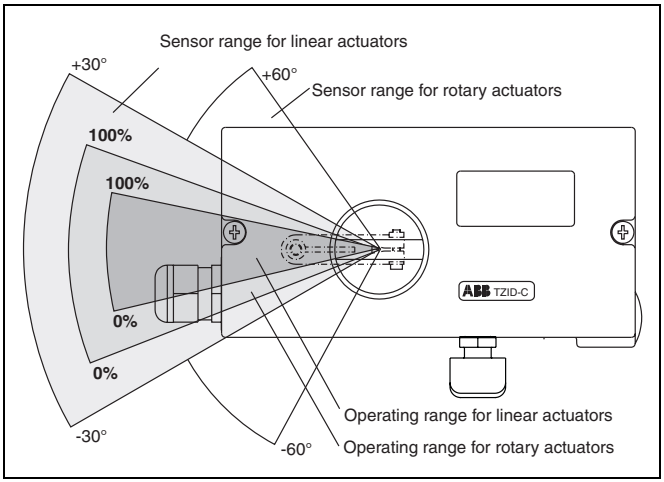
3.1 Mechanical mounting

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, 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 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, the mounting instructions for the splash guard cap on page 21 and the technical data in chapter 4
Explosion protection:	Observe the technical data, and the specifications in the certificates (see the relevant sections of this document).
Mounting orientation:	any orientation allowed, provided that the splash guard cap is in place, (see chapter 3.2.3, page 21).

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:

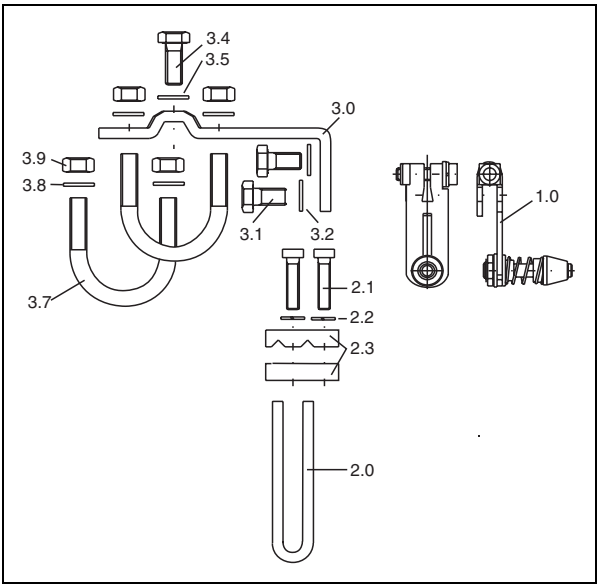


Fig. 4 Mounting kit for linear actuators

- 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 TZIDC to a linear actuator:

Mount the follower guide to the actuator

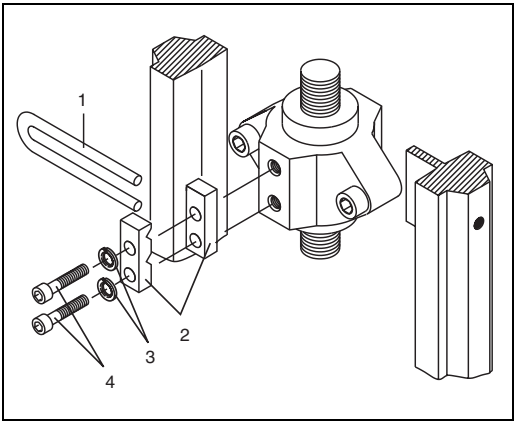


Fig. 5 Mounting follower guide to actuator

- 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.

Assemble the lever (if not yet pre-assembled)

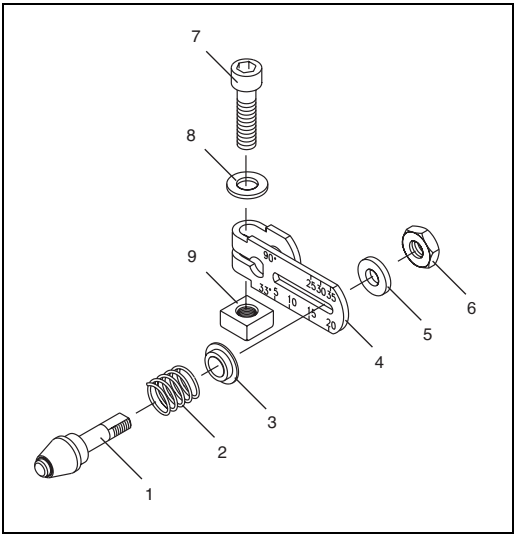


Fig. 6 Assembling the lever

- 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 positioner

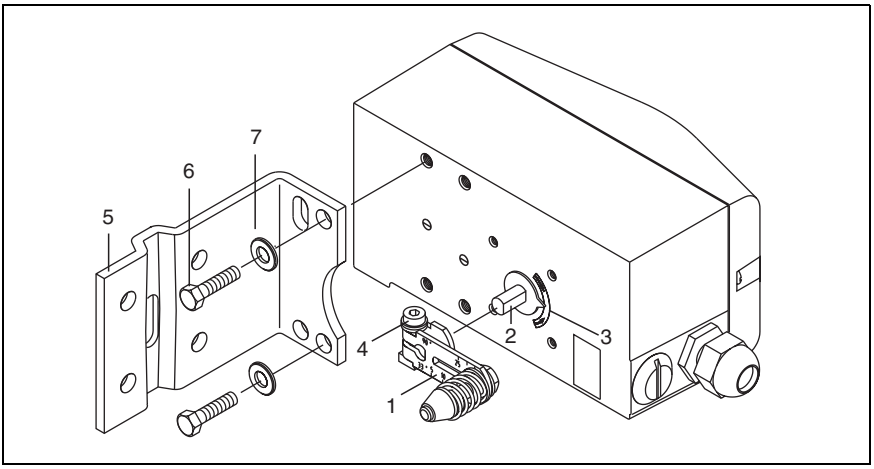
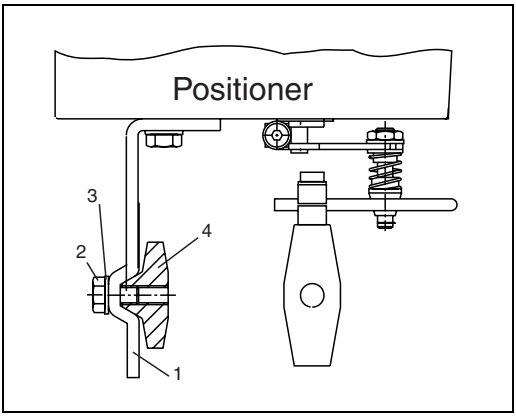


Fig. 7 Mounting lever and angle bracket to TZIDC

- 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 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 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 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

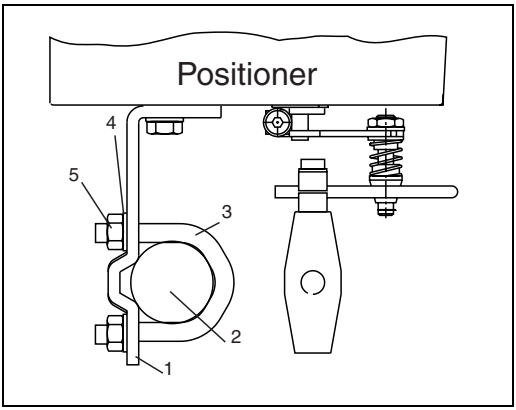


- Fasten the angle bracket (1) with screw (2), plain washer (3) to the cast iron yoke (4).

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 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

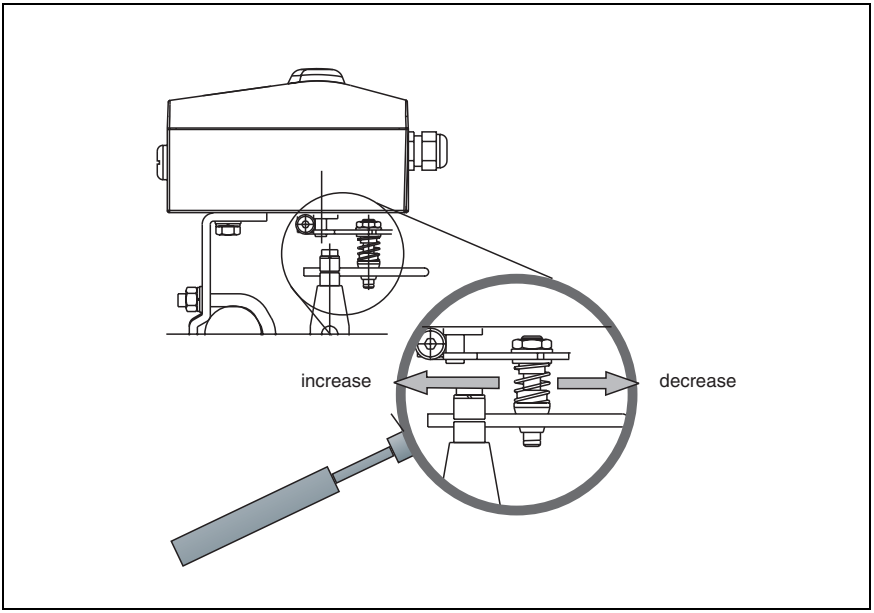


Fig. 10 Positioner linkage

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.

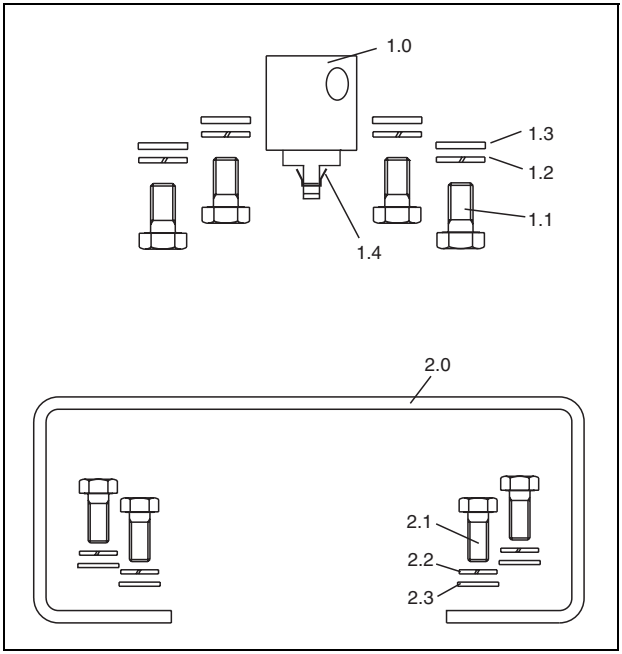
Recommended range for linear actuators: between -28° and +28°
Minimum angle: 25°

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:



- Namur feedback shaft 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 mounting 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 mounting 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 TZIDC to a rotary actuator:

1. Mount the adapter to the positioner

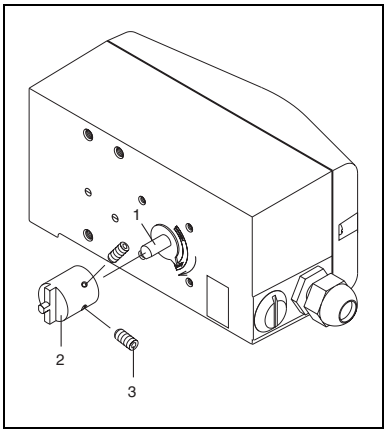


Fig. 12 Mounting the adapter

- 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

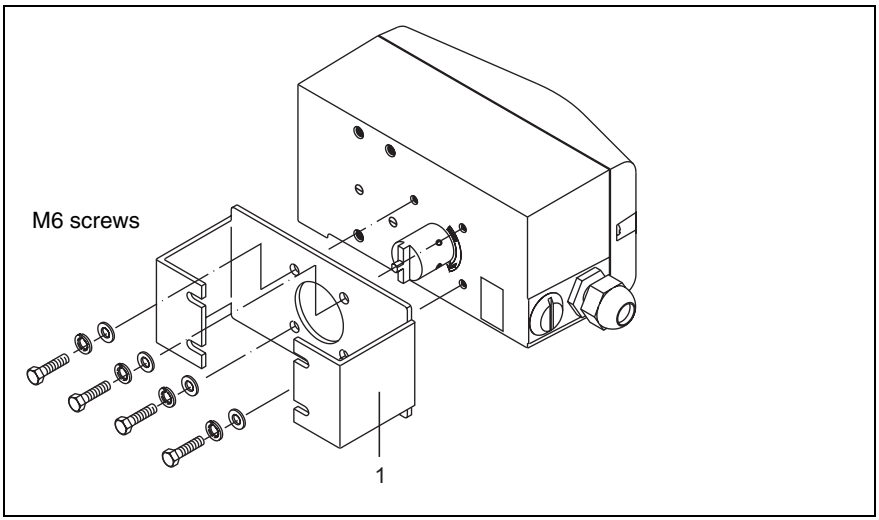


Fig. 13 Attaching the mounting bracket to the positioner

3. Attach the TZIDC positioner to the actuator

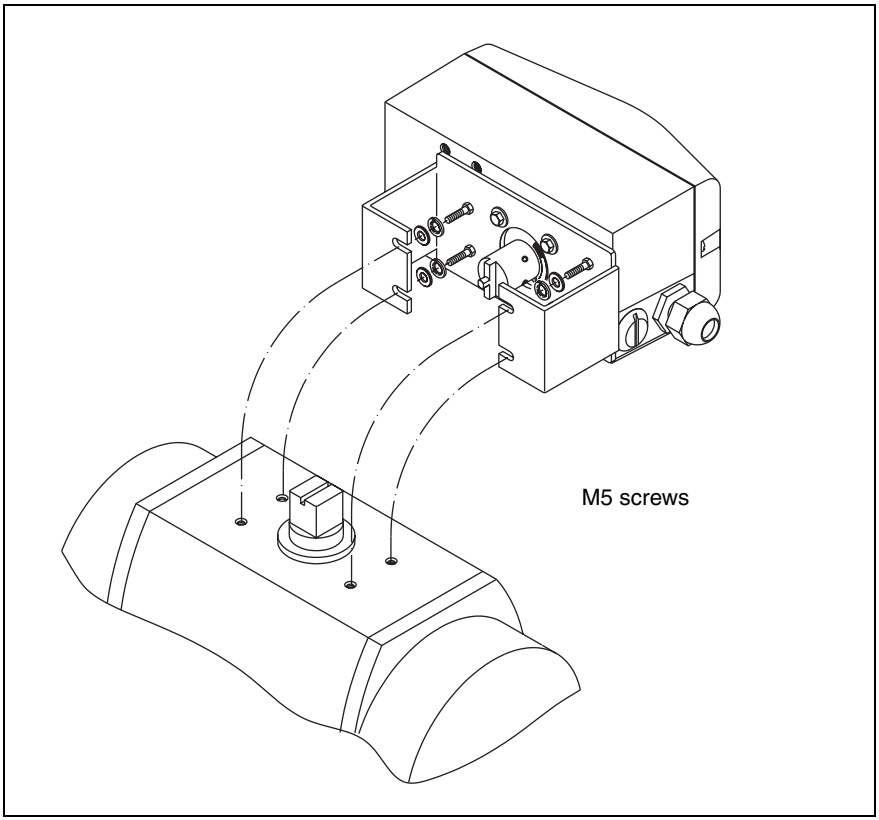


Fig. 14 Attaching the positioner to the actuator

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 !

CAUTION

- 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

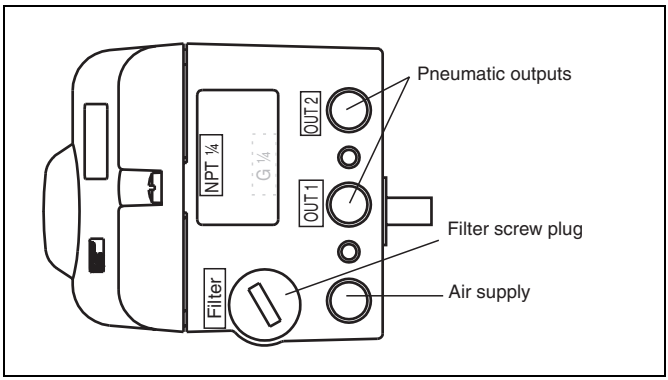


Fig. 15 Pneumatic connections

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 (for double-acting actuators)

3.2.3 Mounting the splash guard cap

CAUTION

Protection class IP 65 / NEMA 4 X is achieved only when the splash guard cap is in place. Do not use the positioner without the cap.

Screw the splash guard cap delivered with your positioner into the appropriate hole in the bottom plate of the case, as seen in the illustration below. Do not use a screw driver for this purpose!

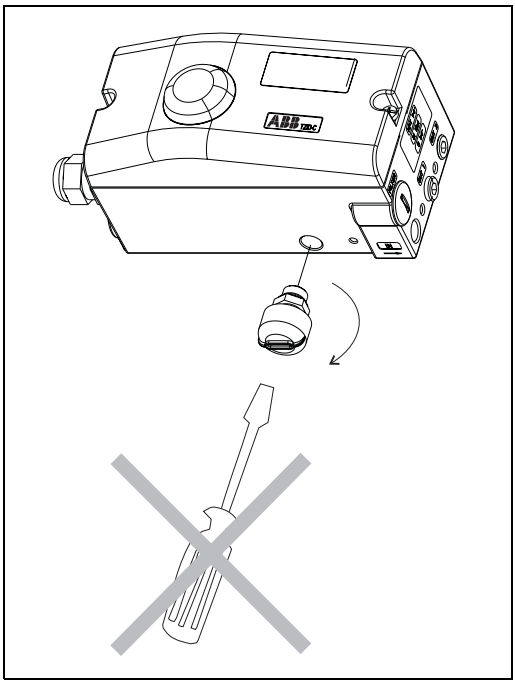


Fig. 16 Mounting the splash guard cap

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 37).

3.3.2 General installation instructions

CAUTION

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 in case of a malfunction or polarity reversal.

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 holes PG 13.5, 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.

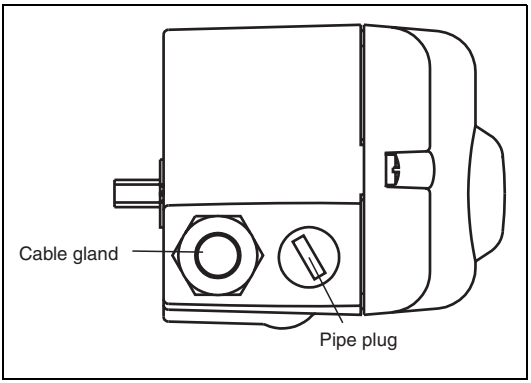


Fig. 17 Cable entry

The screw terminals inside the case are assigned as follows (see Fig. 18):

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

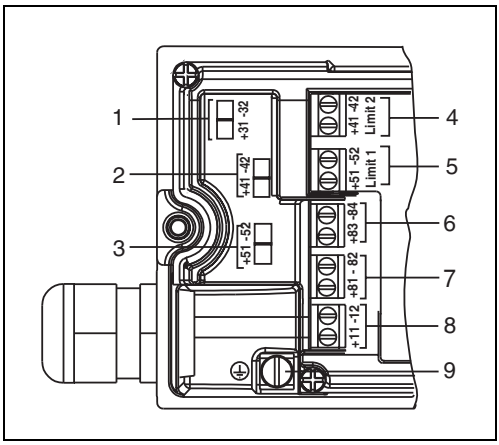


Fig. 18 Screw terminals

3.3.4 Inserting 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:

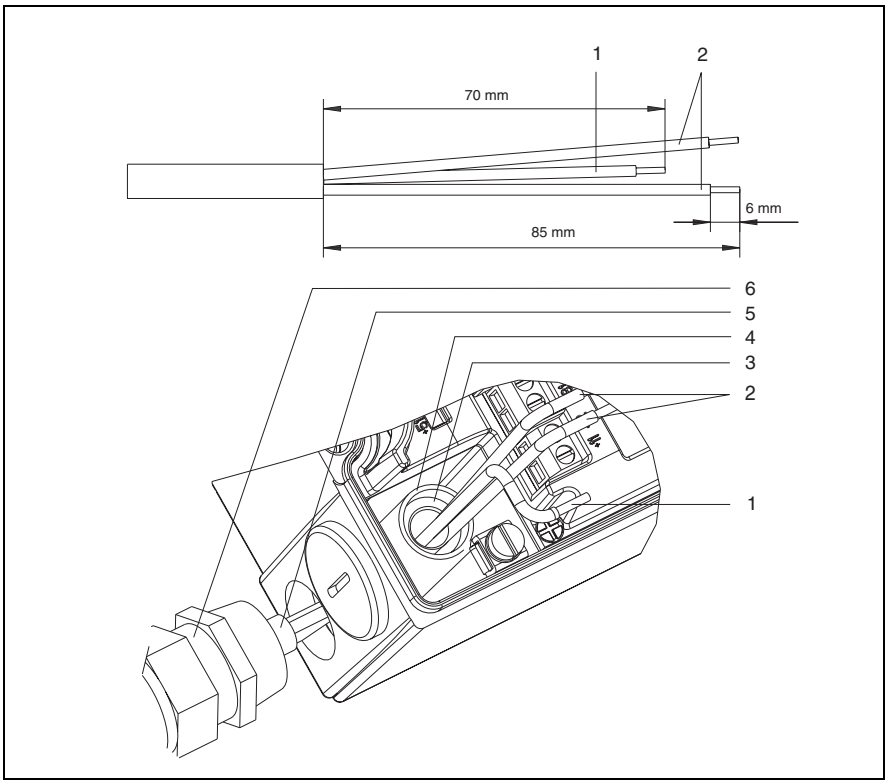


Fig. 19 Inserting the cable

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. 6 mm of the insulation.
2. Put the protective hose (3) on the ferrite tube (4).
3. Insert all wires through the cable gland (6) and the ferrite tube (4). Make sure that the end of the cable sheath (5) protrudes into the connection compartment. Fasten the cable gland.
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. 18 on page 23 and chapter 3.3.5).

3.3.5 Making the electrical connection

- Remove approximately 6 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).

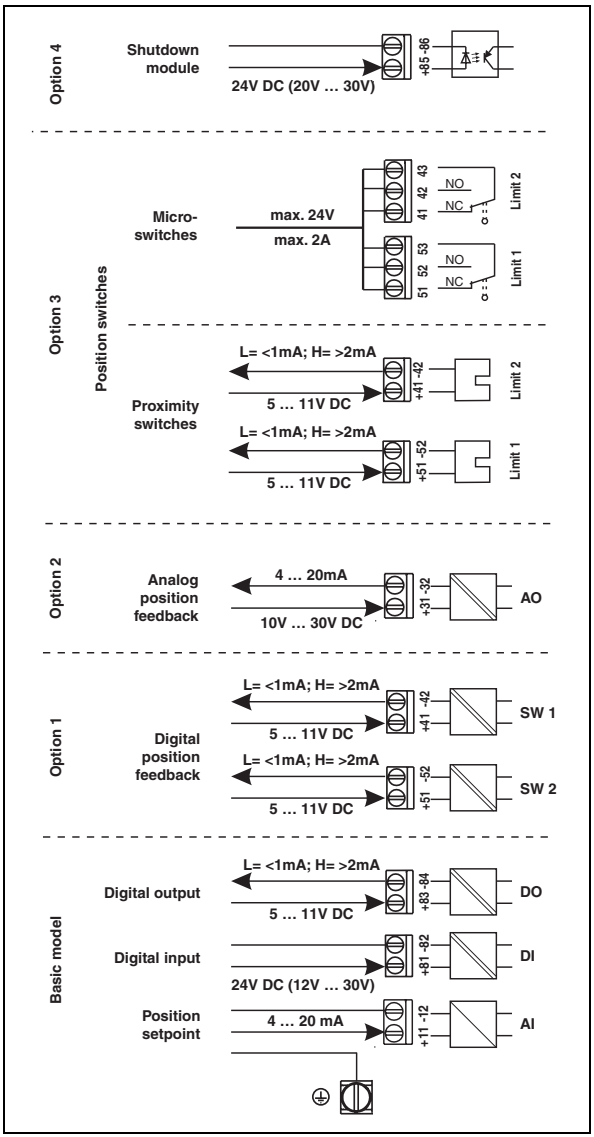


Fig. 20 Terminal assignment

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.

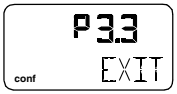
1. Change over to the configuration level:
   - Press and hold ↑ and ↓ at the same time.
   - Additionally, briefly press **ENTER**.
   - Wait until the countdown has run down from 3 to 0.
   - Release ↑ and ↓ .
   - 

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 on devices with explosion protection.

IMPORTANT

You should be aware of the fact that the positioner's warranty will expire immediately if you should modify or manipulate the electronics of a positioner without explosion protection.

The TZIDC positioner is virtually maintenance free.

To ensure flawless 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.

Proceed as described below:

- Remove the cover.
- Alternately set the slide switch (see Fig. 18 on page 23) from the "On" position in the middle to the top and bottom position ("Off1" or "Off2") and check that the actuator is depressurized properly.
- Set the slide switch to the "On" position in the middle again.
- Replace the cover.

4 Technical data

4.1 Basic model

Input

Signal range
Nominal range 4...20 mA
split range configuration between 20% and 100 % of the nominal range

Two-wire technology

Load voltage	8.7 V DC without explosion protection
	9.7 V DC intrinsically safe device
Resistance	435 ohms at 20 mA and 8.7 V DC
	485 ohms at 20 mA and 9.7 V DC

Digital input

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

Digital output (control circuit to DIN 19234/NAMUR)

Supply voltage	5 ... 11 VDC
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 for increasing air capacity on request)

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

Shut-off function
When the setpoint exceeds or falls below the defined limit value,
the actuator immediately moves to the 0 % or 100 % position.

Travel

Angle of rotation

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

Travel time prolongation
Range of 0...200 seconds, separately for each direction

Positioning time limit
Range of 0...200 seconds (monitoring parameter for control until the deviation reaches the tolerance band)

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

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)
Caution: Do not exceed the max. operating pressure of the actuator!

Air consumption

< 0.03 kg/h (0.08 scfm) (independent of supply pressure)

Transmission data and influences

Output pressure (OUT 1)

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

Action (characteristic curve)

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

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

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

Environmental capabilities

Ambient temperature

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

Relative humidity

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

Case

Material/Protection

Aluminum, protection class IP 65 (NEMA 4X)

Surface/color

Electrostatic dipping varnish with epoxy resin, stove-enamelled
Bottom part of case varnished black, RAL 9005, matt,
Cover white aluminum, RAL 9006

Electrical connections

Screw terminals:
max. 1.0 mm^2 for options, max. 2.5 mm^2 for analog signal
Caution: Do not expose the terminals to strain!
Cable entry:
2 threads Pg. 13.5, 1/2-14 NPT or M20x1.5
for cable diameter 6...12 mm
1 with cable gland and 1 with pipe plug

Pneumatic connections

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

Weight

1.7 kg

Mounting orientation

Any orientation allowed

Dimensions

see dimensional drawings in data sheet 10/18-0.22 EN

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 37).

FM J.I. 3005029 (3610, 3611)
Intrinsically safe
CL I, Div. 1, Grp. A-B-C-D
CL II, Div. 1, Grp. E-F-G
CL III, Div. 1

Non-incendive
Suitable for use in Div. 2 environment

CSA Certification 1052414
Intrinsically safe; Enclosure 4X; T4, max. 85°C
CL I, Div. 1, Grp. A-B-C-D
CL II, Div. 1, Grp. E-F-G
CL III, Div. 1

Non-incendive; Enclosure 4X, max. 85°C
CL I, Div. 2, Grp. A-B-C-D
CL II, Div. 2, Grp. E-F-G
CL III

ATEX	⟨Ex⟩ II 2G EEx ib II C T6
Type examination certificate	TÜV 98 ATEX 1370 X
Type:	Intrinsically safe equipment
Device class:	II 2G (EEx ib IIC)
Temperature class:	T4, T5, T6
Permissible ambient temperature:	T4: -40 °C ≤ T_{amb} ≤ +85 °C
	T5: -40 °C ≤ T_{amb} ≤ +50 °C
	T6: -40 °C ≤ T_{amb} ≤ +35 °C

ATEX	⟨Ex⟩ II 3G EEx n A II T6
Type examination certificate	TÜV 02 ATEX 1943 X
Type:	Explosion-proof equipment for zone 2
Device class:	II 3G (EEx n A II)
Temperature class:	T4, T5, T6
Permissible ambient temperature:	T4: -40 °C ≤ T_{amb} ≤ 85 °C
	T5: -40 °C ≤ T_{amb} ≤ 65 °C
	T6: -40 °C ≤ T_{amb} ≤ 50 °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) 48 V DC (20...48 V DC, no explosion protection)

Action (characteristic curve) 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 the min. and max. positions
(position adjustable within the range of 0...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)
Safe position is activated when	V < 5 V
AK approval	AK 4 to DIN V 19250
Test report No.	101/S01/148
Explosion protection	see certificates

In case of a 24 V DC power failure, the positioner can let the valve move to the safe position by depressurizing the actuator independently of the processor. To achieve this, the I/P module power supply is separated by an optocoupler. Both the communication and feedback are still active. The shutdown input is electrically isolated from the control signal.

Due to the shutdown function no additional solenoid valves are required. It has a safety certificate from TÜV Rheinland in accordance with AK4. The plug-in module also has an Ex certificate for use in intrinsically safe current circuits.

1. The modules for analog position feedback and for digital position feedback are plugged in separate slots and, therefore, can be used together.
2. The module for the shutdown function can only be plugged in when no analog and digital position feedback modules are present.

Digital position feedback with proximity switches

2 proximity switches for min. and max. position
(position adjustable within 0...100 %)

Current circuits to DIN 19234/NAMUR

Supply voltage	5...11 V DC
Control current	< 1 mA = logical "0" > 3 mA = logical "1"

(works independently of the software and the electronics of the positioner)

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

CAUTION

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

Digital position feedback with 24 V microswitches

Two 24 V DC/AC microswitches for independent position signaling.
Switching points adjustable between 0 and 100 %
Not approved for use in hazardous areas!

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

5 Certificates

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

10/01ed TÜV Nord e. DAP 5.97

(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.

BA 02 11.98 1.000.000

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

BA 02 11.98 1.000.000

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

Translation

(1) # STATEMENT OF CONFORMITY

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

(3) Test certificate number

TÜV 02 ATEX 1943 X

(4) Equipment: Positioner type TZID-Cxxx

(5) Manufacturer: ABB Automation Products GmbH

(6) Address: Schillerstraße 72
D–32425 Minden

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

(8) The TÜV NORD CERT GmbH & Co. KG, TÜV CERT-Certification Body, notified body number N° 0032 in accordance with Article 9 of the Council Directive 94/9/EC of March 23, 1994, certifies that this equipment or protective system 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 confidential report N° 02YEX 182036.

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

EN 50021:1999

(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 statement of conformity certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

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

Ex II 3 G EEx n A II T6

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, 2002-10-26

Head of the Certification Body

TÜV NORD CERT

(13) **SCHEDULE**

(14) **STATEMENT OF CONFORMITY N° TÜV 02 ATEX 1943 X**

(15) Description of equipment or protective system

The positioner type TZID-Cxxx is used for the control resp. closed loop control of pneumatically actuated valves.
The positioner type TZID-C110 resp. TZID-C110 transfers the reference value via a field bus signal.
The positioner type TZID-C transfers the reference value via a current loop of 4 … 20 mA.
The positioner type TZID-Cxxx may be installed in explosion hazardous areas that require apparatus of the category 3.

The permissible ambient temperature range in dependence of the temperature class has to be taken from the following table:

Temperature class	Ambient temperature range
T6	-40°C to +50°C
T5	-40°C to +65°C
T4	-40°C to +85°C

Electrical data

Type TZID-C
Signal circuit ..... U = 8,7 V d. c.; 4 ... 20 mA, max. 21,5 mA
(Terminals 12[-], 11[+])

Digital input ..... U = 12 ... 24 V DC, 4mA
(Terminals 82[-], 81[+])

Digital output ..... U = 11 V DC
(Terminals 84[-], 83[+])

Options for TZID-C
Circuit for
analog position feedback .... U = 10 …30 V d. c.; 4 ... 20 mA, max. 21,5 mA
(Terminals 32[-], 31[+])

Circuit for
digital position feedback .....U = 5 … 11 V d. c.
(Terminals 42[-], 41[+]
resp. 52[-], 51[+])

Type TZID-C110
Input circuit ..... U = 9 ... 32 V d. c.; 10,5 mA
(Terminals 12[-], 11[+])

Type TZID-C120
Input circuit ..... U = 9 ... 32 V d. c.; 11,5 mA
(Terminals 12[-], 11[+])

Options for all Types
Circuit for
shutdown function..... U = 20 ... 30 V d. c.
(Terminals 86[-], 85[+])

Circuit for digital
position feedback with
proximity switches ..... U = 5 ... 11 V d. c.
(Terminals Limit 1 52[-], 51[+]
resp. Limit 2 42[-], 41[+])

(16) Test documents are listed in the test report no. 02YEX182036.

(17) Special conditions for safe use

1. Only devices, which are suitable for the operation in explosion hazardous areas of the zone 2 and the conditions available at the place of operation (Declaration of conformity or certificate of a testing department), are allowed to be connected to non intrinsically safe circuits in the zone 2.

2. The connecting and disconnecting as well as the switching of circuits under voltage, is only permitted during installation, for maintenance or for repair purposes.
Note: The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes is assessed as unlikely.

3. For the circuit "digital position feedback with proximity switches" measures have to be taken outside the device, that the rated voltage is exceeded not more than 40% by transient disturbances.

4. Only non combustible gases are allowed to be used as pneumatic auxiliary energy.

5. Only suitable cable entries, which meet the requirements of EN 50 021, are allowed to be used.

(18) Essential Health and Safety Requirements

no additional ones

CSA INTERNATIONAL

Certificate of Compliance

Certification: 1052414 **Master Contract:** 203012

Project: 1052414 **Date Issued:** July 31, 2000

Issued to: **ABB Automation Products GmbH**
SchillerstraBe 72
D-32425 Minden
Germany
Attention: Mr. Wolfgang Lasarzik

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

Issued by: Dorin Stochitoiu

Signature: Stochitoiu

PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

Class I, Div 2, Groups A, B, C and D; Class II, Div 2, Groups E, F and G; Class III; Enclosure Type 4X:

Model TZID-C, P/N V18345-x0x2x2xx0x Intelligent Positioner; input rated 30V dc max, 4-20mA; max output pressure 90 psi; 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, Div 1; Enclosure Type 4X:

Model TZID-C, P/N V18345-x0x2x2xx0x, Intelligent Positioner; input rated 30V dc max, 4-20mA; max output pressure 90 psi; intrinsically safe with entity parameters of: Terminals 11/12: V max = 30V, I max = 104mA, Ci = 6.6nF, Li = 0uH; Terminals 81/82: V max = 30V, I max = 110mA,Ci =3.7nF, Li = 0uH; Terminals 83/84: V max = 30V, I max = 96mA, Ci =3.7nF, Li =0uH; Terminals 31/32: V max = 30V, I max = 110mA, Ci =6.6nF, Li = 0uH; Terminals 41/42 and 51/52: V max = 30V, I max = 96mA, Ci =3.7nF, Li =0uH; Terminals Limit 2 41/42 and Limit 1 51/52: V max = 15.5V, I max = 52mA, Ci =20nF, Li =30uH; when installed per installation Drawing No 901064; Temperature Code T4; Max Ambient 85 Deg C.

Note 1: The "x" in P/N denotes minor mechanical variations or optional features.
Note 2: Local communication interface LKS shall not be used in hazardous location.
Note 3: Each pair of conductors of each in intrinsic safety circuit shall be shielded.

DQD 507WP 2000/04/17 Page 1

CSA INTERNATIONAL

Certification: 1052414 **Master Contract:** 203012

Project: 1052414 **Date:** July 31, 2000

APPLICABLE REQUIREMENTS

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
CAN/CSA-C22.2 No 25-1966	-	Enclosures for use in Class II Groups E, F and G Hazardous Location

MARKINGS

- CSA Monogram
- Company Name
- Model Number
- Serial Number
- Electrical Rating
- Hazardous Location Designation
- Entity Parameters (V max, I max, Ci, Li)
- Special Purpose Enclosure Designation, "Type 4X"
- Maximum Ambient
- The Symbol "Exia"
- The Words "INTRINSICALLY SAFE/SECURITE INTRINSEQUE"
- Reference to Installation Instructions
- A statement re: Changing Components ....
- Caution statement re: Disconnection of Circuits...
- Statement: Local Communication Interface LKS cannot be Used in Hazardous Locations.

DQD 507WP 2000/04/17 Page 2

CSA INTERNATIONAL

Supplement to Certificate of Compliance

Certificate: 1052414 **Master Contract:** 203012

Project: 1052414

Issued to: **ABB Automation Products GmbH**
SchillerstraBe 72
D-32425 Minden
Germany
Attention: Mr. Wolfgang Lasarzik

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

Issued By: Dorin Stochitoiu

Signature: Stochitoiu

Product Certification History

Project	Date	Description
1052414	July 31, 2000	Original Certification - Model TZID-C Positioner.

DQD 507WP 2000/04/17 Page 1

APPROVAL REPORT

TZID-C POSITIONER
FOR
HAZARDOUS (CLASSIFIED) LOCATIONS

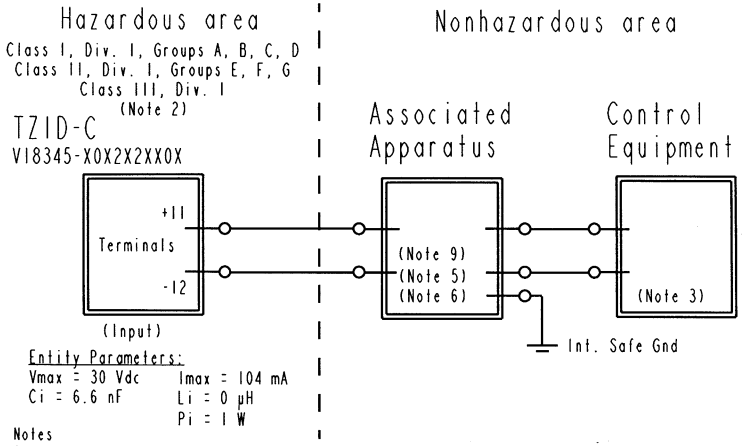
PREPARED FOR:

ABB AUTOMATION PRODUCTS
SCHILLERSTR 72
32425 MINDEN, GERMANY

J.I. 3005029
3610, 3611
August 17, 2000

FACTORY MUTUAL | Factory Mutual System
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062

CONTROL DOCUMENT NO 901064



Entity Parameters:
Vmax = 30 Vdc Imax = 104 mA
Ci = 6.6 nF Li = 0 µH
Pi = 1 W

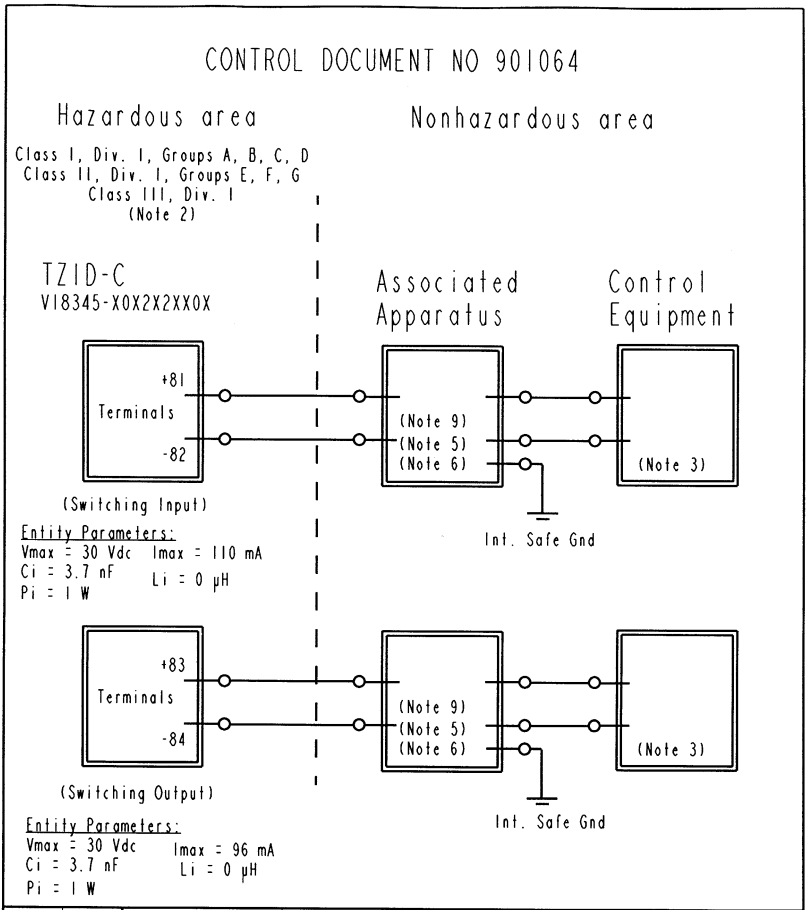
Notes
1. Voc or Vi <= Vmax, Isc or It <= Imax, Ca >= Ci+Ccable, La >= Li + Lcable; Po <= Pi
2. Dust-tight conduit seal must be used when installed in Class II and Class III environments.
3. Control equipment connected to barrier must not use or generate more than 250 Vrms or Vdc
4. Installation should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

Werkstückkanten nach DIN 6784 ohne Angabe:	Allgemeintoleranzen nach DIN 7168-m-C	bis 6	über 6 bis 30	über 30 bis 120	über 120 bis 400	über 400
		± 0,1	± 0,2	± 0,3	± 0,5	± 0,8
Technische Oberfläche nach DIN ISO 1302	nach Vorschrift					
	Winkelmaße nach DIN 7168 mittel					

	Tag:	Name:	Werkstoff:	ABB Automation Products GmbH
Gez.	08-Apr-99	Lasarzik		
Gepr.			Halbzeug, Rohteil-Nr.:	
Normgepr.			Rev. 8 (17.08.00)	TKM

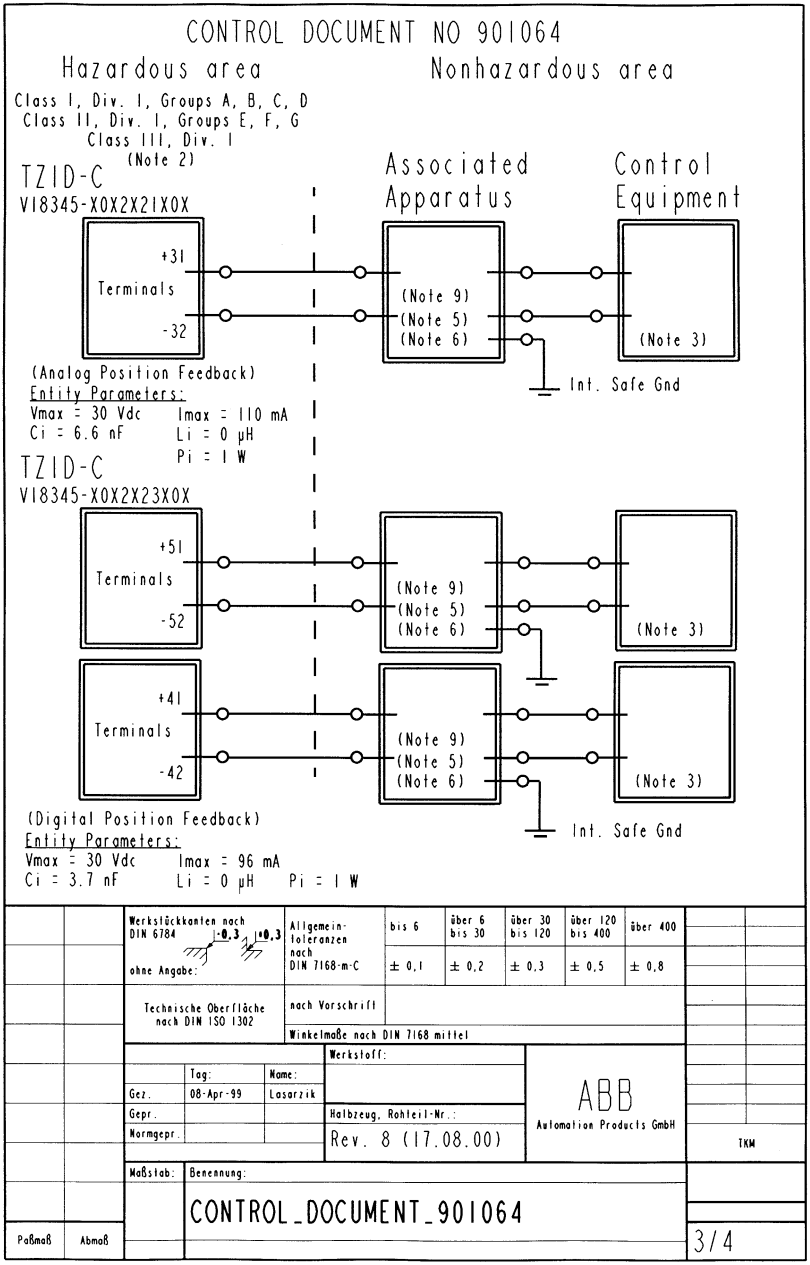
Maßstab: | Benennung: CONTROL_DOCUMENT_901064 | 1/4

Paßmaß | Abmaß



Das Urheberrecht an dieser Zeichnung verbleibt uns. Vervielfältigung und mündlicher Benutzung durch Empfänger od. Dritte bei zivil- u. strafrechtliche Folge.

Werkstückkanten nach DIN 6784 ohne Angabe:		Allgemeintoleranzen nach DIN 7168-m-C	bis 6	über 6 bis 30	über 30 bis 120	über 120 bis 400	über 400		
			± 0,1	± 0,2	± 0,3	± 0,5	± 0,8		
Technische Oberfläche nach DIN ISO 1302		nach Vorschrift							
		Winkelmaße nach DIN 7168 mittel							
	Tag:	Name:	Werkstoff:			ABB Automation Products GmbH			
Gez.	08-Apr-99	Lasarzik							
Gepr.			Halbzeug, Rohteil-Nr.:						
Normgepr.			Rev. 8 (17.08.00)						TKM
Maßstab:	Benennung:								
	CONTROL_DOCUMENT_901064								
Paßmaß	Abmaß								2/4

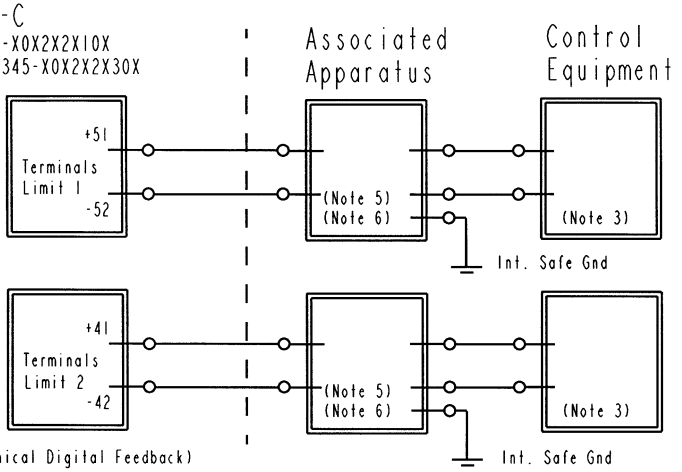

CONTROL DOCUMENT NO 901064
Hazardous area
Nonhazardous area
Class I, Div. I, Groups A, B, C, D
Class II, Div. I, Groups E, F, G
Class III, Div. I
(Note 2)
Associated Apparatus
Control Equipment
TZID-C
VI8345-X0X2X21X0X
+31
Terminals
-32
(Note 9)
(Note 5)
(Note 6)
(Note 3)
Int. Safe Gnd
(Analog Position Feedback)
Entity Parameters:
Vmax = 30 Vdc
Imax = 110 mA
Ci = 6.6 nF
Li = 0 µH
Pi = 1 W
TZID-C
VI8345-X0X2X23X0X
+51
Terminals
-52
+41
Terminals
-42
(Digital Position Feedback)
Entity Parameters:
Vmax = 30 Vdc
Imax = 96 mA
Ci = 3.7 nF
Li = 0 µH
Pi = 1 W
Werkstückkanten nach DIN 6784
ohne Angabe:
Allgemeintoleranzen nach DIN 7168-m-C
bis 6
über 6 bis 30
über 30 bis 120
über 120 bis 400
über 400
± 0,1
± 0,2
± 0,3
± 0,5
± 0,8
Technische Oberfläche nach DIN ISO 1302
nach Vorschrift
Winkelmaße nach DIN 7168 mittel
Werkstoff:
Tag:
Name:
Gez.
08-Apr-99
Lasarzik
Gepr.
Normgepr.
Halbzeug, Rohteil-Nr.:
Rev. 8 (17.08.00)
ABB
Automation Products GmbH
TKM
Maßstab:
Benennung:
CONTROL_DOCUMENT_901064
Paßmaß
Abmaß
3/4
Das Urheberrecht an dieser Zeichnung verbleibt uns. Vervielfältigung und andere, rechtliche Benutzung durch Empfänger od. Dritte hat zivil- u. strafrechtliche Folgen.

CONTROL DOCUMENT NO 901064

Hazardous area | Nonhazardous area

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

TZID-C
VI8345-X0X2X2X10X
or VI8345-X0X2X2X30X



Entity Parameters:
Vmax = 15.5 V
Imax = 52 mA
Ci = 20 nF
Li = 30 µH
Pi = 1 W

Werkstückkanten nach DIN 6784 -0,3 +0,3 ohne Angabe:	Allgemeintoleranzen nach DIN 7168-m-C	bis 6	über 6 bis 30	über 30 bis 120	über 120 bis 400	über 400		
		± 0,1	± 0,2	± 0,3	± 0,5	± 0,8		
Technische Oberfläche nach DIN ISO 1302	nach Vorschrift							
	Winkelmaße nach DIN 7168 mittel							
	Werkstoff:						ABB Automation Products GmbH	
Tag: 08-Apr-99 Name: Lasarzik								
Gez. / Gepr. / Normgepr.	Halbzeug, Rohteil-Nr.: Rev. 8 (17.08.00)							TKM
Maßstab:	Benennung: CONTROL_DOCUMENT_901064							
Paßmaß / Abmaß								4/4

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

(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:

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.

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

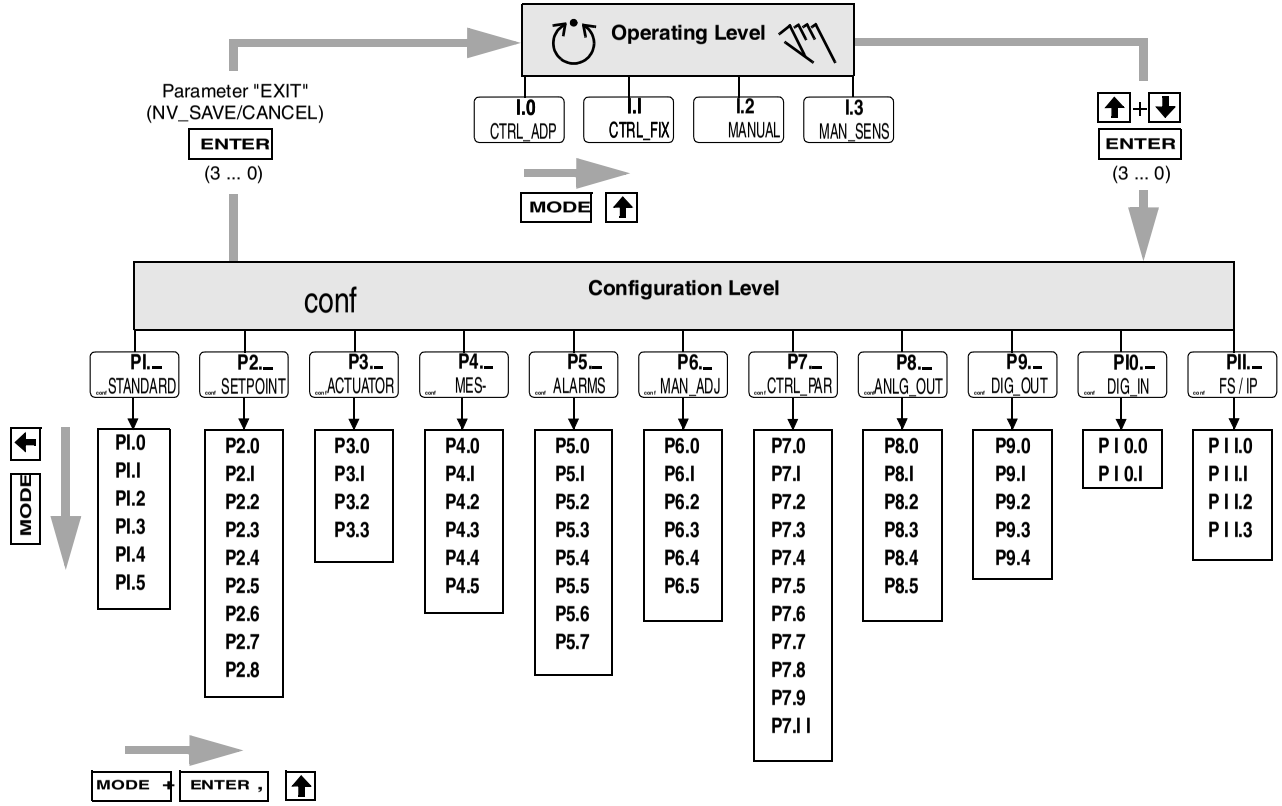
Braunschweig, October 05, 2000

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 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 executed*	-	-
P1.5	**EXIT**	Return to operating level	*Command/function is 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 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 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 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 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 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 executed*	-	-
P7.11	**EXIT**	Return to operating level	*Command/function is 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 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 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 executed*	-	-
P11._	**FS / IP**				
P11.0	**FAIL_POS**	Safe position	ACTIVE, INACTIVE	-	INACTIVE
P11.1	**FACT_SET**	Factory setting	*Command/function is 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 executed*	-	-



Parameter overview

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