

ABB MEASUREMENT & ANALYTICS | DATA SHEET

# TZIDC-220

## Digital Positioner



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Compact, well-proven, and flexible

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**For FOUNDATION Fieldbus<sup>®</sup>, Flameproof enclosure**

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**Low operating cost**

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**Compact design**

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**Well-proven technology and intelligence**

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**Robust and environmentally ruggedized**

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**Wide operating temperature range**

• -40 to 85 °C (-40 to 185 °F)

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**Easy to commission, 'single pushbutton' operating philosophy**

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**Mechanical position indicator**

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**ATEX, FM, CSA, GOST and IECEx approvals**

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## 1 Description

The TZIDC-220 is an electronically configurable positioner with communication capabilities, mounting to pneumatic linear or rotary actuators. It features a small and compact design, a modular construction, and an excellent cost-performance ratio.

Fully automatic determination of the control parameters and adaptation to the final control element yield considerable time savings and an optimal control behavior.

### 1.1 Pneumatics

An I/P module with subsequent pneumatic amplifier is used to control the pneumatic actuator. The well-proven I/P module proportionally converts the permanent electrical positioning signal from the CPU into a pneumatic signal used to adjust a 3/3-way valve.

The air flow for pressurizing or depressurizing the actuator is continuously adjusted. As a result, excellent control is achieved. When reaching the set point, the 3/3-way valve is closed in center position to minimize the air consumption.

Four different pneumatics versions are available: for single-acting or double-acting actuators, each with "fail-safe" or "fail-freeze" function.

#### 1.1.1 "Fail-safe" function

If the electrical power supply fails, the positioner output 1 is depressurized, and the pneumatic actuator's return spring moves the valve to the defined safe position. In case of a double-acting actuator the second output 2 is additionally pressurized.

#### 1.1.2 "Fail-freeze" function

If the electrical power supply should fail, the positioner output 1 (and 2, if applicable) is closed and the pneumatic actuator stops ("freezes") the valve in the current position. If compressed air supply should fail, the positioner depressurizes the actuator.

### 1.2 Operation

The positioner has a built-in operating panel providing a 2-line LCD and 4 pushbuttons for optimal local configuration, commissioning and operational monitoring.

Alternatively, the appropriate configuration program and the available communication option can be used.

### 1.3 Communication

Communication with the TZIDC-220 positioner occurs via FOUNDATION Fieldbus.

### 1.4 Modular design

The TZIDC-220 basic model can be enhanced at any time by retrofitting optional equipment. Option modules for analog or digital position feedback can be installed. Additionally, a mechanical position indicator, proximity switches or 24 V microswitches are available for indicating the position independently of the mother board function.

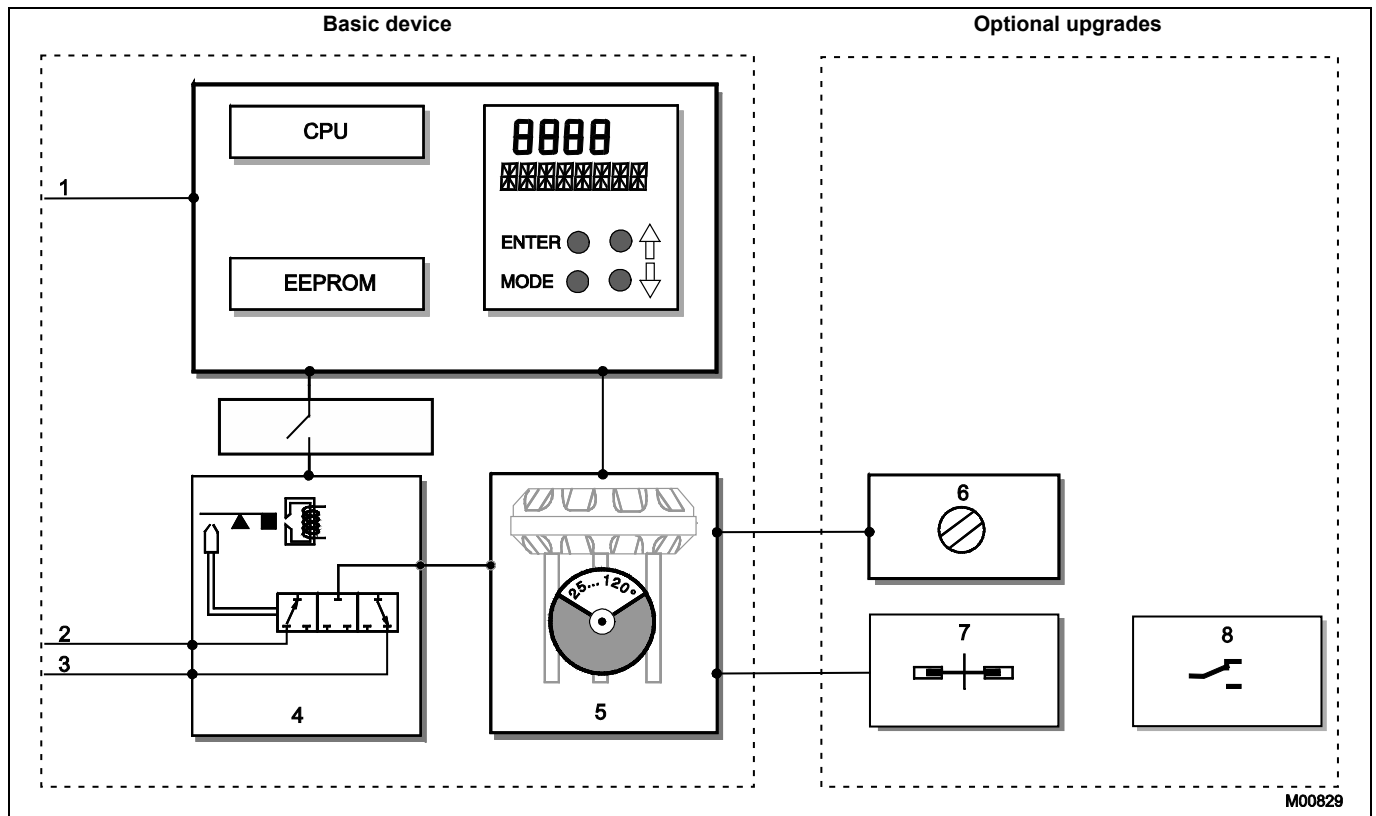


Fig. 1: schematic representation of the TZIDC-220

**Basic device**

- 1 Bus connector
- 2 Supply air, 1.4 ... 6 bar
- 3 Exhaust air
- 4 I/P module with 3/3-way valve
- 5 Displacement sensor (optional up to 270° rotation angle)

**Optional upgrades**

- 6 Mechanical position indicator
- 7 Mechanical feedback with proximity switches
- 8 Mechanical feedback with 24 V microswitches



**IMPORTANT (NOTE)**

With the optional upgrades, either the "mechanical feedback with proximity switches" (no. 7) or the "mechanical feedback with 24 V microswitches" (no. 8) can be used.

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## **2 Mounting versions**

### **2.1 To linear actuators in accordance with the standard**

Lateral attachment is in accordance with DIN / IEC 534 (lateral attachment to NAMUR). The required attachment kit is a complete set of attachment material, but does not include the screwed pipe connections and air pipes.

### **2.2 To rotary actuators in accordance with the standard**

This attachment is designed for mounting according to the standard VDI / VDE 3845. The attachment kit consists of a console with mounting screws for mounting on a rotary actuator. The adapter for coupling the positioner feedback shaft to the actuator shaft has to be ordered separately. Screwed pipe connections and air pipes have to be provided on site.

### **2.3 Integral mounting to control valves**

The TZIDC-220 positioner featuring standard pneumatic action is available as an option for integral mounting.

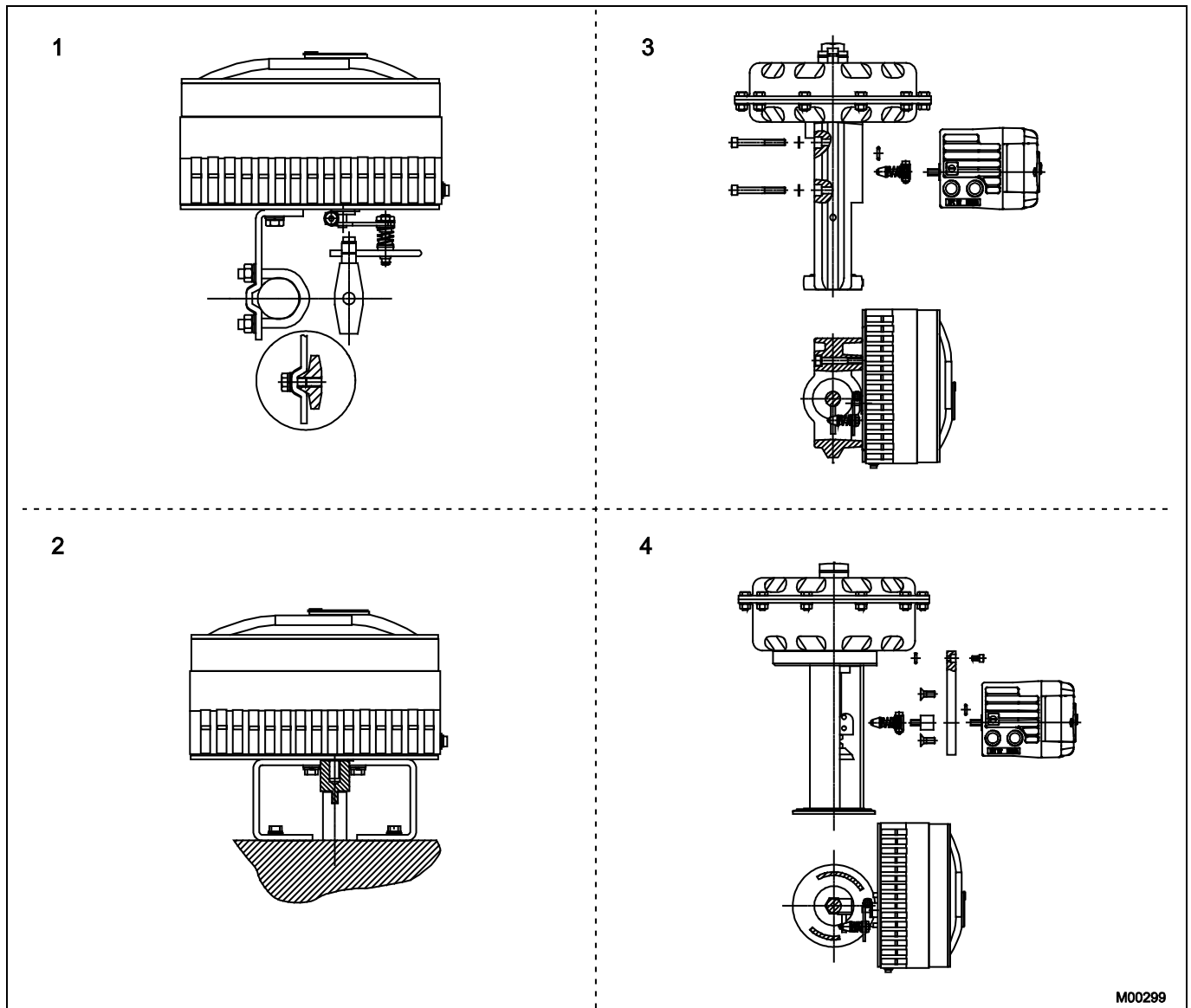
The required holes are found at the back of the device.

The benefit of this design is that the point for mechanical stroke measurement is protected and that the positioner and actuator are linked internally. No external tubing is required.

### **2.4 Special actuator-specific mounting**

In addition to the mounting methods described above, there are special actuator-specific attachments.

Please contact us for details.



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Fig. 2: Mounting options

1 Mounting to linear actuators acc. to DIN / IEC 534  
2 Mounting to rotary actuators to VDI / VDE 3845

3 Integral mounting to control valves  
4 Integral mounting to control valves by using an adapter panel



## 3 Operation

### 3.1 General

The intelligent, microprocessor-controlled TZIDC-220 positioner allows you to obtain optimal results. The positioner features high-precision control functions and high operational reliability. The optimal parameters are set automatically during autoadjust. If necessary, corrections can be made manually.

**The total range of parameters includes:**

- Operating parameters
- Adjustment parameters
- Monitoring parameters

#### 3.1.1 Operating parameters

The following operating parameters can be activated and configured:

**Characteristic curve (travel = f {signal})**

Linear, equal percentage 1:25 or 1:50 or 25:1 or 50:1 or freely configurable with 20 reference points.

**Tolerance band**

When the tolerance band is reached, the position is considered as corrected. From this point on, the position is further slowly re-adjusted until the dead band is reached. The factory setting for this parameter is 0.3 %.

**Dead band (sensitivity)**

When reaching the dead band, the position is held. The factory setting for this parameter is 0,1 %. The tolerance band and dead zone are automatically calculated as part of the controller's self-optimization process.

**Travel limit**

The positioning travel, i.e. the stroke or angle of rotation, can be reduced as required within the full range of 0 ... 100 %, provided that a minimum value of 20 % is observed.

**Shut-off function**

This function can be selected separately for each end position. When the respective configured limit value is exceeded, the shut-off function causes the actuator to travel immediately to the selected end position.

**Travel time prolongation**

This function can be used to increase the max. travel time for full travel. This time parameter can be set separately for each direction.

**● IMPORTANT (NOTE)**

**i** This function can only be used with the pneumatics with the safety function "fail-safe".

**Rules in end position**

For both end positions, you can select whether the pneumatic actuator is vented fully or whether the position is controlled.

#### 3.1.2 Adjustment parameters

The TZIDC-220 positioner has a special function for automatic adjustment of the parameters. The function is launched either via the integrated operator's panel or the user interface.

The following adjustment parameters can be activated and configured:

**Parameters for control block**

To optimally adjust the actuator position, the control parameters can be set individually for the control behavior of the valve.

**Range 0 ... 100 %**

Configuration of end positions for the valve to be adjusted to start position "0" and end position "100 %".

**Direction of the actuator**

Calibration to both possible directions of action:

Air opens / spring force closes

or

Air closes / spring force opens

**Display 0 ... 100 %**

Adjusting the display (0 ... 100 %) to the direction of action for opening or closing the valve.

#### 3.1.3 Monitoring parameters

Various functions for permanent operational monitoring are implemented in the TZIDC-220 operating program, e.g.:

- Internal positioning time-out
- Sensor monitoring
- Backup monitoring

While automatic commissioning is in progress, the current state is continuously indicated on the integrated LCD. Remaining messages can be retrieved via the user interface.

The fieldbus enables users to implement enhanced monitoring in the control system. A special window displays the most important process variables ONLINE such as the positioning signal (in %), the position (in %), the control deviation (in %) as well as the status messages.



### 3.2 Operator panel

The TZIDC-220 positioner's operator panel with four pushbuttons allows for

- operational monitoring
- manual control
- configuration
- fully automatic commissioning

The operator panel is protected by a hinged cover which can be opened during operation even in hazardous areas, i.e. the positioner can be locally operated any time as required.

#### 3.2.1 Single-button commissioning

Commissioning the TZIDC-220 positioner is especially easy. The standard Autoadjust function for automatic adaptation of the device parameters can be started by simply pressing a single front panel button, and without knowing parameterization details.

Depending on the selected actuator type (linear or rotary), the displayed zero position is automatically adapted:

- for linear actuators counter-clockwise (CTCLOCKW)
- for rotary actuators clockwise (CLOCKW).

Besides this standard function, a customized "Autoadjust" function is available. The function is launched either via the operator's panel or the configuration program.

### 3.2.2 Operation

The four pushbuttons enable users to select operating levels, configure the device and store settings. In addition to the known operating functions, a simplified autoadjust can be performed. This enables you to launch the device's automatic configuration function in a few steps and without detailed knowledge regarding parameters.

When changing the actuator type from linear to rotary, the zero position of the display is automatically updated. This is indicated in the display for valves closing on the right in the closed position 0 %.

#### 3.2.3 Display

The information indicated by the 2-line LCD is permanently updated and adapted during operation, to inform the operator in an optimal way.

During control operation the following TZIDC-220 data can be called up by pressing the pushbuttons briefly:

Up button	Cyclic communication:
	- Setpoint (%)
	- Setpoint status
	Acyclic communication:
	- Status of communication
Down button	Operating mode on the bus and bus address
Enter	Software Version



Fig. 3: TZIDC-220 with removed cover, view of the operator panel

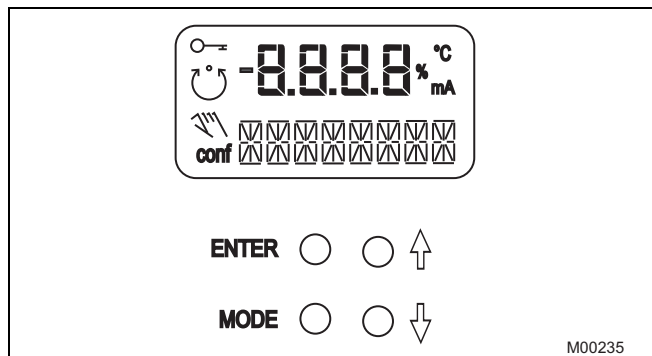


Fig. 4: TZIDC-220 operating elements and display

## 4 Communication

### 4.1 General

Communication occurs via the fieldbus connection. In conformance with bus convention, device data is read in cyclic operation (operating mode AUT, MAN or RCAS) and data is written in the O/S (out-of-service) mode. Newly set parameters are saved in the non-volatile memory directly after writing to the field device, and become active immediately.

FOUNDATION Fieldbus is an open bus standard that enables users to integrate devices from various manufacturers in a system and supports interoperability.

Communication occurs via an FF system using the fast, superordinate HSE bus (high-speed ethernet) and the slower but intrinsically safe H1 bus. It is layer-oriented and based on the ISO/OSI model (International Standards Organization's Open System Interconnect).

A device description (DD) provided in file format by the manufacturer contains all the necessary information on the FF device and its functions.

### 4.2 Configuration

The user interface for the TZIDC-220 positioner is integrated in the control system. This allows you to work with the fieldbus in the commissioning phase, during operation and for service tasks when monitoring the device, setting parameters and uploading data.

### 4.3 FOUNDATION Fieldbus H1

The FOUNDATION Fieldbus H1 was developed primarily for use in process automation. The transmission method (physical layer) complies with IEC 61158. The power supply for the field devices is provided concurrent with signal transmission via the fieldbus line. FOUNDATION Fieldbus H1 is also well suited for use in explosion-proof installations.

### 4.4 Benefits of FF communication

- Standardized function blocks and an interoperability test ensure smooth integration of devices from various manufacturers
- Acyclic access to device data (even during operation) for configuration, diagnostics and service
- High system uptimes based on comprehensive device and bus diagnostics as well as default value strategies in the event of an error
- Support for efficient facility management through provision of operating values

### 4.5 FF communication for TZIDC-220

Using the FOUNDATION Fieldbus in combination with a suitable configuration program installed in the control system, the TZIDC-220 can be easily monitored, configured and queried. Newly set parameters are saved in the non-volatile memory directly upon download to the device, and become active immediately.

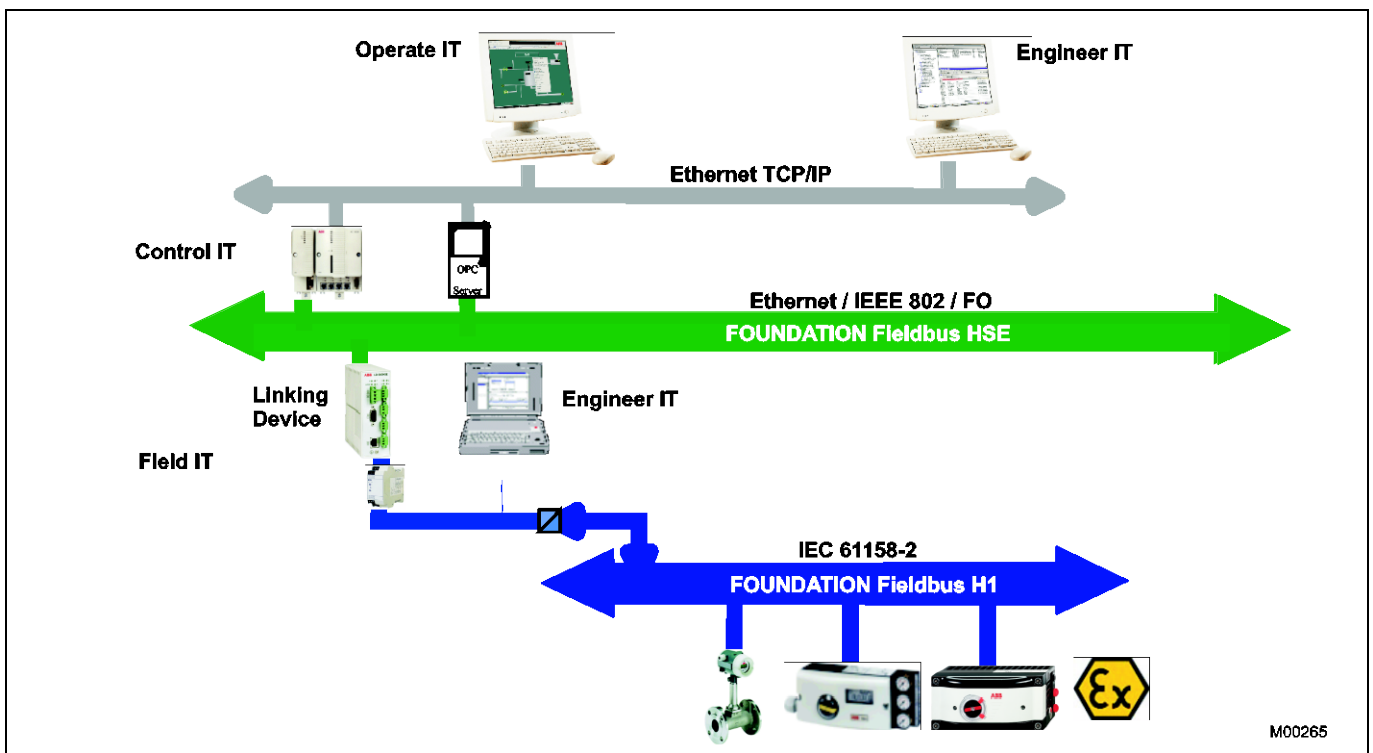


Fig. 5: Communication via FOUNDATION Fieldbus

## 5 Specifications

### 5.1 Communication

<b>Specification</b>	FOUNDATION fieldbus, version 1.5
<b>Physical Layer</b>	Model 113, 121 (IEC 61158-2)
<b>Transmission rate</b>	31.25 Kbit/s
<b>Block types</b>	1 AO Function block 1 PID block 1 Resource block 1 Transducer block 1 physical block
<b>Block class</b>	AO block: standard PID block: enhanced Resource block: enhanced Transducer block: custom
<b>Number of linkage objects</b>	22
<b>Device description (DD)</b>	Rev. No. 1 (file name 0201.ffo, 0201.sym)
<b>File</b>	Common file format (file name: 020101.cff)
<b>Max. execution time</b>	AO block: 40 milliseconds PID block: 50 milliseconds
<b>Supply voltage</b>	Power feed from the fieldbus 9.0 ... c 32.0 V DC
<b>Max. permissible voltage</b>	35 V DC
<b>Power consumption</b>	11.5 mA
<b>Current in the event of an error</b>	15 mA (11.5 mA + 3.5 mA)
<b>FF Certification</b>	Registered with ITK 4.51, Dec.2003 IT Camp. Number IT023200
<b>Device name</b>	ABB TZIDC-220-TAG
<b>Dev. ID</b>	0003200028-TZIDC-220XXXXXXXXXX
<b>Device address</b>	Between 10 and 247, default address 23
<b>ATEX certificate for FISCO</b>	Yes
<b>Insensitive to reversed polarity</b>	Yes
<b>Class</b>	LM profile 32L, 31 PS
<b>Factory default</b>	The positioner is not delivered in an aligned state. To adjust the operating range and control parameters, an automatic configuration must be run on the unit. Otherwise, the transducer block remains in out-of-service mode.
<b>Diagnostic functions</b>	Self-diagnostics for the positioner hardware and software, valve diagnostics with enhanced alarm handling

### 5.2 Designation

<b>Device name</b>	ABB TZID-C220XXXXXXXXXX
<b>Dev. ID</b>	0X3200028-TZID-C220XXXXXXXXXX

### 5.3 Output

<b>Range</b>	0 ... 6 bar (0 ... 90 psi)
<b>Air capacity</b> at 1.4 bar (20 psi) supply pressure	5.0 kg/h = 3.9 Nm <sup>3</sup> /h = 2.3 scfm
at 6 bar (90 psi) supply pressure	13 kg/h = 10 Nm <sup>3</sup> /h = 6.0 scfm
<b>Output function</b>	For single or double-acting actuators, air is vented from actuator or actuator is blocked in case of (electrical) power failure
<b>Shut-off values</b>	End Position 0 % = 0 ... 45 % End position 100 % = 55 ... 100 %

### 5.4 Travel

<b>Rotation angle</b> Used range	25 ... 120° 25 ... 60°	rotary actuators, optionally 270° linear actuators
<b>Travel time prolongation</b> Setting range	0 ... 200 seconds, separately for each direction	

### 5.5 Air supply

<b>Instrument air</b>	free of oil, water and dust acc. 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 <sup>3</sup> ; oil content: max. concentration: 1 mg / m <sup>3</sup> ; pressure dew point: 10 K below operating temperature
<b>Supply pressure</b>	1.4 ... 6 bar (20 ... 90 psi)

**IMPORTANT (NOTE)**  
Do not exceed the maximum operating pressure of the actuator!

<b>Air consumption</b>	< 0.1 kg/h / 0.05 scfm (independent of supply pressure)
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## 5.6 Transmission data and influences

### Direction of action (output signal or pressure in actuator)

Increasing	Increasing output signal 0 ... 100 % Increasing pressure y1 in the actuator
Decreasing	Increasing output signal 0 ... 100 % Decreasing pressure y1 in the actuator

<b>Characteristic deviation</b>	< 0.5 %
<b>Tolerance band</b>	0.3 ... 10 %, adjustable
<b>Dead band</b>	0.1 ... 5 %, adjustable
<b>Resolution (A/D conversion)</b>	> 16000 steps
<b>Sample rate</b>	20 ms
<b>Influence of ambient temperature</b>	< 0.5 % for each 10 K
<b>Influence of vibration</b>	≤ ± 1 % 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

Not measurable.

### Meets the requirements of the following directives

- EMC Directive 2004/108/EC as of December 2004
- EC Directive for CE conformity marking

## 5.7 Environmental capabilities

### Ambient temperature

For operation, storage and transport: -40 ... 85 °C (-40 ... 185 °F)

### Relative humidity

Operational (with closed housing and air supply switched on): 95 % (annual average), condensation permissible  
Transport and storage: 75 % (annual average), non-condensing

## 5.8 Housing

### Material/IP rating

Aluminum with ≤ 0.1 % copper, IP rating: IP 65 (optional IP 66)/NEMA 4X

### Surface/color

Electrostatic dip painting with epoxy resin; stove-hardened.  
Housing painted matt black, RAL 9005; housing cover: Pantone 420.

### Electrical connections

Screw terminals: Max. 1.0 mm<sup>2</sup> (AWG 17) for options  
Max. 2.5 mm<sup>2</sup> (AWG 14) for bus connection



### IMPORTANT (NOTE)

Do not expose the terminals to mechanical strain!

### Four thread combinations for cable entry and pneumatic connection

- Cable: thread 1/2-14NPT, air pipe: thread 1/4-18 NPT
  - Cable: thread M20 x 1,5, air pipe: thread 1/4-18 NPT
  - Cable: thread M20 x 1,5, air pipe: thread G 1/4
  - Cable: thread G 1/2, air pipe: thread Rc 1/4
- (Optional: with cable gland(s) and blind plugs as necessary)

### Weight

3,0 kg (1,36 lb)

### Mounting orientation

Any

### Dimensions

See "Dimensions"

## 5.9 Options

### Mechanical position indicator

- Indicator disk
- Cover with transparent dome
- Symbol label
- Extension shaft

### Digital position feedback with proximity switches

Two proximity switches for independent position signaling. Switching points adjustable between 0 ... 100%

Current circuits acc. to DIN 19234 / NAMUR

Supply voltage 5 ... 11 V DC

Signal current < 1.0 mA Switching state logical "0"

Signal current > 2.0 mA Switching state logical "1"

(function dependent on software and electronics for actuator)

### Direction of action (logical state)

Proximity switch	Position			
	< Lim. 1	> Lim. 1	< Lim. 2	> Lim. 2
SJ2-SN (NC)	0	1	1	0

### Digital position feedback with 24 V microswitches\*

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

Voltage max. 24 V AC / DC

Load rating max. 2 A

Contact surface 10 µm Gold (AU)

### Mechanical position indicator

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

\* The "digital feedback" is activated directly from the axis of rotation for the variable pick-off and can only be used with the "mechanical position indicator".



### IMPORTANT (NOTE)

These options are also available for retrofitting by Service.

## 5.10 Accessories

### Mounting material

- Attachment kit for linear actuators to DIN / IEC 534 / NAMUR
- Attachment kit for part-turn actuators to VDI / VDE 3845
- Attachment kit for integral mounting to control valves
- Attachment kit for actuator-specific attachment upon request

### Pressure gauge block

- Pressure gauges for supply and output pressure
- Pressure gauges with housing ø 28 mm
- Aluminum connection block in black
- Installation material for mounting on positioner

### Filter regulator

All metal version in brass, varnished black, bronze filter element (40 µm) and condensate drain.

Max. pre-pressure 16 bar (232 psi), output adjustable to 1.4 ... 6 bar (20 ... 90 psi)

## 6 Ex relevant specifications

### 6.1 ATEX / GOST Russia / GOST Ukraine

#### 6.1.1 Flameproof enclosure

Designation:	II 2G Ex d II C T4/T5/T6
Type Examination Test Certificate:	DMT 02 ATEX E 029 X
Type:	TZIDC-220 Doc. 901132
Device class:	II 2G
Standards:	EN 60079-0: 2009 EN 60079-1: 2007

#### Electrical data

Voltage: ≤ 30 V AC/DC

Amperage: ≤ 20 mA

#### Pneumatic data

Supply pressure: ≤ 6 bar

#### Thermal data

T4:  $-40\text{ °C} < T_{\text{amb}} < 85\text{ °C}$

T5:  $-40\text{ °C} < T_{\text{amb}} < 80\text{ °C}$

T6:  $-40\text{ °C} < T_{\text{amb}} < 65\text{ °C}$

#### Special conditions for ATEX, flameproof enclosure



#### DANGER – risk of explosion

Hot parts inside the housing may pose a risk of explosion.

Never open the device immediately after switch-off. Always wait at least four minutes before opening the device!

- Prior to final installation, the operator must decide how the device is to be used, either:
  - A) as a device featuring the "Ex i" type of protection; or
  - B) as a device with the "Ex d" type of protection.
 The selected type of use must be permanently marked on the name plate. Specific conditions of the surrounding environment, such as chemical corrosion, must be taken into account when affixing the permanent mark. Only the manufacturer may change the selected type of use following a re-examination
- Variants that, according to declarations, also meet the requirements for the "intrinsically safe" type of protection may no longer be used as "intrinsically safe" if they have been previously used as a flameproof type of protection
- Manipulation of the device in any form by the user is not permitted. Only the manufacturer or an explosion protection specialist may modify the device
- The IP 65 / NEMA 4x IP rating is only achieved if the splash guard is screwed in place. Devices must never be operated without the splash guard
- The device may only be operated using instrument air that is free from oil, water and dust. Flammable gases, oxygen or oxygen-enriched gases must not be used
- Medium strength adhesive must be used to secure the cable entries and line entries and stop them from twisting and self-loosening
- In the event of high torsional forces resulting from wear to the shaft for the position pickoff (significant control deviation), the bearing sleeves must be replaced

- If the positioner is operated at an ambient temperature of above 60 °C (140 °F) or below -20 °C (-4 °F), ensure that the cable entries and lines in use are suitable for an operating temperature that corresponds to the maximum ambient temperature increased by 10 K, or the minimum ambient temperature



#### NOTICE – damage to parts!

If the sealing surface is damaged, "Ex d" explosion protection is no longer guaranteed. Handle the housing cover carefully. Place the housing cover only on a smooth and clean surface!

#### 6.1.2 Operation as intrinsically safe equipment

Designation:	II 2 G Ex ia IIC T6 resp. T4 Gb II 2 G Ex ib IIC T6 resp. T4 Gb II 3 G Ex ic IIC T6 resp. T4 Gc
Type Examination Test Certificate:	TÜV 02 ATEX 1834 X
Type:	TZIDC-220
Standards:	EN 60079-0:2009 EN 60079-11:2007 EN 60079-27:2008

Temperature class	Ambient temperature range
T4	-40 ... 85 °C
T6 <sup>1)</sup>	-40 ... 40 °C

- 1) When using the "digital feedback" plug-in module in temperature class T6, the maximum permissible ambient temperature range is -40 ... 35 °C (-40 ... 95 °F)

#### Electrical data for ia/ib/ic for groups IIB/IIC

With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values according to the following table:	
Signal circuit (Terminal +11 / -12)	Voltage = 24 V Current = 250 mA Output = 1.2 W Characteristic curve = linear $L_i < 10\ \mu\text{H}$ $C_i < 5\ \text{nF}$

With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified intrinsically safe circuit with max. values:	
Mechanical digital feedback (Terminals Limit1 +51 / -52 or Limit2 +41 / -42)	For max. values, see EC type examination test certificate number PTB 00 ATEX 2049 X

**Special conditions for ATEX, operation as intrinsically safe equipment**

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

**6.2 IECEx**

**6.2.1 Flameproof enclosure**

Designation:	Ex d IIC T4/T5/T6
Type Examination Test Certificate:	IECEX BVS 07.0030X, Issue No.: 0
Type:	TZIDC-220
Temperature class:	T4, T5, T6
Permissible ambient temperature:	T4: $-40\text{ °C} < T_{\text{amb}} < 85\text{ °C}$ T5: $-40\text{ °C} < T_{\text{amb}} < 80\text{ °C}$ T6: $-40\text{ °C} < T_{\text{amb}} < 65\text{ °C}$
Standards:	IEC 60079-0: 2011 IEC 60079-1: 2007

**Electrical data**

Voltage:	$\leq 30\text{ V AC/DC}$
Amperage:	$\leq 20\text{ mA}$

**Pneumatic data**

Supply pressure:	$\leq 6\text{ bar}$
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**Thermal data**

T4:	$-40\text{ °C} < T_{\text{amb}} < 85\text{ °C}$
T5:	$-40\text{ °C} < T_{\text{amb}} < 80\text{ °C}$
T6:	$-40\text{ °C} < T_{\text{amb}} < 65\text{ °C}$

**Special conditions for IECEx, flameproof enclosure**

- The positioner is designed for a maximum permissible ambient temperature range of  $-40 \dots 85\text{ °C}$
- If the positioner is operated at an ambient temperature of above  $60\text{ °C}$  or below  $-20\text{ °C}$ , ensure that the cable entries and lines in use are suitable for an operating temperature that corresponds to the maximum ambient temperature increased by 10 K, or the minimum ambient temperature
- Variants that, according to declarations, also meet the requirements for the "intrinsically safe" type of protection may no longer be used as "intrinsically safe" if they have been previously used as a flameproof type of protection.



## 6.2.2 Operation as intrinsically safe equipment

Designation:	Ex ia IIC T6 resp. T4 Gb
Certificate No.:	IECEX TUN 04.0015X
Issue No.:	5
Type:	TZIDC-220
Standards:	IEC 60079-0:2011 IEC 60079-11:2011

Temperature class	Ambient temperature range
T4	-40 ... 85 °C
T6 <sup>1)</sup>	-40 ... 40 °C

1) When using the "digital feedback" plug-in module in temperature class T6, the maximum permissible ambient temperature range is -40 ... 35 °C (-40 ... 95 °F)

### Electrical TZIDC-220 data for ia/ib/ic for groups IIB/IIC

With the intrinsically safe Ex i IIC type of ignition protection, only for connection to a certified FISCO power supply unit or a barrier, i.e., a power supply unit with maximum values according to the following table:	
Signal circuit (Terminal +11 / -12 or + / -)	Voltage = 24 V Current = 250 mA Output = 1.2 W Characteristic curve = linear

### IECEX certification conditions, operation as intrinsically safe equipment

Special conditions relevant to the safe use of intrinsically safe positioners:

The local communication interface (LCI) for the TZIDC and the TZIDC-200 may only be operated at  $U_m \leq 30$  V DC outside the potentially explosive area.

Special conditions for the safe use of positioners labeled "Ex nA II T6" or "Ex nL IIC T6":

Only connect devices to circuits in zone 2 that are suitable for use in potentially explosive atmospheres classified as zone 2 and the prevailing conditions at the installation site.

It is only permissible to connect, disconnect and switch live circuits when carrying out installation, maintenance or repair work.

Please note: It is considered to be unlikely that a potentially explosive atmosphere would be present at the same time that installation, maintenance, or repair work is being carried out.

For the "mechanical digital feedback" circuit, external measures must be taken to prevent the nominal voltage from being exceeded by more than 40 % in the event of transient disturbances.

Only use non-flammable gases as pneumatic auxiliary energy.

Only use suitable cable entries that meet the requirements of IEC 60079-15.

### 6.3 FM/CSA

#### 6.3.1 FM Approval

TZIDC-220 Positioner, Model V18350-a014b3cd4ef  
IS/I,II,III/1/ABCDEFG/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C-901265  
Entity, FISCO

Entity and FISCO Parameters							
Terminals	Type	Groups	Parameters				
			V <sub>max</sub>	I <sub>max</sub>	P <sub>i</sub>	C <sub>i</sub>	L <sub>i</sub>
+11 / -12	Entity	A-G	24 V	250 mA	1.2 W	2.8 nF	7.2 µH
+11 / -12	FISCO	A-G	17.5 V	360 mA	2.52 W	2.8 nF	7.2 µH
+11 / -12	FISCO	C-G	17.5 V	380 mA	5.32 W	2.8 nF	7.2 µH
+51 / -52	Entity	A-G	16 V	20 mA	-	60 nF	100 µH
+41 / -42	Entity	A-G	16 V	20 mA	-	60 nF	100 µH
+85 / -86	Entity	A-G	30 V	-	-	3.7 nF	< 1 µH

NI/II/2/ABCD/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C  
S/II,III/2/EFG/T6,T5,T4 Ta = 40 °C, 55 °C, 85 °C  
Enclosure type 4x

- a = Case/Mounting – 1, 2, 3, 4, 5 or 6
- b = Output/Safe protection – 1, 2, 3 or 4
- c = 0
- d = Optional mechanical kit for digital position feedback – 0, 1 or 2
- e = Design (varnish/coding) – 1 or 2
- f = Device identification label – 0, 1 or 2

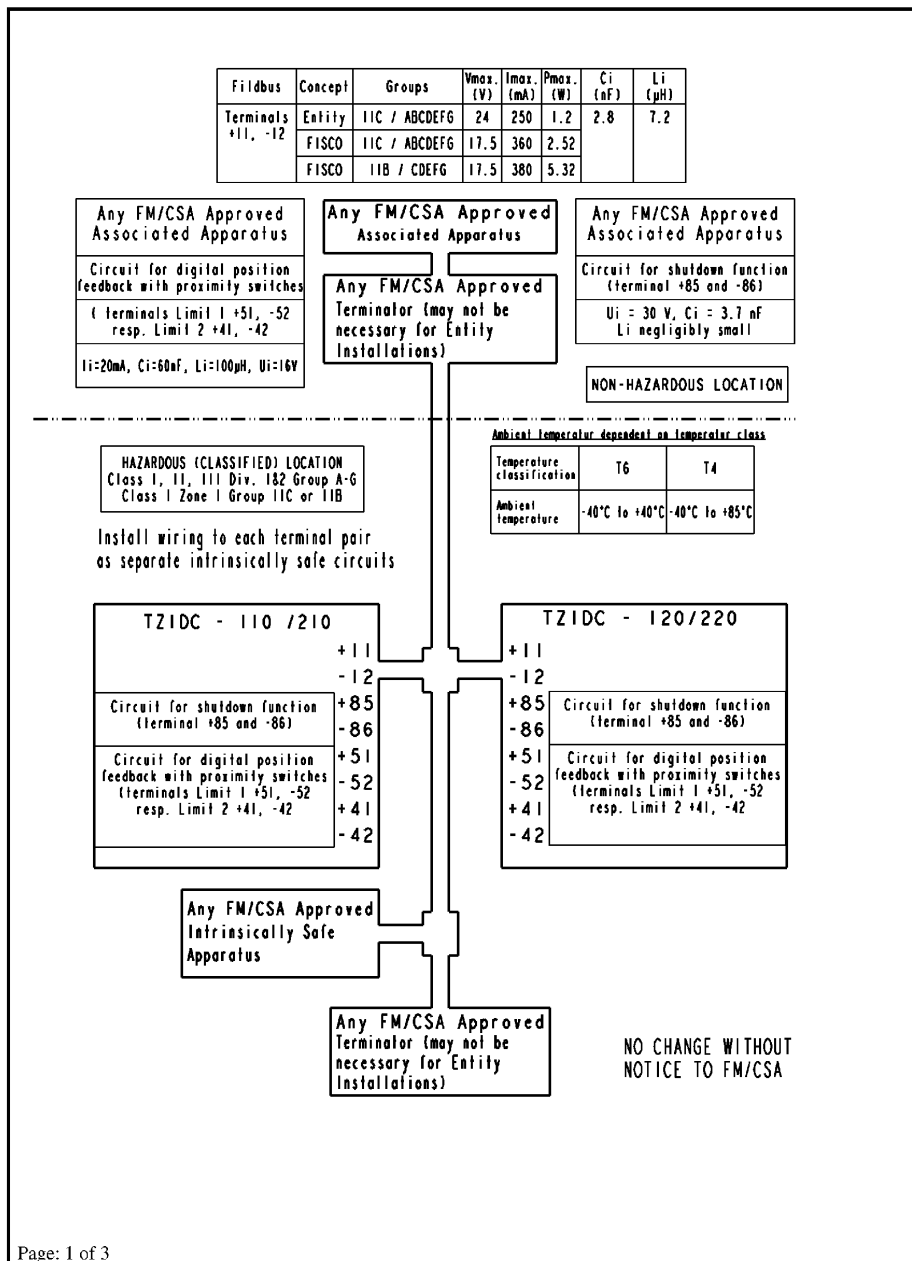
TZIDC-220 Positioner, Model V18350-a012b3cd4ef  
XP/II/2/CD/T6, T5, T4 TA = 82 °C  
DIP/II, III/2/FG/T6, T5, T4 Ta = 82 °C  
Enclosure type 4x

- a = Case/Mounting – 1, 2, 3, 4, 5 or 6
- b = Output/Safe protection – 1, 2, 3 or 4
- c = 0
- d = Optional mechanical kit for digital position feedback – 0, 1 or 2
- e = Design (varnish/coding) – 1 or 2
- f = Device identification label – 0, 1 or 2

#### **CSA Certification 1555690**

Explosion proof; enclosure 4X  
Temperature range: -40 to 85 °C  
T5, max. 85 °C ; T6, max. 70 °C  
CL I; Div 1; Grp. C-D  
CL II; Div 1; Grp. E-F-G  
CL III

6.3.2 FM Control Document



Page: 1 of 3

-	-			2003	Date	Name	Title	Scale
					Name	27.03.03	Thiem.	FM/CSA-Control-Document
					Appr.			/
					Std.			
3	Rev.2	26.06.06	Thie.	<b>ABB</b>		Automation Products		Drwg.-No. (Part-No.)
2	Rev.1	22.05.06	Thie.					<b>901265</b>
1	Rev.0	27.03.	Thie.					
Rev.	Chang	Date	Name			Supersedes Dwg. :	Part Class:	

Page: 2 of 3								
<b>FM/CSA-CONTROL-DOCUMENT_901265</b>								
<b>FISCO rules</b>								
<p>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 (<math>V_{max}</math>), the current (<math>I_{max}</math>) and the power (<math>P_i</math>) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (<math>U_o, V_{oc}, V_t</math>), the current (<math>I_o, I_{sc}, I_t</math>) and the power (<math>P_o</math>) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (<math>C_i</math>) and inductance (<math>L_i</math>) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10 <math>\mu</math>H respectively.</p> <p>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 (<math>U_o, V_{oc}, V_t</math>) 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 <math>\mu</math>A for each connected device. Separately powered equipment needs a galvanic Isolation to insure that the intrinsically safe Fieldbus circuit remains passive.</p> <p>The cable used to interconnect the devices needs to comply with the following parameters:</p> <p>Loop resistance <math>R'</math>: 15...150 <math>\Omega</math>/km          Inductance per unit length <math>L'</math>: 0.4...1mH/km          Capacitance per unit length <math>C'</math>: 80...200 nF / km  <math>C' = C'</math> line/line + 0.5<math>C'</math> line/screen, if both lines are floating          or  <math>C' = C'</math> line/line + <math>C'</math> 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</p> <p><b>Terminators</b>          At each end of the trunk cable an approved line terminator with the following parameters is suitable:  <math>R = 90...100 \Omega</math>  <math>C = 0...2.2 \mu F</math></p> <p><b>System evaluation</b>          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.</p>								
-	-			2003	Date	Name	Title	Scale
					27.03.03	Thiem.	FM/CSA-Control-Document	/
3	Rev.2	26.06.06	Thie.	<b>ABB</b>			Drwg.-No. (Part-No.)	
2	Rev.1	22.05.06	Thie.	<b>Automation Products</b>			<b>901265</b>	
1	Rev.0	27.03.	Thie.					
Rev.	Chang	Date	Name				Supersedes Dwg. :	Part Class:

Page: 3 of 3								
<b>FM/CSA-CONTROL-DOCUMENT_901265</b>								
<p>Installation Notes For FISCO and Entity Concepts:</p> <ol style="list-style-type: none"> <li>1. 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:  <math>U_o</math> or <math>V_{oc}</math> or <math>V_t \leq V_{max}</math>, <math>I_o</math> or <math>I_{sc}</math> or <math>I_t \leq I_{max}</math>, <math>P_o \leq P_i</math>. <math>C_a</math> or <math>C_o \geq \Sigma C_i + \Sigma C</math> cable.                      For inductance use either <math>L_a</math> or <math>L_o \geq \Sigma L_i + \Sigma L</math> cable or <math>L_c / R_c \leq (L_a / R_a \text{ or } L_o / R_o)</math> and <math>L_i / R_i \leq (L_a / R_a \text{ or } L_o / R_o)</math></li> <li>2. 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: <math>U_o</math> or <math>V_{oc}</math> or <math>V_t \leq V_{max}</math>, <math>I_o</math> or <math>I_{sc}</math> or <math>I_t \leq I_{max}</math>, <math>P_o \leq P_i</math>.</li> <li>3. Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.</li> <li>4. 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.</li> <li>5. The configuration of associated Apparatus must be Factory Mutual Research /Canadian Standards Association Approved under the associated concept.</li> <li>6. Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.</li> <li>7. No revision to drawing without prior Factory Mutual Research Approval/Canadian Standards Association.</li> <li>8. Special conditions for safe use                      The operation of the local communication interface (LKS) and of the programming interface (X5) is only allowed outside of the Hazardous explosive area.</li> </ol> <p>NONINCENDIVE, CLASS I, DIV. 2, GROUP A, B, C, D, AND FOR CLASS II AND III, DIV. 1&amp;2, GROUP E, F, G HAZARDOUS LOCATION INSTALLATION.</p> <ol style="list-style-type: none"> <li>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.</li> <li>2. A dust tight seal must be used at the conduit entry when the positioner is used in a Class II &amp; III Location.</li> <li>3. <b>WARNING:</b> Explosion Hazard – do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.  <b>WARNING:</b> Substitution of components may impair suitability for hazardous locations.</li> </ol>								
-	-			2003	Date	Name	Title	Scale
				Name	27.03.03	Thiem.	FM/CSA-Control-Document	/
				Appr.				
				Std.				
3	Rev.2	26.06.06	Thie.	<b>ABB</b>			Drwg.-No. (Part-No.)	
2	Rev.1	22.05.06	Thie.	Automation Products			<b>901265</b>	
1	Rev.0	27.03.	Thie.					
Rev.	Chang	Date	Name				Supersedes Dwg. :	Part Class:

## 7 Electrical connections

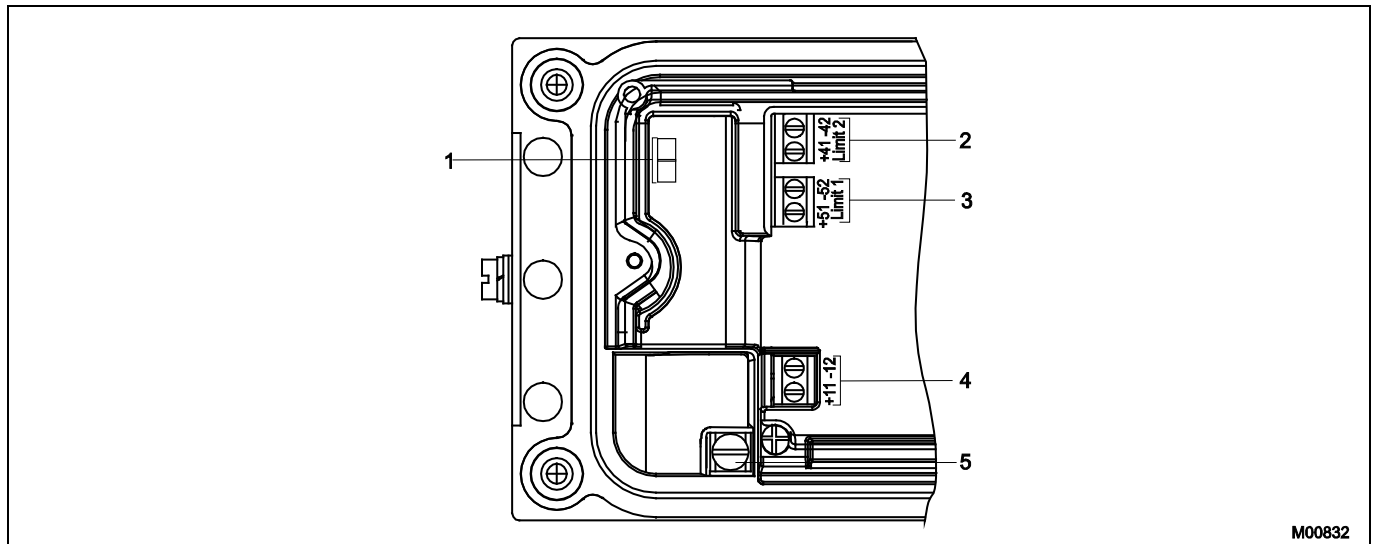
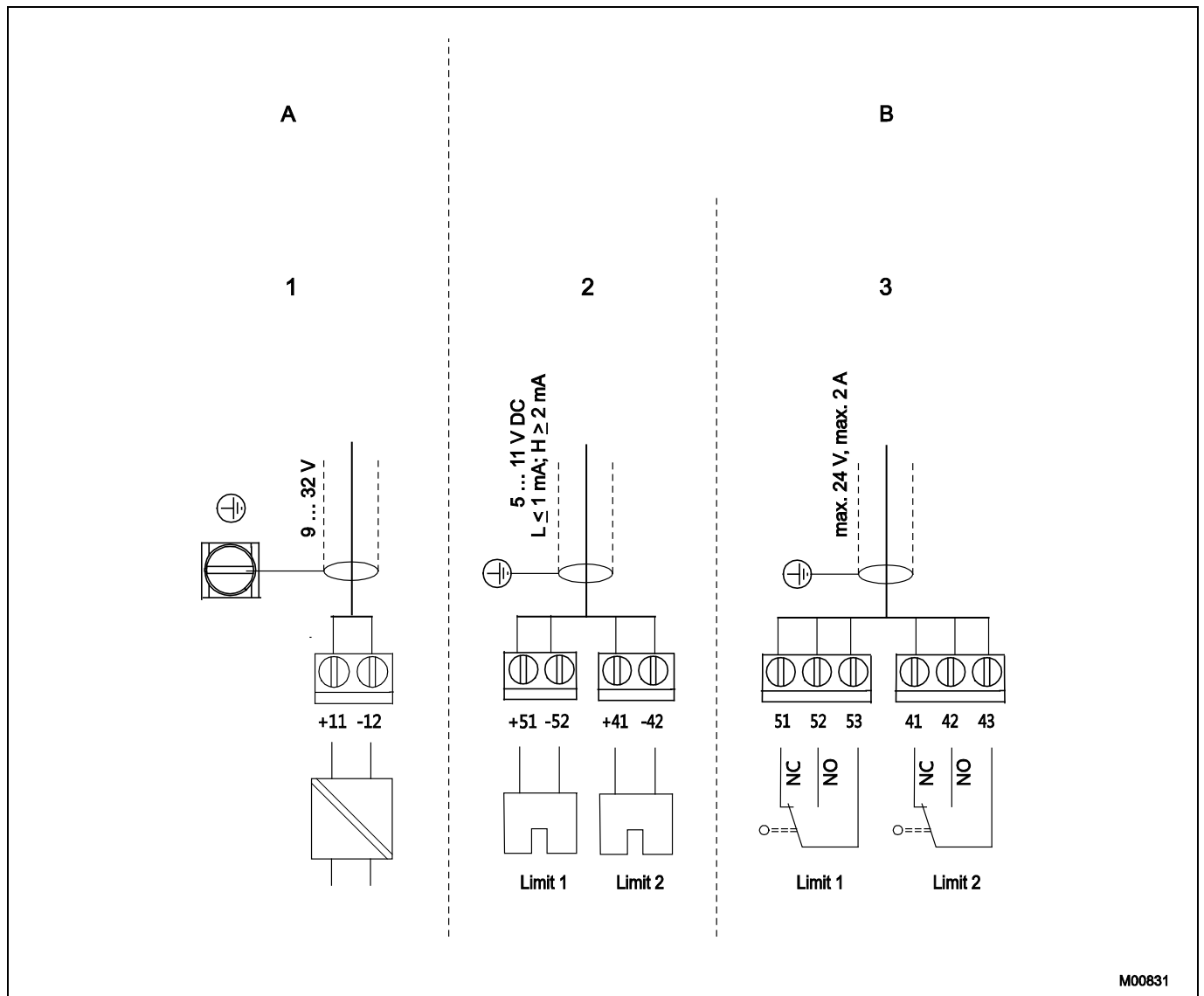


Fig. 6: Screw terminals, overview

- |  |                   |
|--|-------------------|
| 1 Not assigned   | 3 Same as 2       |
| 2 Digital position feedback, either proximity switches or 24 V microswitches | 4 Bus connector   |
|  | 5 Grounding screw |



M00831

Fig. 7: Pin configuration

A Basic model  
B Options

1 Fieldbus, bus feed  
2 Proximity switches  
3 Microswitches



**IMPORTANT (NOTE)**

Keep cable shields as short as possible and connect on both sides.



## 8 Dimensions

All dimensions in mm (inch)

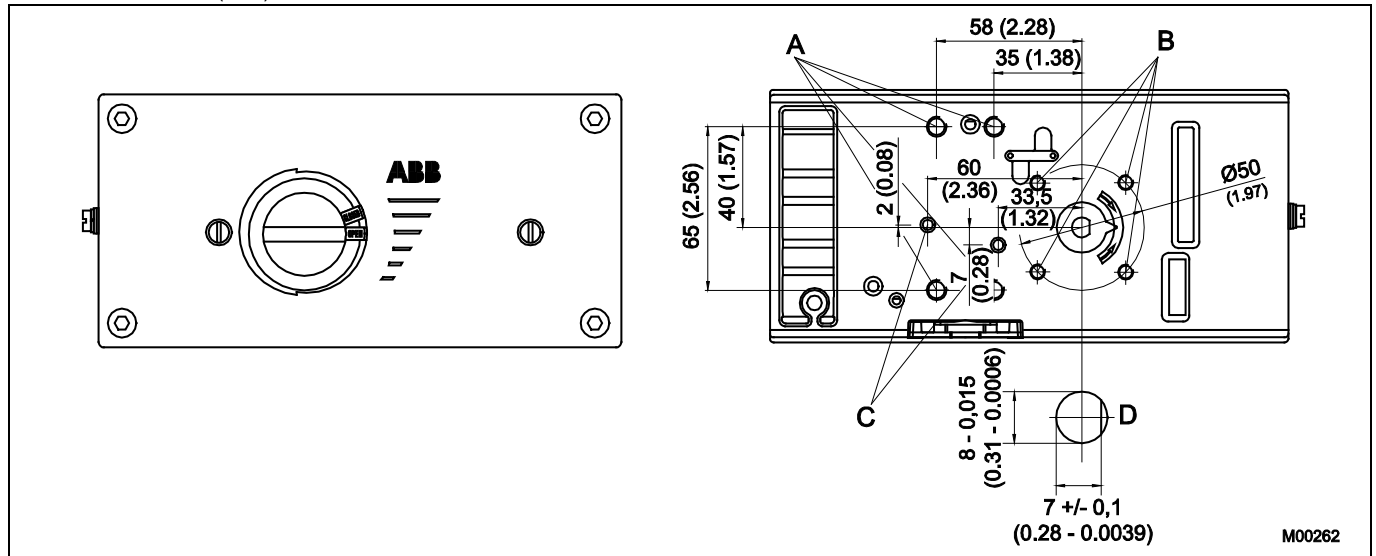


Fig. 8: Top view

- A Tap hole M8 (10 mm (0.39 inch) low)
- B Tap hole M6 (8 mm (0.32 inch) low)
- C Tap hole M5 x 0.5 (air connections in version for integral mounting)
- D Sensor shaft (larger than scale)

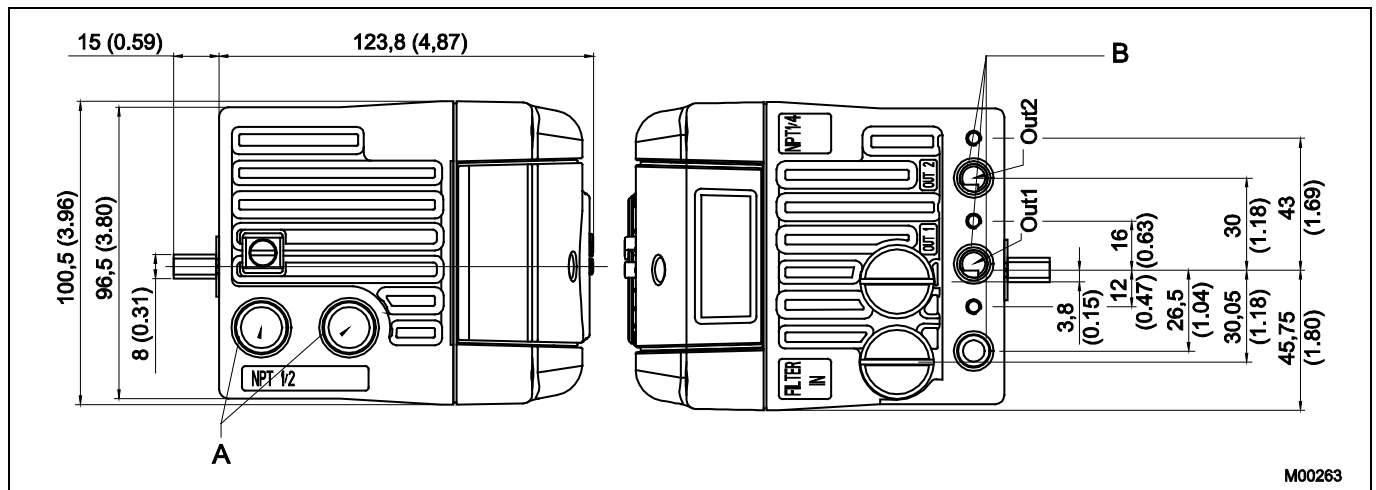


Fig. 9: Left and right side view

- A NPT 1/2" or M20 x 1.5
- B Pneumatic connections, NPT 1/4" -18 or G1/4"

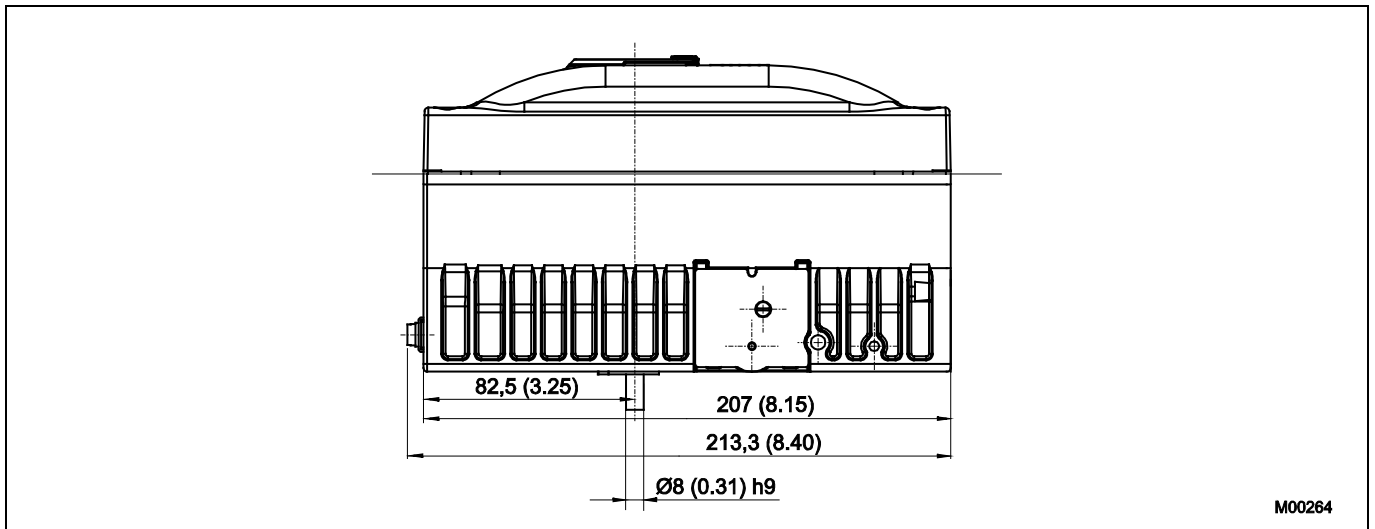


Fig. 10: Bottom view

A Pneumatic connections, NPT 1/4"-18 or G1/4"

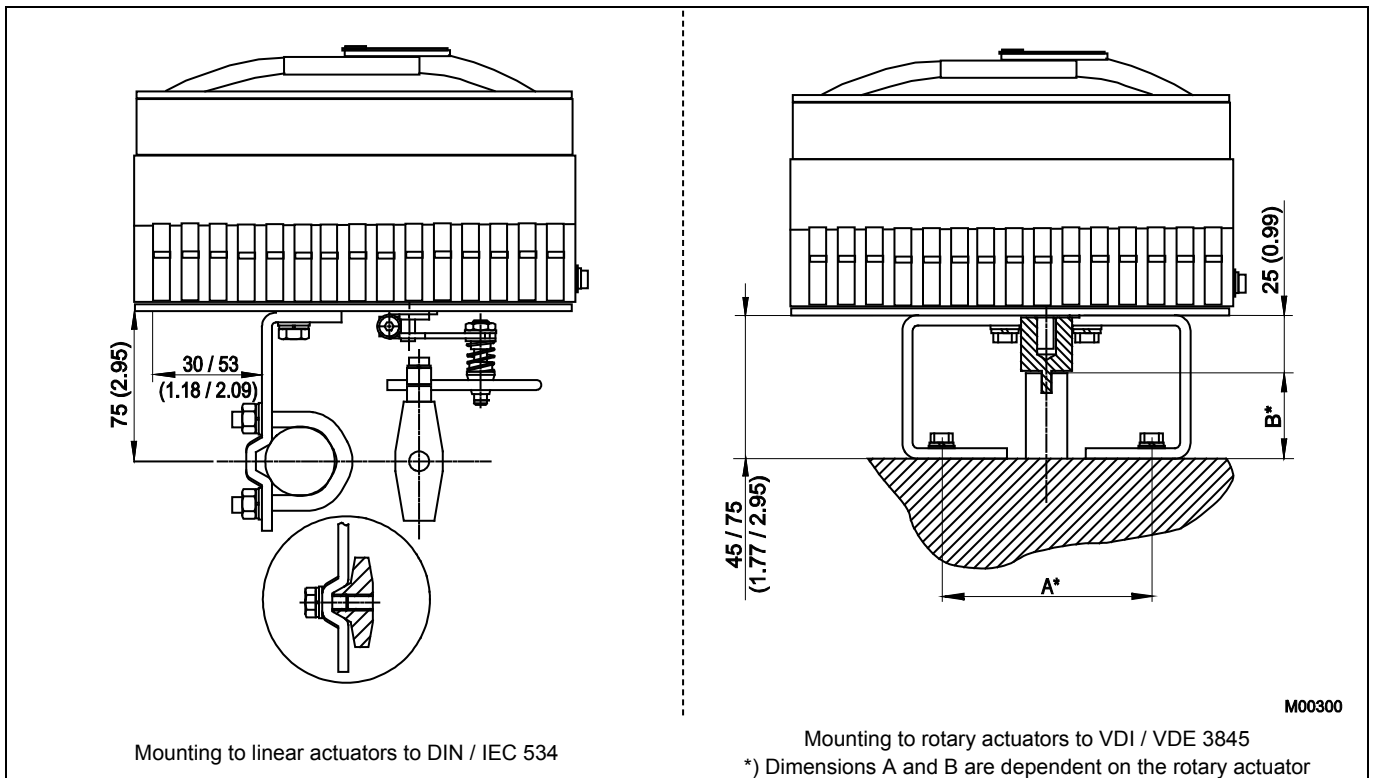


Fig. 11: Mounting drawings

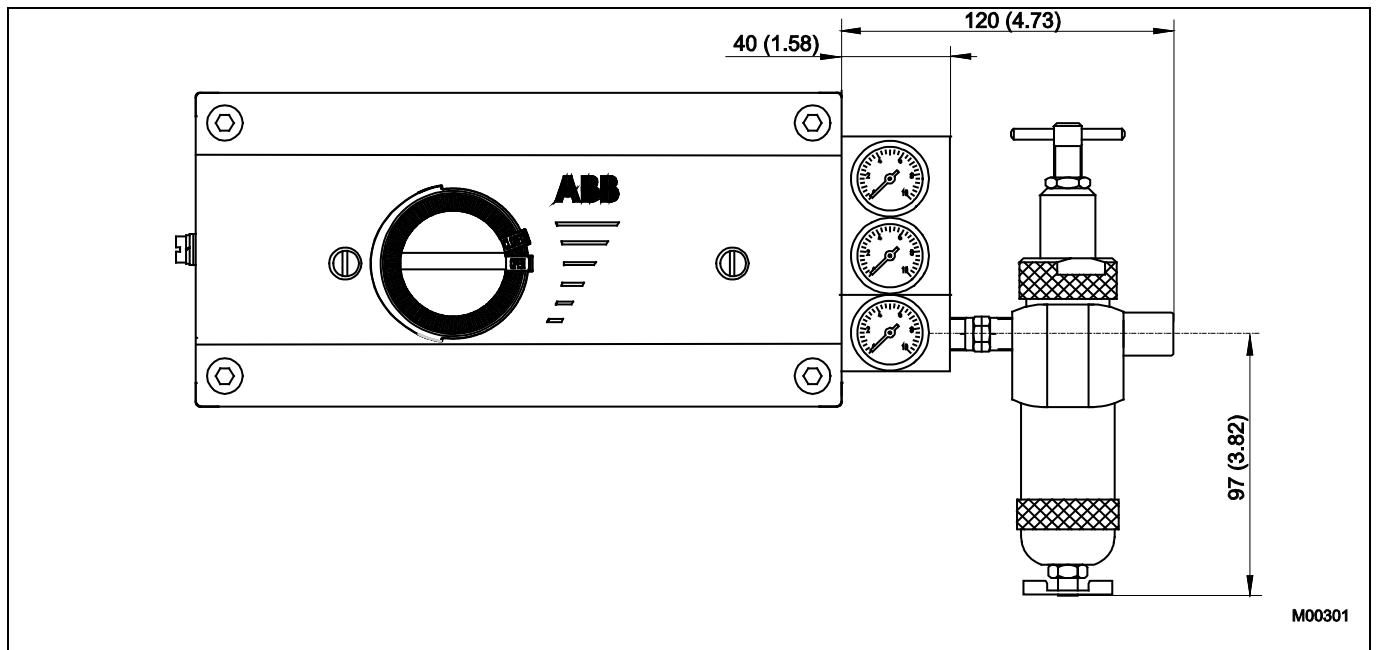


Fig. 12: Positioner TZIDC-220 with pressure gauge block and filter regulator

## 9 Ordering information

	Main Code											Add. Code			
	Variant digit No.	1	2	3	4	5	6	7	8	9	10				
<b>TZIDC-220 Electro-Pneumatic Positioner, with flameproof enclosure, for FOUNDATION fieldbus, intelligent, software-configurable</b>	<b>V18350</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
<b>Case / Mounting</b>															
Case made of aluminium, varnished, for mounting to linear actuators acc. DIN / IEC 534 / NAMUR or to rotary actuators acc. VDI / VDE 3845		1	0												
Case made of aluminium, varnished, with mechanical position indicator, for mounting to linear actuators acc. DIN / IEC 534 / NAMUR or to rotary actuators acc. VDI / VDE 3845		2	0												
Case made of aluminium, varnished, for integral mounting to control valves (see dimensional drawing)		3	0												
Case made of aluminium, varnished, with mechanical position indicator, for integral mounting to control valves (see dimensional drawing)		4	0												
Case made of aluminium, varnished, for mounting to rotary actuators acc. VDI / VDE 3845 with extended rotation angle up to 270°		5	0												
Case made of aluminium, varnished, with mechanical position indicator, for mounting to rotary actuators acc. VDI / VDE 3845 with extended rotation angle up to 270°		6	0												
<b>Operation</b>															
With operator panel and display integrated in the enclosure cover										1					
<b>Explosion Protection</b>															
ATEX Ex d II C T4/T5/T6 Gb															1
FM / CSA Class 1, Div. 1, Group C-D (explosion-proof)															2
ATEX II 2 G Ex ia IIC T6 resp. T4 Gb + Ex d															3
FM / CSA Intrinsically Safe															4
IECEX ia IIC T6 resp. T4 Gb															5
IECEX Ex d II C T4/T5/T6 Gb															6
GOST Russia - Ex d IIC T4 / T5 / T6															D
<b>Output / Safe Position (in case of an electrical power failure)</b>															
Single acting, fail safe															1
Single acting, fail freeze															2
Double acting, fail safe															3
Double acting, fail freeze															4
<b>Connections</b>															
Cable: Thread M20 x 1.5, air pipe: Thread G 1/4															1
Cable: Thread M20 x 1.5, air pipe: Thread 1/4-18 NPT															2
Cable: Thread 1/2-14 NPT, air pipe: Thread 1/4-18 NPT															3
Cable: Thread G 1/2, air pipe: Thread Rc 1/4															7

Continued on next page

1) Only with cable connection NPT thread

	Main Code																Add. Code
	Variant digit No.	1 - 6	7	8	9	10	11	12	13	14	15	16	XX				
<b>TZIDC-220 Electro-Pneumatic Positioner, with flameproof enclosure, for FOUNDATION fieldbus, intelligent, software-configurable</b>	V18350	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX	
<b>Optional Mechanical Kit for Digital Position Feedback</b>																	
Without											0	4					
Mechanical kit for digital position feedback with proximity switches SJ2-SN (NC or logical 1)									2)	1	4						
Mechanical kit for digital position feedback with 24 V AC / DC									3)	3	4						
<b>Design (Varnish / Coding)</b>																	
Standard															1		
Others															2		
<b>Device Identification Label</b>																	
Without																0	
Label including text, with separate sticker logical 1)														4)	1		
Label including text, with separate stainless steel label 11.5 x 60 mm (0.45 x 2.36)														4)	2		
<b>Documentation Language</b>																	
German																M1	
Italian																M2	
Spanish																M3	
French																M4	
English																M5	
Swedish																M7	
Finnish																M8	
Polish																M9	
Portuguese																MA	
Russian																MB	
Czech																MC	
Dutch																MD	
Danish																MF	
Greek																MG	
Latvian																ML	
Hungarian																MM	
Estonian																MO	
Bulgarian																MP	
Romanian																MR	
Slovak																MS	
Lithuanian																MU	
Slovenian																MV	
<b>Certificate of Compliance</b>																	
Certificate of compliance with the order acc. EN 10204-2.1 (DIN 50049-2.1) with item description																CF2	
Test report 2.2 acc. EN 10204 (DIN 50049-2.2)																CF3	
<b>Inspection Certificate</b>																	
Inspection certificate 3.1 acc. EN 10204																CBA	

Continued on next page

- 2) No IECEx
- 3) Only for Ex d version
- 4) Plain text, max. 16 letters

## 9.1 Accessories

Accessories	Order number
<b>Mounting bracket</b>	
EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 80/20 mm	319603
EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 80/30 mm	319604
EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 130/30 mm	319605
EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 130/50 mm	319606
<b>Lever</b>	
EDP300 / TZIDC Lever 30 mm	7959151
EDP300 / TZIDC Lever 100 mm	7959152
<b>Adapter</b>	
EDP300 / TZIDC Adapter (shaft coupler) for rotary actuators (mounting to VDI / VDE 3845)	7959110
EDP300 / TZIDC Form - locking shaft adapter	7959371
<b>Pressure gauge block</b>	
TZIDC Pressure gauge block, 0.6 MPa, single acting, G 1/4 connection	7959364
TTZIDC Pressure gauge block, 0.6 MPa, single acting, Rc 1/4 connection	7959358
TZIDC Pressure gauge block, 0.6 MPa, single acting, NPT 1/4 connection	7959360
TZIDC Pressure gauge block, 0.6 MPa, double acting, G 1/4 connection	7959365
TZIDC Pressure gauge block, 0.6 MPa, double acting, Rc 1/4 connection	7959359
TZIDC Pressure gauge block, 0.6 MPa, double acting, NPT 1/4 connection	7959361
<b>Filter regulator</b>	
TZIDC Filter regulator, brass, connections thread G 1/4, incl. material for mounting to pressure gauge block	7959119
TTZIDC Filter regulator, brass, connections thread 1/4-18 NPT, incl. material for mounting to pressure gauge block	7959120
<b>Attachment kit</b>	
EDP300 / TZIDC Attachment kit for linear actuators, stroke 10 ... 35 mm	7959125
EDP300 / TZIDC Attachment kit for linear actuators, stroke 20 ... 100 mm	7959126
EDP300 / TZIDC Attachment for remote sensor control unit (for wall or pipe mounting)	7959381
EDP300 / TZIDC Attachment kit for Fisher 1051-30, 1052-30	7959214
EDP300 / TZIDC Attachment kit for Fisher 1061 size 130	7959206
EDP300 / TZIDC Attachment kit for Fisher 471	7959195
EDP300 / TZIDC Attachment kit for Fisher 657 / 667 Size 10 ... 90 mm	7959177
EDP300 / TZIDC Attachment kit for Fisher Gulde 32/34	7959344
EDP300 / TZIDC Attachment kit for Gulde DK	7959161
EDP300 / TZIDC Attachment kit for Keystone 79U/E-002(S) ... 79U/E-181(S)	7959147
EDP300 / TZIDC Attachment kit for Masoneilan CAMFLEX II, VARIMAX, MINITORK II	7959144
EDP300 / TZIDC Attachment kit for Masoneilan VariPak 28000 series	7959163
EDP300 / TZIDC Attachment kit for MaxFlo MaxFlo	7959140
EDP300 / TZIDC Attachment kit for NAF 791290	7959207
EDP300 / TZIDC Attachment kit for NAMUR stroke 100 ... 170 mm	7959339
EDP300 / TZIDC Attachment kit for NELES BC6-20, B1C6-20, BJ8-20, B1J8-20	7959146
EDP300 / TZIDC Attachment kit for Valves Nuovo Pignone, lever for linear stroke, length 150 ... 250 mm	7959210
EDP300 / TZIDC Attachment kit for Samson 241, 271, 3271	7959145
EDP300 / TZIDC Attachment kit for Samson 3277	7959136
EDP300 / TZIDC Attachment kit for Schubert&Salzer GS 8020 / 8021 / 8023	7959200
EDP300 / TZIDC Attachment kit for SED SED stroke 100 mm	7959141
EDP300 / TZIDC Mounting Kit Uhde Type 4 Stroke 400 mm cropped	7959500
<b>Cable gland</b>	
TZIDC-2xx 1 x Ex d cable gland M20 x 1.5, 1 pipe plug M20 x 1.5, securing adhesive	7959244
TZIDC-2xx 2 x Ex d cable glands M20 x 1.5, securing adhesive	7959245
TZIDC-2xx 1 x Ex d cable gland 1/2 in. NPT, 1 pipe plug 1/2 in. NPT, securing adhesive	7959246
TZIDC-2xx 2 x Ex d cable glands 1/2 in. NPT, securing adhesive	7959247









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