Compact, well-proven, and flexible

For FOUNDATION Fieldbus,
Flameproof enclosure
Low operating cost
Compact design
Well-proven technology and intelligence
Robust and environmentally ruggedized

Wide operating temperature range
— -40 ... 85 °C (-40 ... 185 °F)
Easy to commission, “single pushbutton” operating philosophy
Mechanical position indicator
ATEX, FM, CSA, GOST and IECEx approvals
## Contents

1 Description ............................................................................................................................................... 3  
1.1 Pneumatics ........................................................................................................................................ 3  
1.2 Operation .......................................................................................................................................... 3  
1.3 Communication ................................................................................................................................. 3  
1.4 Modular design ................................................................................................................................ 3  
2 Mounting versions .................................................................................................................................. 5  
  2.1 To linear actuators in accordance with the standard ..................................................................... 5  
  2.2 To rotary actuators in accordance with the standard ..................................................................... 5  
  2.3 Integral mounting to control valves .............................................................................................. 5  
  2.4 Special actuator-specific mounting ................................................................................................. 5  
3 Operation ............................................................................................................................................... 7  
  3.1 General ............................................................................................................................................ 7  
  3.2 Operator panel ................................................................................................................................ 8  
4 Communication ...................................................................................................................................... 9  
  4.1 General ............................................................................................................................................ 9  
  4.2 Configuration ................................................................................................................................. 9  
  4.3 FOUNDATION Fieldbus H1 ......................................................................................................... 9  
  4.4 Benefits of FF communication ..................................................................................................... 9  
  4.5 FF communication for TZIDC-220 ............................................................................................... 9  
5 Specifications ....................................................................................................................................... 10  
  5.1 Communication ................................................................................................................................. 10  
  5.2 Designation .................................................................................................................................... 10  
  5.3 Output ............................................................................................................................................. 10  
  5.4 Travel ............................................................................................................................................. 10  
  5.5 Air supply ....................................................................................................................................... 10  
  5.6 Transmission data and influences ............................................................................................... 11  
  5.7 Environmental capabilities .......................................................................................................... 11  
  5.8 Housing ....................................................................................................................................... 11  
  5.9 Options ......................................................................................................................................... 12  
  5.10 Accessories ................................................................................................................................ 12  
6 Ex relevant specifications ....................................................................................................................... 13  
  6.1 ATEX / GOST Russia / GOST Ukraine .......................................................................................... 13  
  6.2 IECEx ............................................................................................................................................... 14  
  6.3 FM/CSA .......................................................................................................................................... 16  
7 Electrical connections ............................................................................................................................ 20  
8 Dimensions ........................................................................................................................................... 22  
9 Ordering information ............................................................................................................................. 25  
  9.1 Accessories .................................................................................................................................... 27
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.
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.
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)**
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.

![Communication via FOUNDATION Fieldbus](image-url)
5 Specifications

5.1 Communication

<table>
<thead>
<tr>
<th>Specification</th>
<th>FOUNDATION fieldbus, version 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Layer</td>
<td>Model 113, 121 (IEC 61158-2)</td>
</tr>
<tr>
<td>Transmission rate</td>
<td>31.25 Kbit/s</td>
</tr>
</tbody>
</table>

Block types
- 1 AO Function block
- 1 PID block
- 1 Resource block
- 1 Transducer block
- 1 physical block

Block class
- AO block: standard
- PID block: enhanced
- Resource block: enhanced
- Transducer block: custom

Number of linkage objects | 22
Device description (DD) | Rev. No. 1 (file name 0201.ffo, 0201.sym)
File | Common file format (file name: 020101.cff)
Max. execution time | AO block: 40 milliseconds
| PID block: 50 milliseconds
Supply voltage | Power feed from the fieldbus
| 9.0 ... c 32.0 V DC
Max. permissible voltage | 35 V DC
Power consumption | 11.5 mA
Current in the event of an error | 15 mA (11.5 mA + 3.5 mA)

FF Certification
- Registered with ITK 4.51, Dec. 2003
- IT Camp. Number IT023200

Device name | ABB TZIDC-220-TAG
Dev. ID | 0X3200028-TZID-C220XXXXXXXXXXX

5.2 Designation

Device name | ABB TZIDC-C220XXXXXXXXXXX
Dev. ID | 0X3200028-TZID-C220XXXXXXXXXXX

5.3 Output

Range | 0 ... 6 bar (0 ... 90 psi)
Air capacity
- at 1.4 bar (20 psi) supply pressure: 5.0 kg/h = 3.9 Nm³/h = 2.3 scfm
- at 6 bar (90 psi) supply pressure: 13 kg/h = 10 Nm³/h = 6.0 scfm

Output function
- For single or double-acting actuators, air is vented from actuator or actuator is blocked in case of (electrical) power failure

Shut-off values
- End Position 0 % = 0 ... 45 %
- End position 100 % = 55 ... 100 %

5.4 Travel

Rotation angle
- Used range
  - 25 ... 120°: rotary actuators, optionally 270°
  - 25 ... 60°: linear actuators

Travel time prolongation
- Setting range: 0 ... 200 seconds, separately for each direction

5.5 Air supply

Instrument air
- 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 / m³; oil content: max. concentration: 1 mg / m³; pressure dew point: 10 K below operating temperature

Supply pressure | 1.4 ... 6 bar (20 ... 90 psi)

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

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

Direction of action (output signal or pressure in actuator)
- Increasing: Increasing output signal 0 ... 100 %
- Decreasing: Increasing pressure y1 in the actuator
- Increasing: Decreasing pressure y1 in the actuator

Characteristics deviation
- < 0.5 %

Tolerance band
- 0.3 ... 10 %, adjustable

Dead band
- 0.1 ... 5 %, adjustable

Resolution (A/D conversion)
- > 16000 steps

Sample rate
- 20 ms

Influence of ambient temperature
- < 0.5 % for each 10 K

Influence of vibration
- ≤ ± 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 mm² (AWG 17) for options
Max. 2.5 mm² (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 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)

<table>
<thead>
<tr>
<th>Proximity switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; Lim. 1</td>
</tr>
<tr>
<td>SJ2-SN (NC)</td>
<td>0</td>
</tr>
</tbody>
</table>

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)

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.
6 Ex relevant specifications

6.1 ATEX / GOST Russia / GOST Ukraine

6.1.1 Flameproof enclosure

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>II 2G Ex d II C T4/T5/T6</td>
</tr>
<tr>
<td>Type Examination Test Certificate</td>
<td>DMT 02 ATEX E 029 X</td>
</tr>
<tr>
<td>Type</td>
<td>TZIDC-220 Doc. 901132</td>
</tr>
<tr>
<td>Device class</td>
<td>II 2G</td>
</tr>
<tr>
<td>Standards</td>
<td>EN 60079-0: 2009</td>
</tr>
<tr>
<td></td>
<td>EN 60079-1: 2007</td>
</tr>
</tbody>
</table>

Electrical data

- Voltage: ≤ 30 V AC/DC
- Amperage: ≤ 20 mA

Pneumatic data

- Supply pressure: ≤ 6 bar

Thermal data

- Temperature range:
  - T4: -40 °C < T_{amb} < 85 °C
  - T5: -40 °C < T_{amb} < 80 °C
  - T6: -40 °C < T_{amb} < 65 °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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Designation</td>
<td>II 2 G Ex ia IIC T6 resp. T4 Gb</td>
</tr>
<tr>
<td></td>
<td>II 2 G Ex ib IIC T6 resp. T4 Gb</td>
</tr>
<tr>
<td></td>
<td>II 3 G Ex ic IIC T6 resp. T4 Gc</td>
</tr>
<tr>
<td>Type Examination Test Certificate</td>
<td>TÜV 02 ATEX 1834 X</td>
</tr>
<tr>
<td>Type</td>
<td>TZIDC-220</td>
</tr>
<tr>
<td>Standards</td>
<td>EN 60079-0: 2009</td>
</tr>
<tr>
<td></td>
<td>EN 60079-11: 2007</td>
</tr>
<tr>
<td></td>
<td>EN 60079-27: 2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>-40 … 85 °C</td>
</tr>
<tr>
<td>T6 1)</td>
<td>-40 … 40 °C</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Signal circuit (Terminal +11 / -12)</td>
<td>Voltage = 24 V</td>
</tr>
<tr>
<td></td>
<td>Current = 250 mA</td>
</tr>
<tr>
<td></td>
<td>Output = 1.2 W</td>
</tr>
<tr>
<td></td>
<td>Characteristic curve = linear</td>
</tr>
<tr>
<td></td>
<td>L &lt; 10 µH</td>
</tr>
<tr>
<td></td>
<td>C &lt; 5 nF</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical digital feedback (Terminals Limit1 +51 / -52 or Limit2 +41 / -42)</td>
<td>For max. values, see EC type examination test certificate number PTB 00 ATEX 2049 X</td>
</tr>
</tbody>
</table>
Electro-Pneumatic Positioner TZIDC-220
for FOUNDATION Fieldbus, Flameproof

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 °C < Tamb < 85 °C
  T5: -40 °C < Tamb < 80 °C
  T6: -40 °C < Tamb < 65 °C
Standards: IEC 60079-0: 2011
  IEC 60079-1: 2007

Electrical data
Voltage: ≤ 30 V AC/DC
Amperage: ≤ 20 mA

Pneumatic data
Supply pressure: ≤ 6 bar

Thermal data
T4: -40 °C < Tamb < 85 °C
T5: -40 °C < Tamb < 80 °C
T6: -40 °C < Tamb < 65 °C

Special conditions for IECEx, flameproof enclosure

- The positioner is designed for a maximum permissible ambient temperature range of -40 ... 85 °C
- If the positioner is operated at an ambient temperature of above 60 °C or below -20 °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

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>-40 ... 85 °C</td>
</tr>
<tr>
<td>T6 1)</td>
<td>-40 ... 40 °C</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Signal circuit (Terminal +11 / -12 or + / -)</th>
<th>Voltage = 24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current = 250 mA</td>
</tr>
<tr>
<td></td>
<td>Output = 1.2 W</td>
</tr>
<tr>
<td></td>
<td>Characteristic curve = linear</td>
</tr>
</tbody>
</table>

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 \( U_m \leq 30 \text{ V DC} \) 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

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Type</th>
<th>Groups</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vmax</td>
</tr>
<tr>
<td>+11 / -12</td>
<td>Entity A-G</td>
<td>24 V</td>
<td>250 mA</td>
</tr>
<tr>
<td>+11 / -12</td>
<td>FISCO A-G</td>
<td>17.5 V</td>
<td>360 mA</td>
</tr>
<tr>
<td>+11 / -12</td>
<td>FISCO C-G</td>
<td>17.5 V</td>
<td>380 mA</td>
</tr>
<tr>
<td>+51 / -52</td>
<td>Entity A-G</td>
<td>16 V</td>
<td>20 mA</td>
</tr>
<tr>
<td>+41 / -42</td>
<td>Entity A-G</td>
<td>16 V</td>
<td>20 mA</td>
</tr>
<tr>
<td>+85 / -86</td>
<td>Entity A-G</td>
<td>30 V</td>
<td>-</td>
</tr>
</tbody>
</table>

NI/I/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/I/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

Electro-Pneumatic Positioner TZIDC-220
for FOUNDATION Fieldbus, Flameproof

<table>
<thead>
<tr>
<th>Fieldbus Concept</th>
<th>Groups</th>
<th>Max. (V)</th>
<th>Max. (mA)</th>
<th>Min. (V)</th>
<th>Ci (Amp)</th>
<th>Li (Amp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals v1, v2, v3</td>
<td>IIC / ABCDEFG</td>
<td>24</td>
<td>250</td>
<td>1.2</td>
<td>2.8</td>
<td>1.2</td>
</tr>
<tr>
<td>FISCO</td>
<td>IIC / ABCDEFG</td>
<td>17.5</td>
<td>366</td>
<td>2.52</td>
<td>2.8</td>
<td>1.2</td>
</tr>
<tr>
<td>FISCO</td>
<td>IIB / C / EFG</td>
<td>17.5</td>
<td>368</td>
<td>5.3</td>
<td>2.8</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Any FM/CSA Approved Associated Apparatus
Circuit for digital position feedback with proximity switches
- Terminals Limit 1+51, -52, resp. Limit 2+41, -42
- Li=2Ω, Ci=5kF, Li=100kΩ, Li=1kΩ

Any FM/CSA Approved Associated Apparatus
Circuit for shutdown function (terminal +55 and -66)
Li = 30 V, Ci = 5.7 A
Li negligibly small

NON-HAZARDOUS LOCATION

HAZARDOUS (CLASSIFIED) LOCATION
Class I, II, III Div. I, Group A, B, C, D Class I Zone 1 Group 1A or 1B

Install wiring to each terminal pair as separate intrinsically safe circuits

TZIDC - 110/210

+11
-12
+05
-06
+51
-52
+41
-42

Circuit for shutdown function (terminal +55 and -66)

Circuit for digital position feedback with proximity switches (terminals Limit 1+51, -52, resp. Limit 2+41, -42)

Any FM/CSA Approved Intrinsically Safe Apparatus

TZIDC - 120/220

+11
-12
+05
-06
+51
-52
+41
-42

Circuit for shutdown function (terminal +55 and -66)

Circuit for digital position feedback with proximity switches (terminals Limit 1+51, -52, resp. Limit 2+41, -42)

Any FM/CSA Approved Terminator (may not be necessary for Entity Installations)

NO CHANGE WITHOUT NOTICE TO FM/CSA

Page: 1 of 3

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Name</th>
<th>Time</th>
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<td>27.03.03</td>
<td>Them.</td>
<td>FM/CSA-Control-Document</td>
<td>/</td>
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ABB Automation Products
Dreg-No. / Part-No. 901265

Rev. Chang Date Name
3 Rev.2 26.06.06 Thie.
2 Rev.1 22.05.06 Thie.
1 Rev.0 27.03. Thie.

Superseded Dwg.: 17
Part Class:
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 (Vmax), the current (I(max)) and the power (P) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (C) and inductance (L) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10 μH 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 (Uo, Voc, Vt) 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 μA for each connected device. Separately powered equipment needs a galvanic Isolation to ensure 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: 0.0...200 nF / km
- C = C’ line/line + 0.5C’ line/screen, if both lines are floating
- C = C’ line/line + C’ Line/screen, if the screen is connected to one line
- Length of spares 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 = 0...100 Ω
  C = 0...2.2 μF.

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.
Installation Notes For FISCO and Entity Concepts:

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:
   \[ U_0 \text{ or } V_0 \leq I_{\text{max}}, \quad I_0 \text{ or } I_{\text{ac}} \text{ or } I_{\text{dc}} \leq I_{\text{max}}, \quad P_0 \leq P_{\text{max}}, \quad C_A \text{ or } C_{\text{dc}} \geq \sum C + \sum C \text{ cable} \]
   For inductance use either \( L_0 \geq \sum L_1 + \sum L \text{ cable} \) or \( L_0 / R_0 \leq (L_0 / R_0 \text{ or } L_0 / R_0) \) and \( I_{\text{ac}} / R_0 \leq (L_0 / R_0 \text{ or } L_0 / R_0) \)

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:
   \[ U_0 \text{ or } V_0 \leq I_{\text{max}}, \quad I_0 \text{ or } I_{\text{ac}} \text{ or } I_{\text{dc}} \leq I_{\text{max}}, \quad \]
   \[ I_0 \text{ or } I_{\text{ac}} \text{ or } I_{\text{dc}} \leq I_{\text{max}}, \quad P_0 \leq P_{\text{max}} \]

3. Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.

4. Installation should be in accordance with ANSI/ISA RF12.5 (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.

5. The configuration of associated Apparatus must be Factory Mutual Research /Canadian Standards Association Approved under the associated concept.

6. Associated Apparatus manufacturer’s installation drawing must be followed when installing this equipment.

7. No revision to drawing without prior Factory Mutual Research Approval/Canadian Standards Association.

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.

NONINCENDIVE, CLASS 1, 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.

<table>
<thead>
<tr>
<th>Rev</th>
<th>Date</th>
<th>Time</th>
<th>Name</th>
<th>Title</th>
<th>Scale</th>
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<td>22.05.06</td>
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<td>ABB Automation Products</td>
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<td>1</td>
<td>27.03.03</td>
<td>Thue.</td>
<td></td>
<td>Supersedes Dwg. 901265</td>
<td></td>
</tr>
</tbody>
</table>

Drw.-No. (Part No.) 901265
7 Electrical connections

Fig. 6: Screw terminals, overview

1  Not assigned
2  Digital position feedback, either proximity switches or 24 V microswitches
3  Same as 2
4  Bus connector
5  Grounding screw
Electro-Pneumatic Positioner TZIDC-220
for FOUNDATION Fieldbus, Flameproof

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 ½” or M20 x 1.5
B Pneumatic connections, NPT ¼” -18 or G1/4”
Electro-Pneumatic Positioner TZIDC-220
for FOUNDATION Fieldbus, Flameproof

Fig. 10: Bottom view
A Pneumatic connections, NPT 1/4"-18 or G1/4"

Fig. 11: Mounting drawings
Mounting to linear actuators to DIN / IEC 534
Mounting to rotary actuators to VDI / VDE 3845
*) Dimensions A and B are dependent on the rotary actuator
Fig. 12: Positioner TZIDC-220 with pressure gauge block and filter regulator
9 Ordering information

<table>
<thead>
<tr>
<th>Variants for Electro-Pneumatic Positioner TZIDC-220</th>
<th>Main Code</th>
<th>Add. Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case/Mounting</td>
<td>V18350</td>
<td>XX</td>
</tr>
<tr>
<td>Case made of aluminium, varnished, for mounting to linear actuators acc. DIN / IEC 534 / NAMUR or to rotary actuators acc. VDI / VDE 3845</td>
<td>X X X X X X X X</td>
<td>XX</td>
</tr>
<tr>
<td>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</td>
<td>1 0</td>
<td></td>
</tr>
<tr>
<td>Case made of aluminium, varnished, for integral mounting to control valves (see dimensional drawing)</td>
<td>2 0</td>
<td></td>
</tr>
<tr>
<td>Case made of aluminium, varnished, with mechanical position indicator, for integral mounting to control valves (see dimensional drawing)</td>
<td>3 0</td>
<td></td>
</tr>
<tr>
<td>Case made of aluminium, varnished, for mounting to rotary actuators acc. VDI / VDE 3845 with extended rotation angle up to 270°</td>
<td>4 0</td>
<td></td>
</tr>
<tr>
<td>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°</td>
<td>5 0</td>
<td></td>
</tr>
<tr>
<td>Case made of aluminium, varnished, for integral mounting to control valves</td>
<td>6 0</td>
<td></td>
</tr>
<tr>
<td>Case made of aluminium, varnished, with mechanical position indicator, for integral mounting to control valves</td>
<td>7 0</td>
<td></td>
</tr>
<tr>
<td>Case made of aluminium, varnished, for mounting to rotary actuators acc. VDI / VDE 3845 with extended rotation angle up to 270°</td>
<td>8 0</td>
<td></td>
</tr>
</tbody>
</table>

Operation

With operator panel and display integrated in the enclosure cover | 1

Explosion Protection

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

Output / Safe Position (in case of an electrical power failure)

Single acting, fail safe | 1
Single acting, fail freeze | 2
Double acting, fail safe | 3
Double acting, fail freeze | 4

Connections

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
Electro-Pneumatic Positioner TZIDC-220 for FOUNDATION Fieldbus, Flameproof

| TZIDC-220 Electro-Pneumatic Positioner, with flameproof enclosure, for FOUNDATION fieldbus, intelligent, software-configurable | V18350 | X | X | X | X | X | X | X | XX |

**Variant digit No.** | **Main Code** | **Add. Code**
--- | --- | ---
1 - 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | XX

**Optional Mechanical Kit for Digital Position Feedback**
- Without
- Mechanical kit for digital position feedback with proximity switches SJ2-SN (NC or logical 1)
- Mechanical kit for digital position feedback with 24 V AC / DC

<table>
<thead>
<tr>
<th>Design (Varnish / Coding)</th>
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</thead>
<tbody>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>Others</td>
</tr>
</tbody>
</table>

**Device Identification Label**
- Without
- Label including text, with separate sticker logical 1)
- Label including text, with separate stainless steel label 11.5 x 60 mm (0.45 x 2.36

<table>
<thead>
<tr>
<th>Documentation Language</th>
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</table>

**Certificate of Compliance**
- Certificate of compliance with the order acc. EN 10204-2.1 (DIN 50049-2.1) with item description
- Test report 2.2 acc. EN 10204 (DIN 50049-2.2)

**Inspection Certificate**
- Inspection certificate 3.1 acc. EN 10204

Continued on next page

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

<table>
<thead>
<tr>
<th>Accessories</th>
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<td>Mounting bracket</td>
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<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 80/20 mm</td>
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<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 80/30 mm</td>
<td>319604</td>
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<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 130/30 mm</td>
<td>319605</td>
</tr>
<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 130/50 mm</td>
<td>319606</td>
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<tr>
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<tr>
<td>EDP300 / TZIDC Lever 30 mm</td>
<td>7959151</td>
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<tr>
<td>EDP300 / TZIDC Lever 100 mm</td>
<td>7959152</td>
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<td>Adapter</td>
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<tr>
<td>EDP300 / TZIDC Adapter (shaft coupler) for rotary actuators (mounting to VDI / VDE 3845)</td>
<td>7959110</td>
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<td>EDP300 / TZIDC Form - locking shaft adapter</td>
<td>7959371</td>
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<td>Pressure gauge block</td>
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<td>TTZIDC Pressure gauge block, 0.6 MPa, single acting, Rc 1/4 connection</td>
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<td>TZIDC Pressure gauge block, 0.6 MPa, single acting, NPT 1/4 connection</td>
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<td>TZIDC Pressure gauge block, 0.6 MPa, double acting, G 1/4 connection</td>
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<tr>
<td>TZIDC Pressure gauge block, 0.6 MPa, double acting, Rc 1/4 connection</td>
<td>7959359</td>
</tr>
<tr>
<td>TZIDC Pressure gauge block, 0.6 MPa, double acting, NPT 1/4 connection</td>
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<td>Filter regulator</td>
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<td>TZIDC Filter regulator, brass, connections thread G 1/4, incl. material for mounting to pressure gauge block</td>
<td>7959119</td>
</tr>
<tr>
<td>TTZIDC Filter regulator, brass, connections thread 1/4-18 NPT, incl. material for mounting to pressure gauge block</td>
<td>7959120</td>
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<td>Attachment kit</td>
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<tr>
<td>EDP300 / TZIDC Attachment kit for linear actuators, stroke 10 ... 35 mm</td>
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<td>EDP300 / TZIDC Attachment kit for linear actuators, stroke 20 ... 100 mm</td>
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<td>EDP300 / TZIDC Attachment for remote sensor control unit (for wall or pipe mounting)</td>
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<td>EDP300 / TZIDC Attachment kit for Fisher 1051-30, 1052-30</td>
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<td>EDP300 / TZIDC Attachment kit for NELES BC6-20, B1C6-20, B1J8-20, B1J8-20</td>
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<td>EDP300 / TZIDC Mounting Kit Uhde Type 4 Stroke 400 mm cropped</td>
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<td>Cable gland</td>
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<td>TZIDC-2xx 1 x Ex d cable gland M20 x 1.5, 1 pipe plug M20 x 1.5, securing adhesive</td>
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<td>TZIDC-2xx 2 x Ex d cable glands M20 x 1.5, securing adhesive</td>
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<td>TZIDC-2xx 1 x Ex d cable gland 1/2 in. NPT, 1 pipe plug 1/2 in. NPT, securing adhesive</td>
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<td>TZIDC-2xx 2 x Ex d cable glands 1/2 in. NPT, securing adhesive</td>
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