

TZIDC

Digital positioner

cFMus

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



—
TZIDC

Introduction

The TZIDC is an intelligent digital positioner for communication via HART within the positioner product range. Unsurpassed shock absorption and vibration compensation from 10 g to 80 Hz distinguishes the TZIDC from other products and guarantees reliable operation in nearly any area under the harshest ambient conditions.

Additional Information

Additional documentation on TZIDC is available for download free of charge at www.abb.com/positioners. Alternatively simply scan this code:



Table of contents

1	Safety.....	3	6	Electrical connections	25
	General information and instructions.....	3		Safety instructions.....	25
	Warnings	3		TZIDC / TZIDC Control Unit terminal assignment.....	26
	Intended use	3		TZIDC Remote Sensor terminal assignment.....	27
	Improper use.....	3		Electrical data for inputs and outputs	28
	Cable glands.....	3		Option modules	28
	Cyber security disclaimer.....	4		Connection on the device.....	29
	Software downloads	4		Conductor cross-section	30
	Manufacturer's address	4		Connection on device - TZIDC Control Unit with TZIDC	
	Service address	4		Remote Sensor.....	31
2	Use in potentially explosive atmospheres	5		Connection on device - TZIDC Control Unit for remote	
	General requirements	5		position sensor	32
	Approvals and certifications	5	7	Pneumatic Connections	33
	Explosion protection approvals	5		Safety instructions.....	33
	Standards applied	5		Information on double acting actuators with spring-	
	Product identification.....	5		return mechanism	33
	cFMus	6		Notes on ABB pressure gauge blocks.....	33
	Ex marking.....	6		Connection on the device.....	34
	Temperature Data	6		Air supply.....	34
	Electrical Data.....	6	8	Commissioning	35
	Commissioning, installation	6		Operating modes	35
	Special conditions for the safe use of intrinsically safe			Standard automatic adjustment	36
	positioners	7		Standard automatic adjustment for linear actuators*	
	Use, operation	7		36
	Maintenance, repair.....	8		Standard automatic adjustment for rotary actuators*	
	Fault elimination	8		36
	Warning markings.....	9		Sample parameters	36
	FM installation drawing No. 901265	10		Setting the mechanical position indication	37
3	Product identification	15		Setup of the feedback on the actuator position using	
	Name plate	15		proximity switches.....	37
4	Transport and storage.....	16		Setup of the feedback on the actuator position using	
	Inspection.....	16		microswitches.....	38
	Transporting the device	16	9	Operation.....	38
	Storing the device.....	16		Safety instructions.....	38
	Ambient conditions	16		Parameterization of the device.....	38
	Returning devices	16		Menu navigation	38
5	Installation	17		Menu levels	39
	Safety instructions	17	10	Maintenance	40
	External position sensors	17	11	Recycling and disposal	40
	Mechanical mounting.....	18	12	Additional documents	40
	Measurement and operating range to HW-Rev.: 5.0... 18		13	Appendix	41
	Measurement and operating range from HW-Rev.: 5.01			Return form	41
	with optional contactless position feedback.....	20			
	Mounting on linear actuators	21			
	Mounting on rotary actuator.....	23			

1 Safety

General information and instructions

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

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

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

The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.

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

Information and symbols on the product must be observed.

These may not be removed and must be fully legible at all times.

The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Note

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

Intended use

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

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

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

Improper use

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

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

Cable glands

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

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

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

... 1 Safety

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is operator’s sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be). Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Software downloads

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

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



Manufacturer’s address

ABB AG
Measurement & Analytics
Schillerstr. 72
32425 Minden
Germany
Tel: +49 571 830-0
Fax: +49 571 830-1806

Service address

To find your local ABB contact visit:
www.abb.com/contacts

For more information visit:
www.abb.com/measurement

2 Use in potentially explosive atmospheres

General requirements

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

Product identification

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

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

Approvals and certifications

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

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

Explosion protection approvals

- cFMus, for details, see page 6.

Standards applied

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

... 2 Use in potentially explosive atmospheres

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Ex marking

TZIDC without mechanical position indication	
Model number: V18345-10b2c2de0f or V18345-30b2c2de0f	
IS / I, II, III / 1 / ABCDEFG / T6, T4 Ta = 40°C, 85°C - 901265; Entity	
NI / I, II, III / 2 / ABCDEFG / T6, T4 Ta = 40°C, 85°C	
Type 4X; IP65	
Max Entity Parameters: Per Control Drawings	
Certificate	FM20US0122X und FM20CA0061X

TZIDC with mechanical position indication	
Model number: V18345-20b2c2de0f or V18345-40b2c2de0f	
IS / I / 1 / ABCD / T6, T4 Ta = 40°C, 85°C - 901265; Entity	
IP65	
Max Entity Parameters: Per Control Drawings	
Certificate	FM20US0122X und FM20CA0061X

Model number details

- b Set input / communication port: 1 or 2.
- c Set output / safety position: 1, 2, 4 or 5.
- d Optional upgrade with plug-in module for analog / digital feedback (option): 0, 1, 3 or 5.
- e Optional upgrade with mechanical digital feedback (option): 0, 1 or 2.
- f Design (painting / marking): 1, H, P, S or 2

Temperature Data

Temperature class	Ambient temperature Ta
T4 T125 °C	-40 °C < Ta < 85 °C
T6 T85 °C	-40 °C < Ta < 40 °C

Electrical Data

Refer to **FM installation drawing No. 901265** on page 10.

Commissioning, installation

The ABB positioner has to be mounted in a major system. Depending on the degrees of IP-protection, an interval for cleaning the equipment (dust settlement) has to be defined. Strict care has to be taken that only such equipment is installed that complies with the types of protection relevant to the applicable zones and categories. When installing the equipment, the locally applicable rules on erection, have to be observed, see **Page 4 of 5** on page 13 to **Page 5 of 5** on page 14.

Other important facts to be observed:

- The equipment is constructed for IP 66 and has to be protected accordingly in adverse ambient conditions.
- The Certificates have to be taken into account including any special conditions defined therein.
- The equipment shall only be used as intended.
- The equipment is only to be connected when de-energized.
- The potential equalization of the system has to be established according to the regulations of erection applicable in the respective country of use, see **Page 4 of 5** on page 13 to **Page 5 of 5** on page 14. For installation according to the North American Zone concept the external grounding is supplementary.
- Circulating currents shall not be led via the enclosures!
- It has to be ensured that the enclosure is properly installed and that its IP protection is not impaired.
- Inside the potentially explosive atmospheres' assembly shall only be performed taking the locally applicable rules of erection into account.

The following conditions have to be observed (incomplete):

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

The following opportunities are available:

- Direct connection of single-strand wires of up to 2.5 mm² or
- Direct connection of fine wires of up to 1.5 mm² or
- Connection of cross-sections of up to 6 mm² using a ring or spade terminal with 4 mm drill hole.
- For proper selection of cables see electrical installation instructions in the original manufacturer's manual. Use cables rated at least 20 K greater than the ambient temperature.
- High / recurring charging processes in gas areas must be excluded by the operator.

Notes for operation

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

Special conditions for the safe use of intrinsically safe positioners

Special conditions

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

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

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

Note

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

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

Use, operation

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

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

... 2 Use in potentially explosive atmospheres

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Maintenance, repair

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

Inspection:

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

Visual inspection:

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

Close inspection:

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

Detailed inspection:

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

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

Activity

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

Fault elimination

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

Warning markings

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

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

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

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

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

... 2 Use in potentially explosive atmospheres

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FM installation drawing No. 901265

Page 1 of 5

FM-CONTROL-DOCUMENT_901265

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

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

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

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

8		2022-02-19	Pet.	2003	Date	Name	Title FM-Control-Document		Scale /
7	DIP marking removed	2021-06-23	Ste	Name	27.03.03	Thiem.			
6		2020-04-28	Ste	Appr.					
5		2011-07-08	Thie	Std.			No change without notice to FM		Page -1/-5
4		2009-10-07	Lasa.	<div>ABB</div> Automation Products					
3		2006-06-26	Thie.						
2		2006-05-22	Thie.						
1		2006-03-27	Thie.						
Rev.	Change	Date	Name				Supersedes Dwg. :		Part Class:

FM-CONTROL-DOCUMENT_901265

Non-Hazardous Location	HAZARDOUS (CLASSIFIED) LOCATION Class I, II, III Div. I & 2 Group A-G Class I Zone 1, 21 Group IIC or IIB/ IIIC																																													
Any FM/CSA Approved Associated Apparatus	<table border="1"> <tr> <td colspan="2">TZIDC-xxx</td> </tr> <tr> <td>+11</td> <td>Analog Input</td> </tr> <tr> <td>-12</td> <td>Analog Input</td> </tr> <tr> <td>+31</td> <td>Analog Position Feedback / Limit Switches</td> </tr> <tr> <td>-32</td> <td>Analog Position Feedback / Limit Switches</td> </tr> <tr> <td>+41</td> <td>Digital Position Feedback /</td> </tr> <tr> <td>-42</td> <td>Digital Position Feedback</td> </tr> <tr> <td>+51</td> <td>Digital Position Feedback/ Limit Switches</td> </tr> <tr> <td>-52</td> <td>Digital Position Feedback/ Limit Switches</td> </tr> <tr> <td>+81</td> <td>Digital Input</td> </tr> <tr> <td>-82</td> <td>Digital Input</td> </tr> <tr> <td>+83</td> <td>Digital Output</td> </tr> <tr> <td>-84</td> <td>Digital Output</td> </tr> </table> <p>→Any FM/ CSA Approved Terminator (maynot be necessary for Entity Installations)</p> <table border="1"> <tr> <td colspan="3">Ambient temperature dependent on temperature class</td> </tr> <tr> <td>Type and Marking</td> <td colspan="2">TZIDC, TZDIC-110/-120</td> </tr> <tr> <td>Ambient temperature</td> <td>Gas atmosphere</td> <td>Dust atmosphere</td> </tr> <tr> <td></td> <td>Temperature class</td> <td>Ambient temperature</td> </tr> <tr> <td>-40 °C to 85 °C</td> <td>T4</td> <td>T 125°C</td> </tr> <tr> <td>-40 °C to 40 °C</td> <td>T6</td> <td>T 85°C</td> </tr> </table>		TZIDC-xxx		+11	Analog Input	-12	Analog Input	+31	Analog Position Feedback / Limit Switches	-32	Analog Position Feedback / Limit Switches	+41	Digital Position Feedback /	-42	Digital Position Feedback	+51	Digital Position Feedback/ Limit Switches	-52	Digital Position Feedback/ Limit Switches	+81	Digital Input	-82	Digital Input	+83	Digital Output	-84	Digital Output	Ambient temperature dependent on temperature class			Type and Marking	TZIDC, TZDIC-110/-120		Ambient temperature	Gas atmosphere	Dust atmosphere		Temperature class	Ambient temperature	-40 °C to 85 °C	T4	T 125°C	-40 °C to 40 °C	T6	T 85°C
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6		2020-04-28	Ste	Appr.				
5		2011-07-08	Thie	Std.			No change without notice to FM	Page -2/5-
4		2009-10-07	Lasa.	ABB Automation Products			Drwg.-No. (Part-No.)	
3		2006-06-26	Thie.				901265	
2		2006-05-22	Thie.					
1		2006-03-27	Thie.					
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:

... 2 Use in potentially explosive atmospheres

... cFMus

Page 3 of 5

FM-CONTROL-DOCUMENT_901265

FISCO rules

The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination.

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

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

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

The allowed voltage (U_o , V_o , V_t) of the associated apparatus used to supply the bus must be limited to the range of 14V d.c. to 24V d.c.

All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 μ A for each connected device.

Separately powered equipment needs a galvanic Isolation to insure that the intrinsically safe Fieldbus circuit remains passive.

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

Loop resistance	R' : 15...150 Ω /km
Inductance per unit length	L' : 0.4...1mH/km
Capacitance per unit length	C' : 80...200 nF / km
	$C' = C' \text{ line/line} + 0.5C' \text{ line/screen}$, if both lines are floating or $C' = C' \text{ line/line} + C' \text{ Line/screen}$, if the screen is connected to one line
Length of spur cable:	max. 30m
Length of trunk cable:	max. 1km
Length of splice:	max. 1m

Terminators

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

- $R = 90...100 \Omega$
- $C = 0...2.2 \mu F$.

System evaluation

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

8		2022-02-19	Pet.	2003	Date	Name	Title	Scale
7	DIP marking removed	2021-06-23	Ste		27.03.03	Thiem.	FM-Control-Document	/
6		2020-04-28	Ste	Appr.			No change without notice to FM	
5		2011-07-08	Thie	Std.				
4		2009-10-07	Lasa.	ABB Automation Products			Drwg.-No. (Part-No.)	Page
3		2006-06-26	Thie.				901265	-3/5-
2		2006-05-22	Thie.					
1		2006-03-27	Thie.					
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:

FM-CONTROL-DOCUMENT_901265**Installation Notes****A. Installation notes for all ignition protection methods**

- Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
- Installation should be in accordance with ANSI/ISA RP12.6 (except chapter 5 for FISCO Installations) "Installation of Intrinsically Safe System for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70) Sections 504 and 505.
- Output current must be limited by a resistor such that the output voltage current plot is a straight line drawn between open circuit voltage and short circuit current
- The operation of the local communication interface (LKS) and of the programming interface (X5) is only allowed outside of the Hazardous explosive area.
- Tampering and replacement with non-factory components may adversely affect the safe use of the system. Substitution of components may impair suitability for hazardous locations.
- For FM Div. 2 use: Do not connect or disconnect unless the power was switched off or the area is known to be non hazardous
- Preventing electrostatic charging
- Due to the possibility of impermissible electrostatic charging of the housing occurring, the effects of high-voltage sources on the equipment must be prevented. Electrostatic charging can also occur if the device is wiped with a dry cloth or if large amounts of dust flow around the device in dusty environments.
- To prevent charging of this type from occurring, the C, device may only be cleaned using a damp cloth.
- Dust flowing round the device should be prevented by installing a flow restrictor or partition.

B. Installation Notes for I.S.

- The Intrinsic Safety Entity concept allows the interconnection of FM/CSA Approved Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:
 - U_o or V_{oc} or $V_t \leq V_{max}$, I_o or I_{sc} or $I_t \leq I_{max}$, $P_o \leq P_i$. C_a or $C_o \geq \sum C_i + \sum C_{cable}$.
 - For inductance use either L_a or $L_o \geq \sum L_i + \sum L_{cable}$ or $L_c / R_c \leq (L_a / R_a \text{ or } L_o / R_o)$ and $L_i / R_i \leq (L_a / R_a \text{ or } L_o / R_o)$
- The Intrinsic Safety FISCO concept allows the interconnecting of FM/CSA Approved Intrinsically safe devices with FISCO parameters not specifically examine in combination as a system when: U_o or V_{oc} or $V_t \leq V_{max}$, I_o or I_{sc} or $I_t \leq I_{max}$, $P_o \leq P_i$.
- The configuration of associated Apparatus must be Factory Mutual Research /Canadian Standards Association Approved under the associated concept.
- Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- Caution: Substitution of components may impair intrinsic safety.
- To maintain intrinsic safety, wiring associated with each channel must be run in separate cable shields connected to intrinsically safe (associated apparatus) ground.

8		2022-02-19	Pet.	2003	Date	Name	Title	Scale
7	DIP marking removed	2021-06-23	Ste	Name	27.03.03	Thiem.	FM-Control-Document	/
6		2020-04-28	Ste	Appr.				
5		2011-07-08	Thie	Std.			No change without notice to FM	
4		2009-10-07	Lasa.	ABB Automation Products			Drwg.-No. (Part-No.)	
3		2006-06-26	Thie.				901265	Page -4/5-
2		2006-05-22	Thie.					
1		2006-03-27	Thie.					
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:

... 2 Use in potentially explosive atmospheres

... cFMus

Page 5 of 5

FM-CONTROL-DOCUMENT_901265

C. Installation notes for flameproof housing

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

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

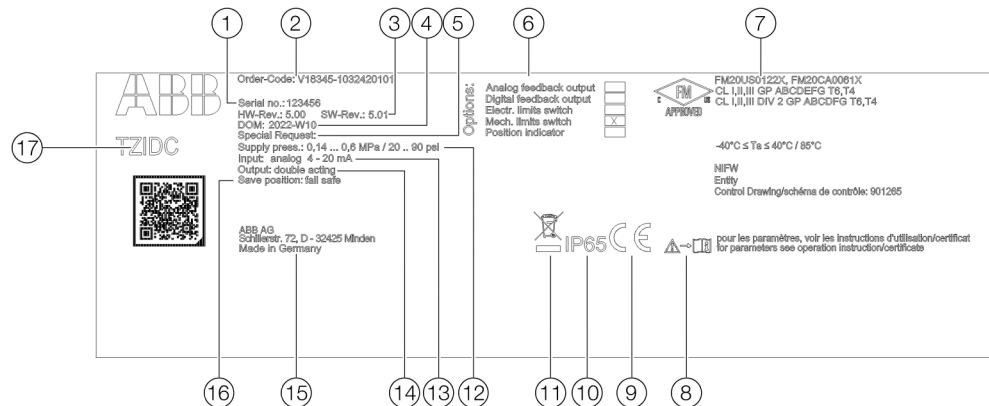
1. Install per National Electrical Code (NEC) using threaded metal conduit. Intrinsic safety barrier required. Max. Supply voltage 30 V. For T-code see table.
2. A dust tight seal must be used at the conduit entry when the positioner is used in a Class II & III Location.
3. WARNING: Explosion Hazard – do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.
WARNING: Substitution of components may impair suitability for hazardous locations.

FM-901265 FM-Control-Document Rev.8

8		2022-02-19	Pet.	2003	Date	Name	Title FM-Control-Document	Scale /	
7	DIP marking removed	2021-06-23	Ste	Name	27.03.03	Thiem.			
6		2020-04-28	Ste	Appr.					
5		2011-07-08	Thie	Std.			No change without notice to FM		
4		2009-10-07	Lasa.	<div>ABB</div> <div>Automation Products</div>					
3		2006-06-26	Thie.				Drwg.-No. (Part-No.) 901265		Page -5/5-
2		2006-05-22	Thie.						
1		2006-03-27	Thie.						
Rev.	Change	Date	Name				Supersedes Dwg. :	Part Class:	

3 Product identification

Name plate



- | | |
|---------------------------------------|-------------------------------------|
| ① Serial number | ⑩ IP rating |
| ② Order code | ⑪ Disposal information |
| ③ Hardware rev. / Software rev. | ⑫ Supply air pressure |
| ④ Year of manufacture / Calendar week | ⑬ Input signal |
| ⑤ Special request | ⑭ Pneumatic system mode of action |
| ⑥ Additional options | ⑮ Manufacturer address |
| ⑦ cFMus marking | ⑯ Reaction in case of power failure |
| ⑧ Note: Observe product documentation | ⑰ Type designation |
| ⑨ CE mark | |

Figure 1: Name plate (example)

4 Transport and storage

Inspection

Check the devices immediately after unpacking for possible damage that may have occurred from improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents.

All claims for damages must be submitted to the shipper without delay and before installation.

Transporting the device

Observe the following instructions:

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

Storing the device

Bear the following points in mind when storing devices:

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

Ambient conditions

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

Adhere to the device data sheet!

Returning devices

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

Fill out the return form (see **Return form** on page 41) and include this with the device.

In accordance with the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:

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

Address for returns:

Please contact Customer Center Service acc. to page 4 for nearest service location.

5 Installation

Safety instructions

⚠ CAUTION

Risk of injury

Risk of injury from pressurized positioner / actuator.

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

⚠ CAUTION

Risk of injury due to incorrect parameter values!

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

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

Note

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

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

Only qualified specialists who have been trained for these tasks are authorized to mount and adjust the unit, and to make the electrical connection.

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

External position sensors

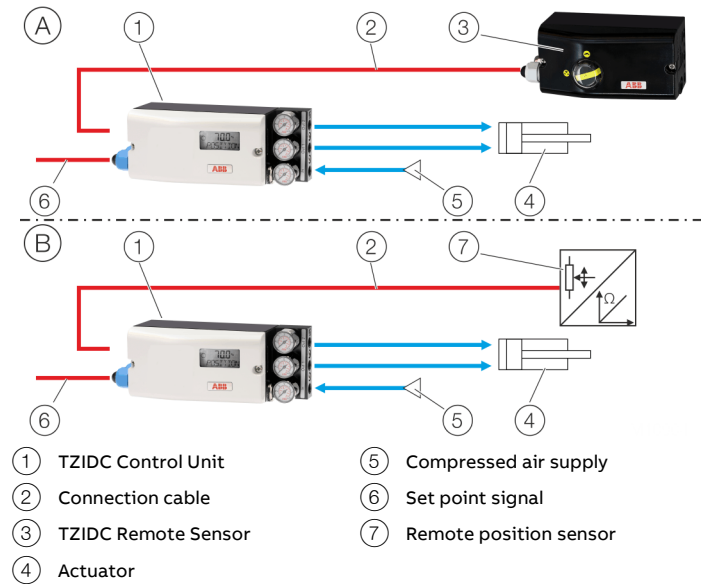


Figure 2: TZIDC with external position sensors

Note

If the device is being operated on a cylinder, for reasons associated with linearity you should run automatic adjustment for rotary actuators (refer to **Standard automatic adjustment for rotary actuators** on page 36).

... 5 Installation

... External position sensors

Ⓐ TZIDC Control Unit with TZIDC Remote Sensor*

In this version, the components are supplied in two housings, which together form one harmonized unit.

The following points should be observed during installation:

- Housing 1 (TZIDC Control Unit) contains the electronics and pneumatics and is mounted separately from the actuator.
- Housing 2 (TZIDC Remote Sensor) contains the position sensor and is mounted on the linear and rotary actuator. Perform mechanical mounting as described in **Mechanical mounting** on page 18.
- The electrical connection is performed as described in **Connection on device - TZIDC Control Unit with TZIDC Remote Sensor** on page 31.

Note

To connect the TZIDC Remote Sensor, a cable with the following specifications needs to be used:

- 3-wire, cross-section 0.5 to 1.0 mm²
- shielded, with at least 85 % coverage
- Temperature range up to at least 100 °C (212 °F)

The cable glands must also be approved for a temperature range up to at least 100 °C (212 °F). The cable glands require a mounting for the shielding and strain relief for the cable in addition.

* The TZIDC Remote Version is temporarily not available for the marine version.

Ⓑ TZIDC Control Unit for remote position sensor

In this version the positioner is supplied without a position sensor.

The following points should be observed during installation:

- Housing 1 (TZIDC Control Unit) contains the electronics and pneumatics and is mounted separately from the actuator.
- The remote position sensor is mounted on the linear and rotary actuator. Follow the operating instructions for the remote position sensor for mechanical mounting!
- The electrical connection is performed as described in **Connection on device - TZIDC Control Unit for remote position sensor** on page 32.

Mechanical mounting

Measurement and operating range to HW-Rev.: 5.0

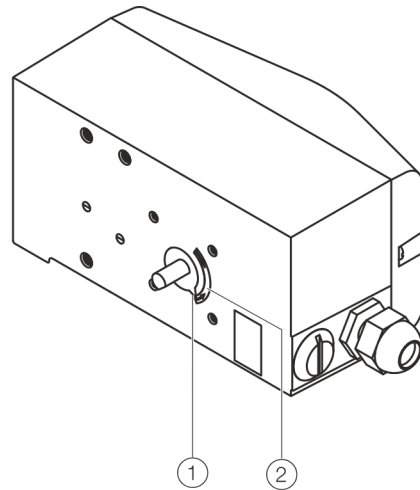
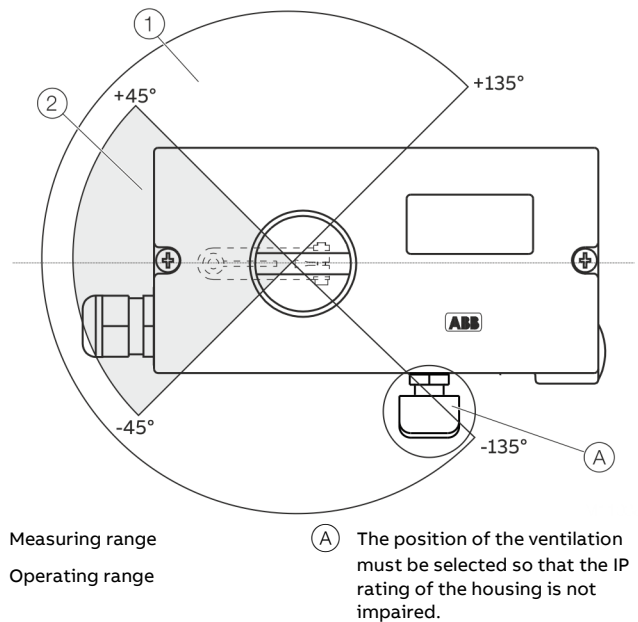


Figure 3: Working range

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



- ① Measuring range
- ② Operating range

Ⓐ The position of the ventilation must be selected so that the IP rating of the housing is not impaired.

Figure 4: Measurement and operating ranges of the positioner

Operating range for linear actuators:

The operating range for linear actuators is maximum $\pm 45^\circ$ symmetrically to the longitudinal axis.

The usable span within the operating range is ideally 40° , but at least 25° . The usable span should run as symmetrically to the longitudinal axis as possible.

Operating range for rotary actuators:

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

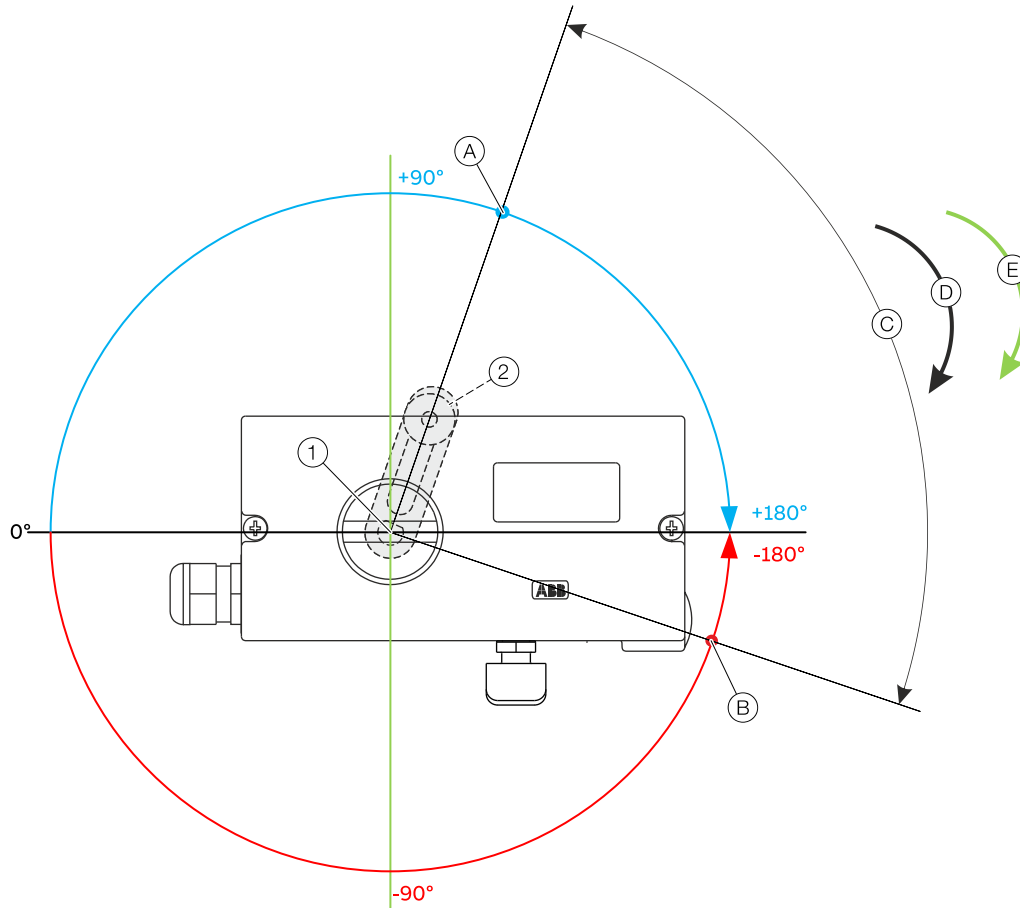
Note

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

... 5 Installation

... Mechanical mounting

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



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

Figure 5: Measurement and operating range with contactless position feedback (example for rotary actuators)

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

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

Automatic adjustment

The standard automatic adjustment for rotary and linear actuators is performed as described in **Standard automatic adjustment** on page 36.

Requirements for automatic adjustment:

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

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

Mounting on linear actuators

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

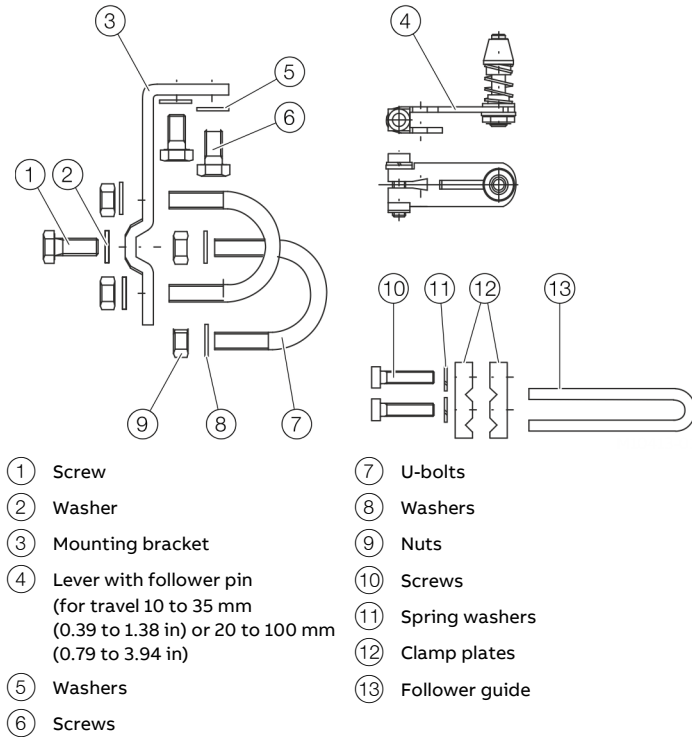


Figure 6: Attachment kit

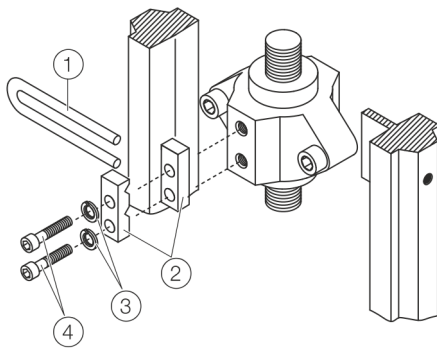


Figure 7: Attaching a follower guide to the actuator

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

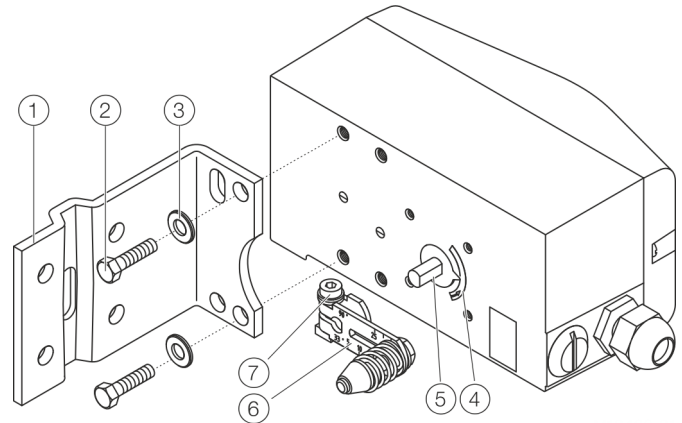


Figure 8: Mounting lever and bracket on the positioner

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

... 5 Installation

... Mechanical mounting

Mounting on a cast iron yoke

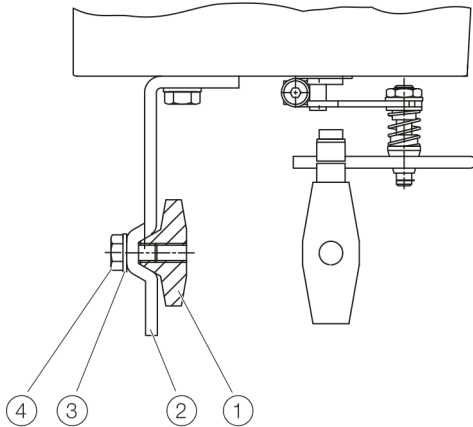


Figure 9: Mounting on a cast iron yoke

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

Mounting on a columnar yoke

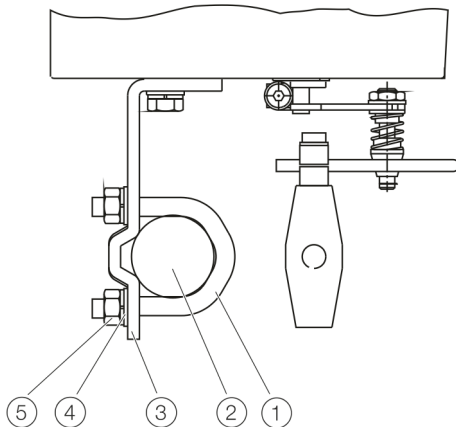


Figure 10: Mounting on a columnar yoke

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

Note

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

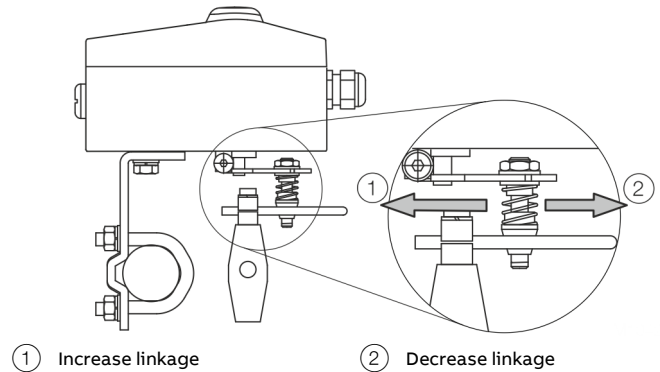


Figure 11: Positioner linkage

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

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

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

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

Recommended range for linear actuators:

40°

Minimum angle:

25°

Note

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

Position of actuator bolt

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

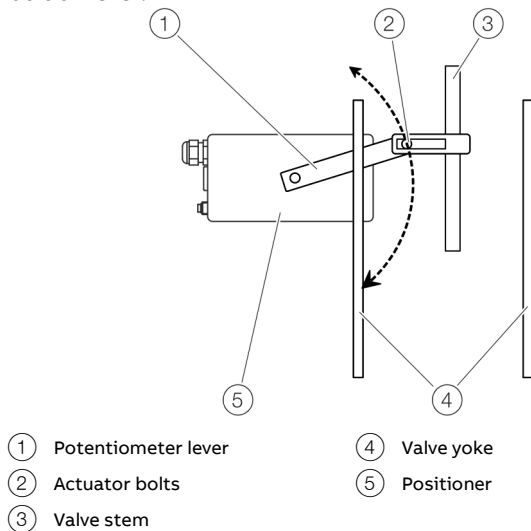


Figure 12: Actuator bolts on the lever (rear view)

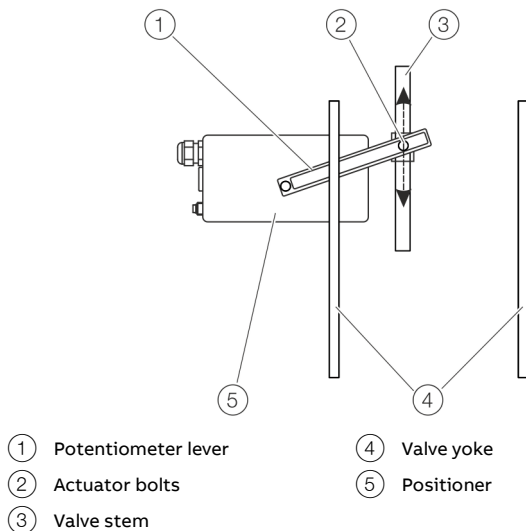


Figure 13: Actuator bolts on the valve (rear view)

Mounting on rotary actuator

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

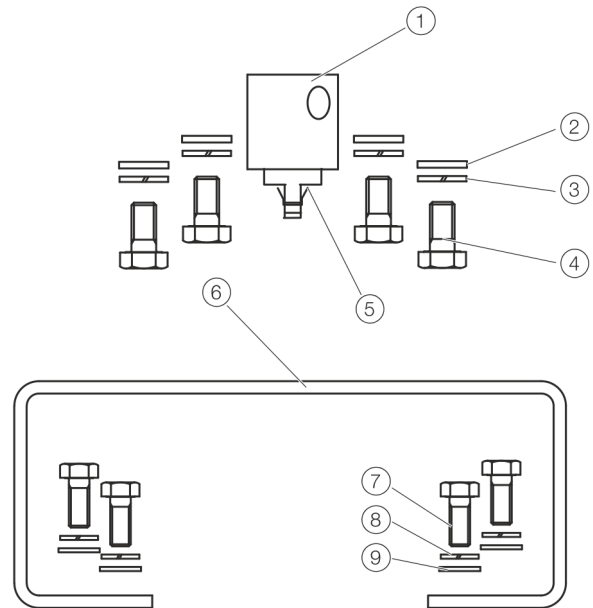


Figure 14: Attachment kit components

- Adapter ① with spring ⑤
- four M6 screws each ④, spring washers ③ and washers ② to fasten the attachment bracket ⑥ to the positioner
- four M5 screws ⑦, Spring washers ⑧ and washers ⑨ to fasten the attachment bracket to the actuator

Required tools:

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

... 5 Installation

... Mechanical mounting

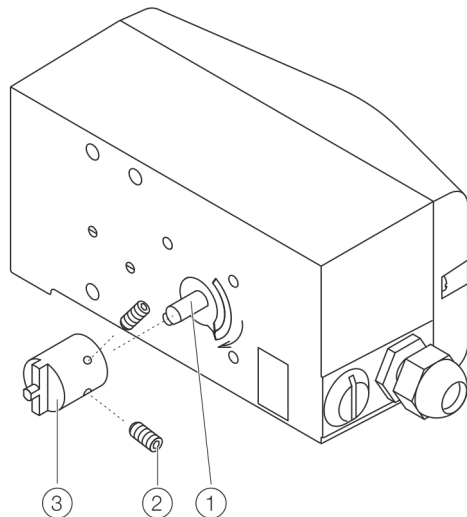
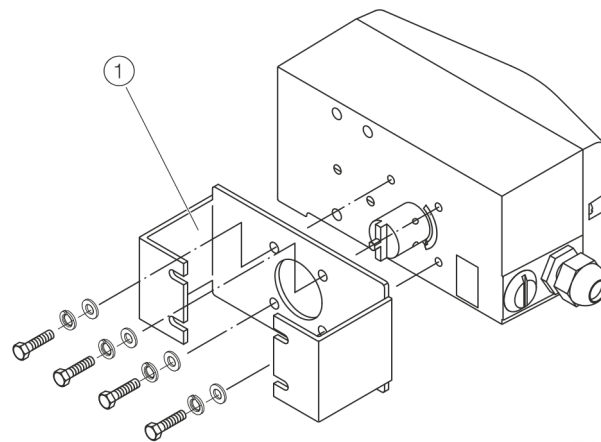


Figure 15: Mounting the adapter on the positioner

1. Determine the mounting position (parallel to actuator or at 90° angle)
2. Calculate the rotational direction of the actuator (right or left).
3. Move the part-turn actuator into the home position.
4. Pre-adjust feedback shaft.
In order for the positioner to work within the operating range (see **Measurement and operating range to HW-Rev.: 5.0** on page 18 or **Measurement and operating range from HW-Rev.: 5.01 with optional contactless position feedback** on page 20), the installation position as well as the basic position and rotational direction of the actuator when determining the adapter position on axis ① must be considered. For this purpose, the feedback shaft can be adjusted manually so that the adapter ③ can be attached in the correct position.
5. Place the adapter in the proper position on the feedback shaft and fasten with threaded pins ②. One of the threaded pins must be locked in place on the flat side of the feedback shaft.



① Attachment bracket

Figure 16: Screwing the mounting bracket onto the positioner

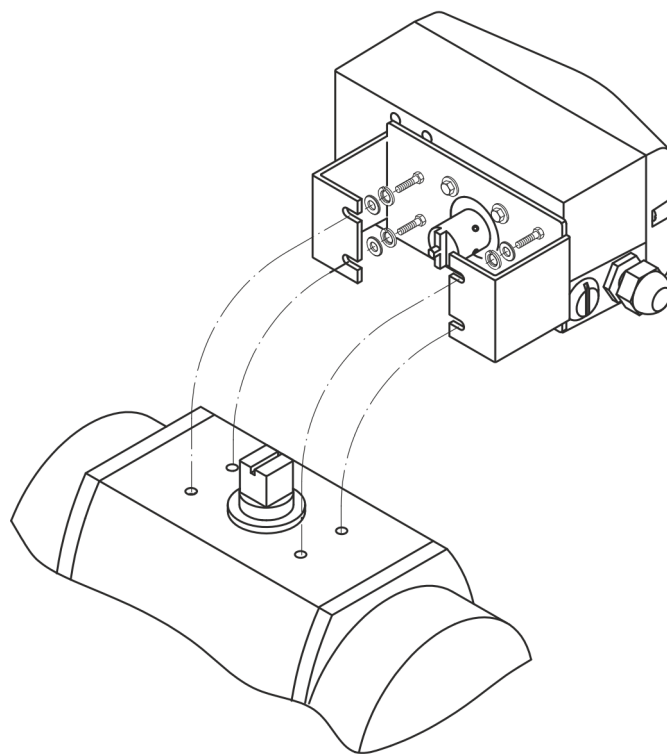


Figure 17: Screwing positioner onto actuator

Note

After mounting, check whether the operating range of the actuator matches the measurement range of the positioner, see **Measurement and operating range to HW-Rev.: 5.0** on page 18 or **Measurement and operating range from HW-Rev.: 5.01 with optional contactless position feedback** on page 20.

6 Electrical connections

Safety instructions

DANGER

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

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

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

WARNING

Risk of injury due to live parts!

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

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

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

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

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

To ensure safe isolation, install supply lines so that they are separate from electrical circuits which are dangerous if touched, or implement additional isolation measures for them.

... 6 Electrical connections

TZIDC / TZIDC Control Unit terminal assignment

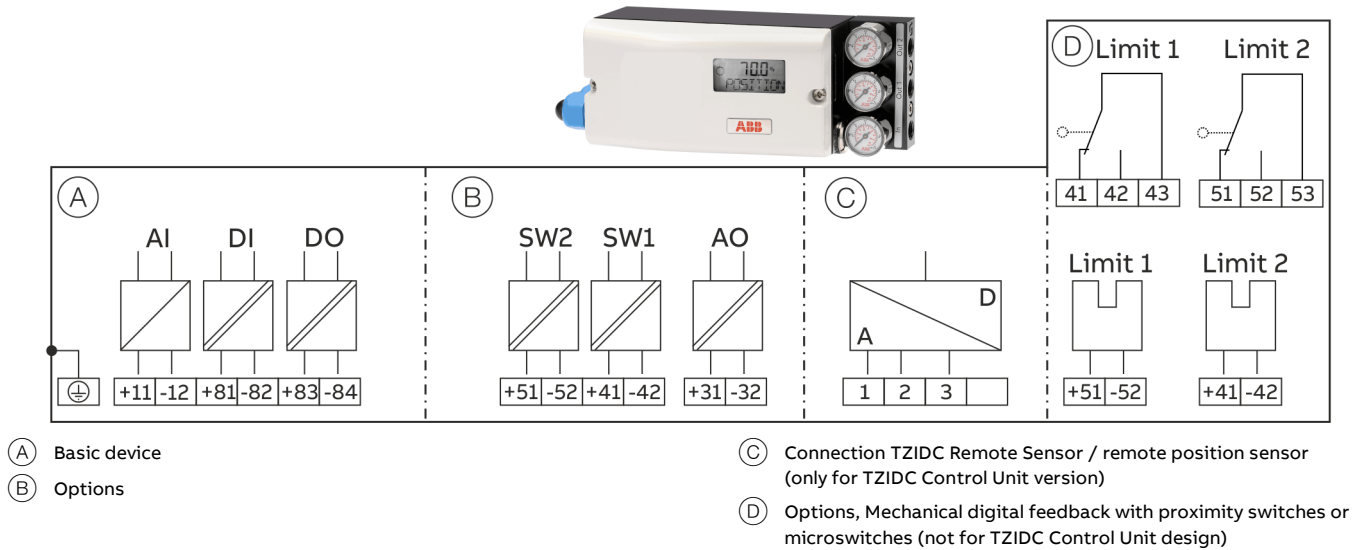


Figure 18: TZIDC Electrical connection

Connections for inputs and outputs

Terminal	Function/comments
+11 / -12	Analog input
+81 / -82	Binary input DI
+83 / -84	Binary output DO2
+51 / -52	Plug-in module for digital feedback SW1 (Option module)
+41 / -42	Plug-in module for digital feedback SW2 (Option module)
+31 / -32	Plug-in module for analog feedback AO (Option module)
1 / 2 / 3	TZIDC remote sensor (Only for options TZIDC Remote Sensor or TZIDC for remote position sensor)

Terminal	Function/comments
+51 / -52	Mechanical digital feedback Limit 1 with proximity switch (optional)
+41 / -42	Mechanical digital feedback Limit 2 with proximity switch (optional)
41 / 42 / 43	Mechanical digital feedback Limit 1 with microswitch (optional)
51 / 52 / 53	Mechanical digital feedback Limit 2 with microswitch (optional)

Note

The TZIDC can be fitted either with proximity switches or microswitches as mechanical digital feedback. It is not possible to combine both variants. For the TZIDC Control Unit with TZIDC Remote Sensor version, the mechanical digital feedback is located in the TZIDC Remote Sensor.

TZIDC Remote Sensor terminal assignment

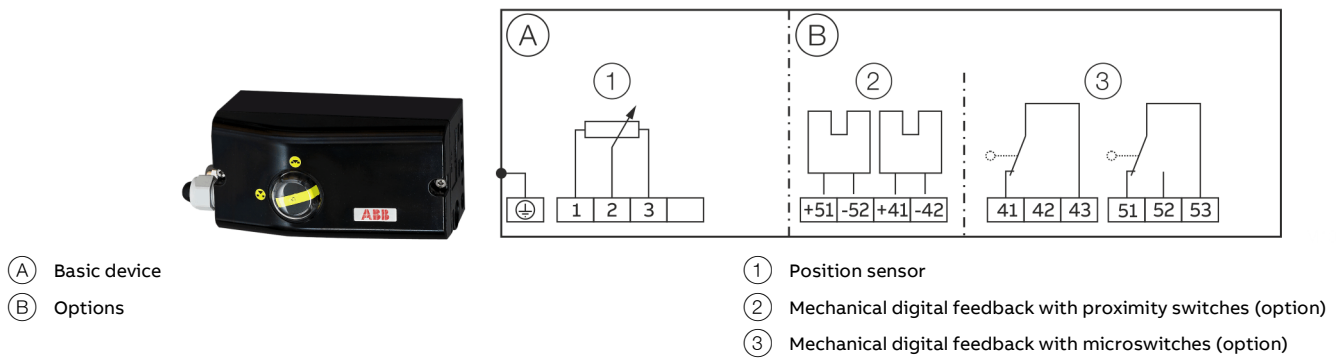


Figure 19: TZIDC Remote Sensor Electrical Connection

Connections for inputs and outputs

Terminal	Function/comments
1 / 2 / 3	TZIDC control unit
+51 / -52	Mechanical digital feedback Limit 1 with proximity switch (optional)
+41 / -42	Mechanical digital feedback Limit 2 with proximity switch (optional)
41 / 42 / 43	Mechanical digital feedback Limit 1 with microswitch (optional)
51 / 52 / 53	Mechanical digital feedback Limit 2 with microswitch (optional)

Note

The TZIDC Remote Sensor can be fitted either with proximity switches or microswitches as mechanical digital feedback. It is not possible to combine both variants. It is not possible to combine both variants.

... 6 Electrical connections

Electrical data for inputs and outputs

Note

When using the device in potentially explosive atmospheres, note the additional connection data in **Use in potentially explosive atmospheres** on page 5!

Analog input

Set point signal analog (two-wire technology)

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

Digital input

Input for the following functions:

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

Binary input DI

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

Digital output DO

Output configurable as alarm output by software.

Binary output DO

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

Option modules

Plug-in module for analog feedback AO*

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

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

Plug-in module for digital feedback SW1, SW2*

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

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

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

Mechanical digital feedback

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

Feedback on the actuator position using proximity switches Limit 1, Limit 2

Terminals	+41 / -42, +51 / -52	
Supply voltage	5 to 11 V DC (Control circuit in accordance with DIN 19234/NAMUR)	
Direction of action	Metal tag in the proximity switch	Metal tag outside the proximity switch
Type SJ2-SN (NC; log 1)	< 1.2 mA	> 2.1 mA

Feedback on the actuator position using microswitches Limit 1, Limit 2

Terminals	+41 / -42, +51 / -52
Supply voltage	maximum 24 V AC/DC
Load rating	Maximum 2 A
Contact surface	10 µm Gold (AU)

Mechanical position indicator

Indicator disk in enclosure cover linked with device feedback shaft.

These options are also available for retrofitting by Service.

Connection on the device

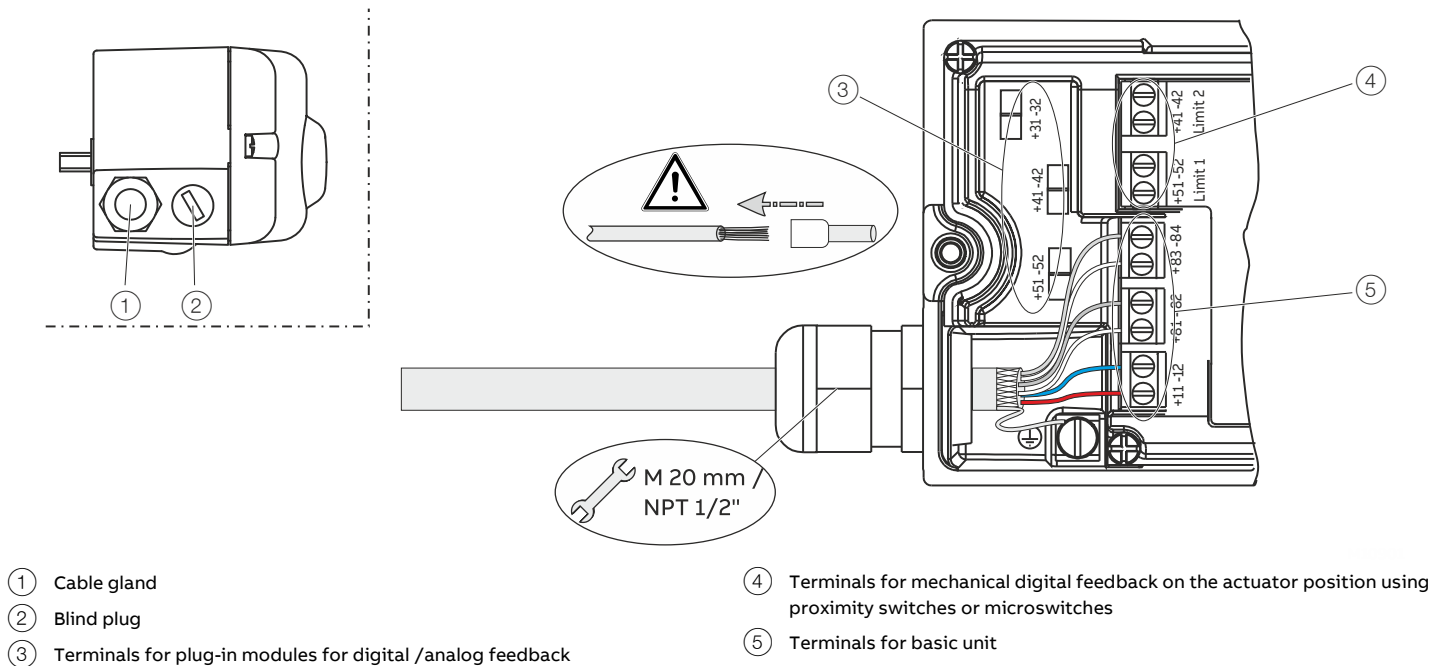


Figure 20: Connection on device (example)

2 tap holes $\frac{1}{2}$ - 14 NPT or M20 \times 1.5 are provided on the left side of the housing for cable entry in the housing.

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

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

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

Note

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

1. Strip the wires to approximately 6 mm (0.24 in).
2. After stripping the cable end, fit the appropriate wire end sleeves and crimp
3. Connect the wires to the connecting terminals in line with the connection diagram.

Tightening torque for the terminal screws:
0.5 to 0.6 Nm

... 6 Electrical connections

... Connection on the device

Conductor cross-section

Basic device

Electrical connections	
4 to 20 mA input	Screw terminals max. 2.5 mm ² (AWG14)
Options	Screw terminals max. 1.0 mm ² (AWG18)
Cross section	
Rigid / flexible wires	0.14 to 2.5 mm ² (AWG26 to AWG14)
Flexible with wire end sleeve	0.25 to 2.5 mm ² (AWG23 to AWG14)
Flexible with wire end sleeve no plastic sleeve	0.25 to 1.5 mm ² (AWG23 to AWG17)
Flexible with wire end sleeve with plastic sleeve	0.14 to 0.75 mm ² (AWG26 to AWG20)
Multi-wire connection capacity (two wire with the same cross-section)	
Rigid / flexible wires	0.14 to 0.75 mm ² (AWG26 to AWG20)
Flexible with wire end sleeve no plastic sleeve	0.25 to 0.75 mm ² (AWG23 to AWG20)
Flexible with wire end sleeve with plastic sleeve	0.5 to 1.5 mm ² (AWG21 to AWG17)

Option modules

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

Connection on device - TZIDC Control Unit with TZIDC Remote Sensor

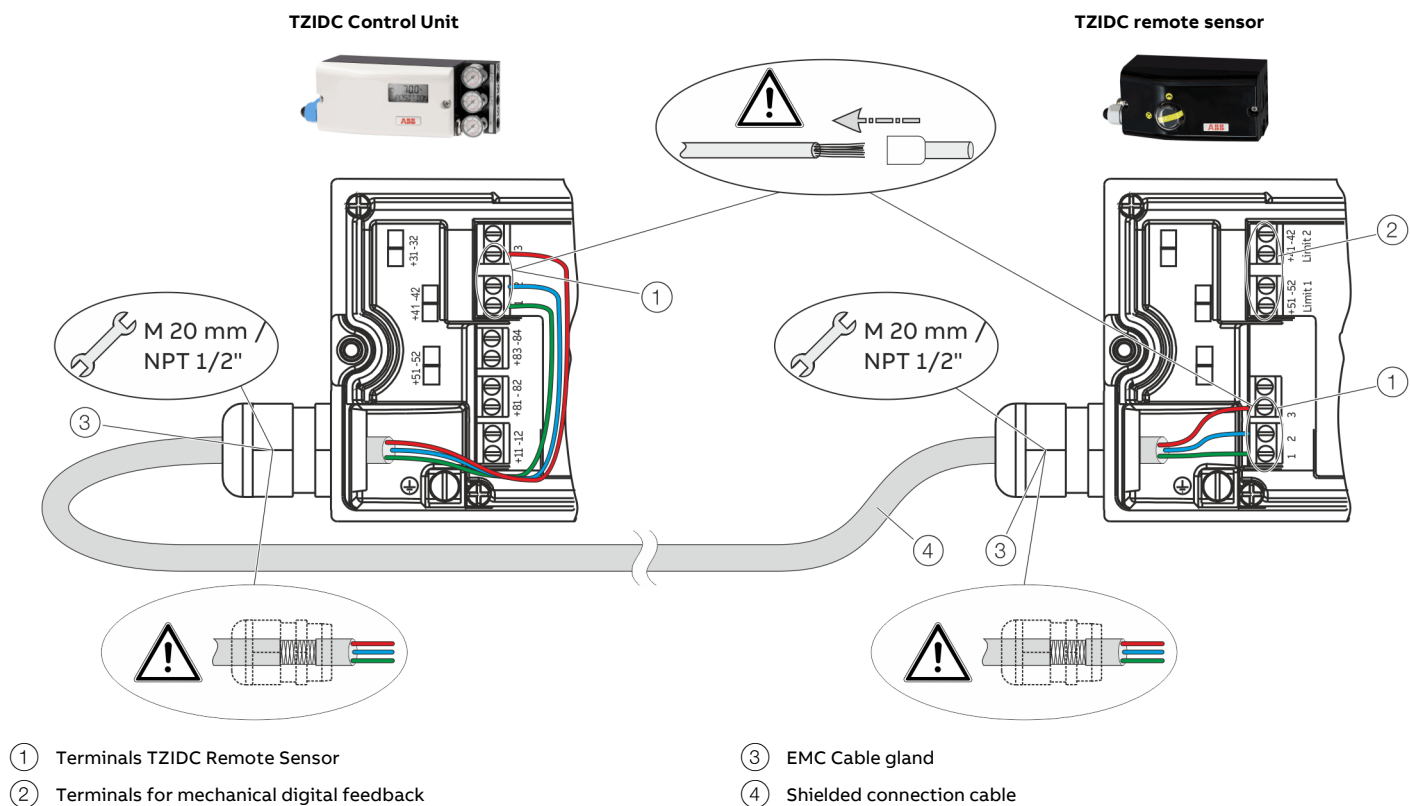


Figure 21: Connection of TZIDC Control Unit with TZIDC Remote Sensor (example)

In the case of the 'TZIDC Control Unit with TZIDC Remote Sensor' design, the components are supplied in two housings, which together form one harmonized unit.

Housing 1 (TZIDC Control Unit) contains the electronics and pneumatics along with the following options (where applicable):

- Plug-in module for analog feedback
- Plug-in module for digital feedback

Housing 2 (TZIDC Remote Sensor) contains the position sensor and is suitable for mounting on linear or part-turn actuators.

If necessary, the following options can be installed if required:

- Optical position indicator
- Mechanical digital feedback with proximity switches or microswitches.

Connect the positioner (TZIDC Control Unit, housing 1) and remote position sensor (TZIDC Remote Sensor, housing 2) while following the instructions below:

- The sensor and the electronics have been matched. Ensure that only devices with the same serial number are connected.

- A shielded 3-wire cable with a maximum length of 10 m (33 ft) must be used for the connection.
- Route the cable into the terminal compartment through the EMC cable glands. Ensure that the shielding is secured correctly in the EMC cable glands.
- Connect the cables in accordance with the electrical connections and tighten the screws of the terminals so that they are hand-tight.
- The electrical connection of the TZIDC Control Unit and the optional modules are described in **TZIDC / TZIDC Control Unit terminal assignment** on page 26.
- If the TZIDC Control Unit is fastened so that it is non-conductive, the housing must be grounded (TZIDC Control Unit and TZIDC Remote Sensor housing with the same electric potential); otherwise control deviations could occur with regard to analog position feedback.
- Use wire end ferrules when connecting.

... 6 Electrical connections

Connection on device - TZIDC Control Unit for remote position sensor

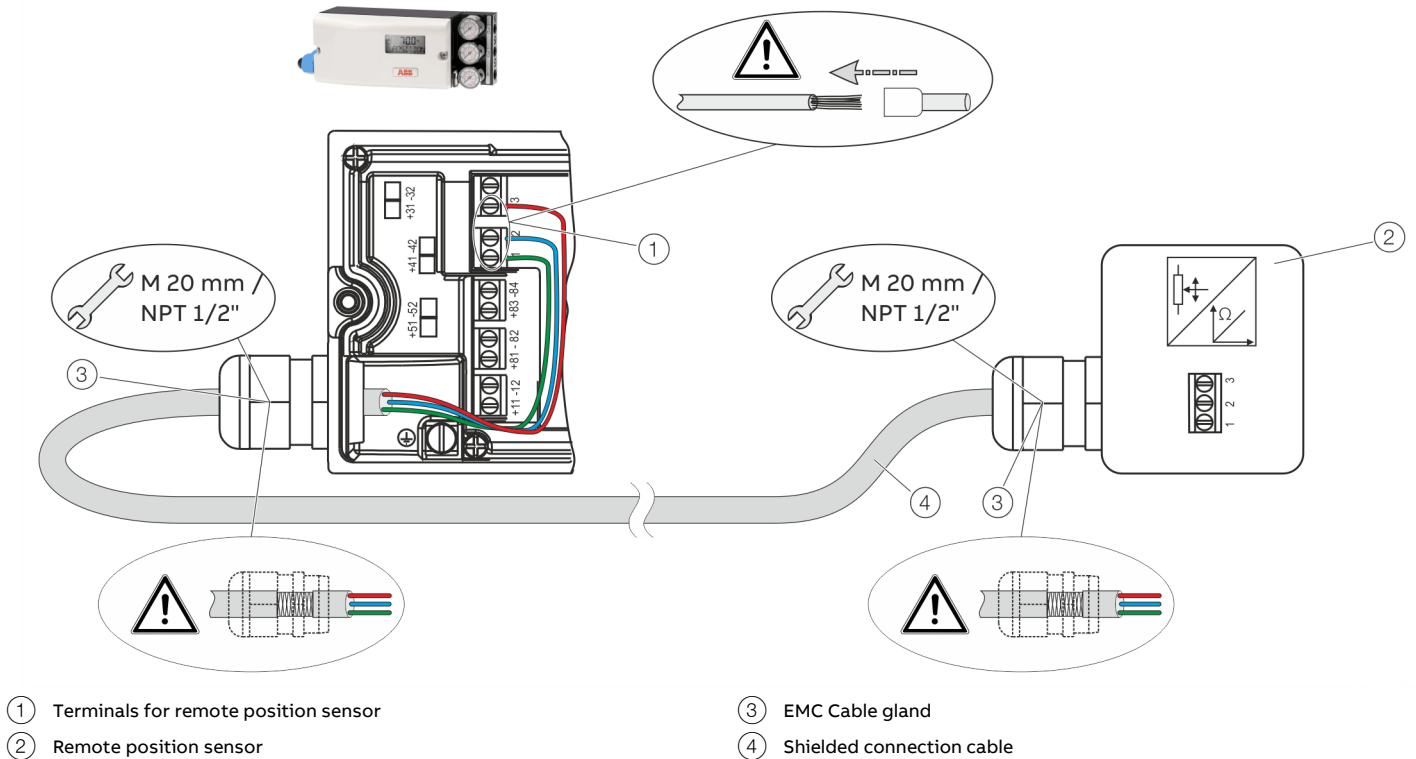


Figure 22: Connection of TZIDC Control Unit with remote position sensor (example)

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

The TZIDC Control Unit contains the electronics and pneumatics along with the following options (where applicable):

- Plug-in module for analog feedback
- Plug-in module for digital feedback

Any position sensor (4 to 30 k Ω , with line break detection 4 to 18 k Ω) can be connected.

Connect the positioner (TZIDC Control Unit) and remote position sensor while observing the following instructions:

- A shielded 3-wire cable with a maximum length of 10 m (33 ft) must be used for the connection.
- Route the cable into the terminal compartment through the EMC cable glands. Ensure that the shielding is secured correctly in the EMC cable glands.

- Connect the cables in accordance with the electrical connections and tighten the screws of the terminals so that they are hand-tight.
- The electrical connection of the TZIDC Control Unit and the optional modules are described in **TZIDC / TZIDC Control Unit terminal assignment** on page 26.
- If the TZIDC Control Unit is fastened such that it is non-conductive, the housing must be grounded (TZIDC Control Unit and remote position sensor housing with the same electric potential); otherwise control deviations could occur with regard to analog position feedback.
- Use wire end ferrules when connecting.
- The pneumatic outputs must be connected to the actuator using cables of at least \varnothing 6 mm (0.23 in).
- If the device is being operated on a cylinder, for reasons associated with linearity you should run automatic adjustment for rotary actuators.

7 Pneumatic Connections

Safety instructions

CAUTION

Risk of injury

Risk of injury from pressurized positioner / actuator.

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

NOTICE

Damage to components!

Contamination in the air pipe and positioner can damage components.

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

NOTICE

Damage to components!

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

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

* 5.5 bar (80 psi) (marine version)

Note

The positioner must only be supplied with instrument air that is free of oil, water, and dust.

The purity and oil content must meet the requirements of Class 3 in accordance with DIN/ISO 8573-1.

Information on double acting actuators with spring-return mechanism

On double-acting actuators with spring-return mechanism, a pressure that significantly exceeds the supply air pressure value can be generated during operation by the springs in the chamber opposite the springs.

This may damage the positioner or adversely affect control of the actuator.

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

The opening pressure of the check valve should be < 250 mbar (< 3.6 psi).

Notes on ABB pressure gauge blocks

The pressure gauge blocks available as accessories from ABB have a restricted operating temperature range and a different IP rating than the positioner.

The operator must take these restrictions into account when using ABB pressure gauge blocks.

ABB pressure gauge block specification

Operating temperature range	–5 °C to 60 °C (23 to 140 °F)
IP rating	IP 30

... 7 Pneumatic Connections

Connection on the device

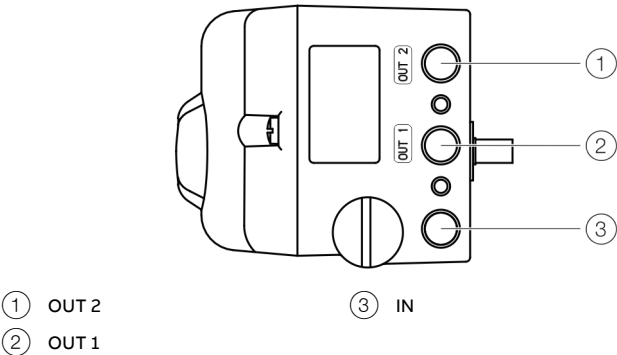


Figure 23: Pneumatic connections

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

* (Marine version)

Join the pipe connections according to the designation, observing the following points:

- All pneumatic piping connections are located on the right-hand side of the positioner. G¾ or ¼ 18 NPT tap holes are provided for the pneumatic connections. The positioner is labeled according to the tap holes available.
- We recommend that you use a pipe with dimensions of 12 × 1.75 mm.
- The supply air pressure required to apply the actuating force must be adjusted in line with the output pressure in the actuator. The working range for the positioner is between 1.4 and 6 bar (20 to 90 psi)**.

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

Air supply

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

* Free of oil, water and dust in accordance with DIN / ISO 8573-1, pollution and oil content according to Class 3 (except for natural gas variant)

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

*** Independent of supply pressure

8 Commissioning

Note

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

⚠ CAUTION

Risk of injury due to incorrect parameter values!

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

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

Note

Please observe the information in **Operation** on page 38 to operate the device!

Commissioning the positioner:

1. Open the pneumatic power supply.
2. Power-up the electric power supply and feed in the setpoint signal 4 to 20 mA.
3. Checking mechanical mounting:
 - Press **MODE** and hold; additionally press \uparrow or \downarrow until operating mode 1.3 (manual adjustment in the measuring range) is displayed. Release **MODE**.
 - Press \uparrow or \downarrow to move the actuator into the mechanical end position; check the end positions; rotational angle is displayed in degrees; for high-speed mode, press \uparrow or \downarrow simultaneously.

Recommended rotational angle range

Linear actuators	-20 to 20°
Rotary actuators	-57 to 57°
Minimum angle	25°

4. Perform standard automatic adjustment in accordance with **Standard automatic adjustment** on page 36.

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

Operating modes

Selection from the operating level

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

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

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

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

** Positioning not active.

*** For high-speed mode, press \uparrow and \downarrow simultaneously.

... 8 Commissioning

Standard automatic adjustment

Note

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

Standard automatic adjustment for linear actuators*

1. MODE Press and hold until ADJ_LIN is displayed.
2. MODE Press and hold until the countdown ends.
3. Release MODE; this starts Autoadjust.

Standard automatic adjustment for rotary actuators*

1. ENTER Press and hold until ADJ_ROT is displayed.
2. ENTER Press and hold until the countdown ends.
3. Release ENTER; this starts Autoadjust.

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

If an error occurs during Autoadjust, the process will be terminated with an error message.

Perform the following steps if an error occurs:

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

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

2. Check mechanical mounting in accordance with **Mechanical mounting** on page 18 and repeat the standard automatic adjustment.

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

Sample parameters

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

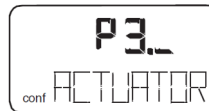
Initial situation: the positioner is in bus operation on the operating level.

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

The following is now shown in the display:



2. Switching to parameter group 3._:
 - Press and hold down **MODE** and **ENTER** simultaneously,
 - additionally quickly press and release \uparrow 2x,
 The following is now shown in the display:

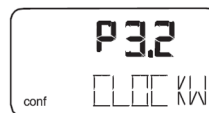


- Release **MODE** and **ENTER**.

The following is now shown in the display:



3. Selecting parameter 3.2:
 - Press and hold down **MODE**,
 - additionally quickly press and release \uparrow 2x,
 The following is now shown in the display:



- Release **MODE**.

4. Changing parameter settings:
 - Quickly press and release **↑** to select **CTCLOCKW**.
5. Switching to parameter 3.3 (Return to operating level) and saving the new settings:
 - Press and hold down **MODE**,
 - additionally quickly press and release **↑** 2x,
 The following is now shown in the display:



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

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

Setting the option modules

Setting the mechanical position indication

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

Note

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

Setup of the feedback on the actuator position using proximity switches

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

⚠ CAUTION

Risk of injury!

The device includes slot sensors with sharp edges.

- Adjust the metal tags using a screwdriver only!

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

... 8 Commissioning

... Sample parameters

Setup of the feedback on the actuator position using microswitches

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

9 Operation

Safety instructions

⚠ CAUTION

Risk of injury due to incorrect parameter values!

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

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

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

Parameterization of the device

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

Menu navigation

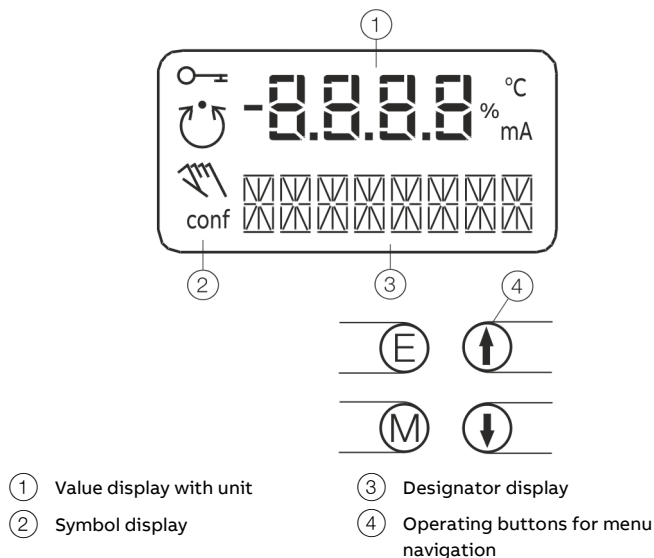


Figure 24: LCD display with operating buttons




Value display with unit

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

Designator display

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

Description of symbols

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

Operating button functions

The four operating buttons **(E) (ENTER)**, **(M) (MODE)**, **↑** and **↓** are pressed individually or in certain combinations depending on the desired function.

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

Menu levels

The positioner has two operating levels.

Operating level

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

Configuration level

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

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

NOTICE

Property damage

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

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

Note

For detailed information on how to parameterize device, consult the associated operating instructions and/or configuration and parameterization instructions.

10 Maintenance

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

Note

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

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

11 Recycling and disposal

Note



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

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

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

Bear the following points in mind when disposing of them:

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

12 Additional documents

Note

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

www.abb.com/positioners

13 Appendix

Return form

Statement on the contamination of devices and components

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

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

Customer details:

Company:

Address:

Contact person:

Telephone:

Fax:

Email:

Device details:

Type:

Serial no.:

Reason for the return/description of the defect:

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

☐ Yes ☐ No

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

☐ biological

☐ corrosive / irritating

☐ combustible (highly / extremely combustible)

☐ toxic

☐ explosive

☐ other toxic substances

☐ radioactive

Which substances have come into contact with the device?

1.

2.

3.

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

Town/city, date

Signature and company stamp

Trademarks

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

Notes

ABB Measurement & Analytics

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

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

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