

# EDP300 / TZIDC DATASHEET

JUNHO 2013

# PositionMaster EDP300 Electro-Pneumatic Positioner

Compact, well-proven, and flexible



High air capacity

Diagnostics capability

Resistant to overpressure

Robust and environmentally ruggedized

Easy to commission

Approvals for explosion protection

- ATEX
- IECEx
- FM / CSA
- GOST

For SIL2 safety loop

Extended diagnostics

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Brief description

The PositionMaster EDP300 is an electronically configurable positioner with communication capabilities designed for mounting to pneumatic linear or part-turn 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.

#### 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 setpoint 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 setpoint, 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.

#### “Fail-safe” function

If the electrical supply power 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.

#### “Fail-freeze” function

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

#### Operation

The positioner has a built-in LCD-indicator with a multi-line LCD display and 4 pushbuttons for commissioning, configuration, and monitoring during live operation. Alternatively, the appropriate DTM/EDD can be used via the available communication interface.

#### Communication

The positioner supports HART5 and HART7 communication.

#### Inputs / Outputs

In addition to its input for the analog position setpoint, the positioner is equipped with a digital input which can be used to activate control system functions in the device. A digital output allows you to output collective alarms or fault messages.

#### Modular design

The basic model can be enhanced at any time by retrofitting optional equipment.

Option modules for analog and digital feedback, an emergency shutdown module, and pressure sensors for valve diagnostics can be installed.

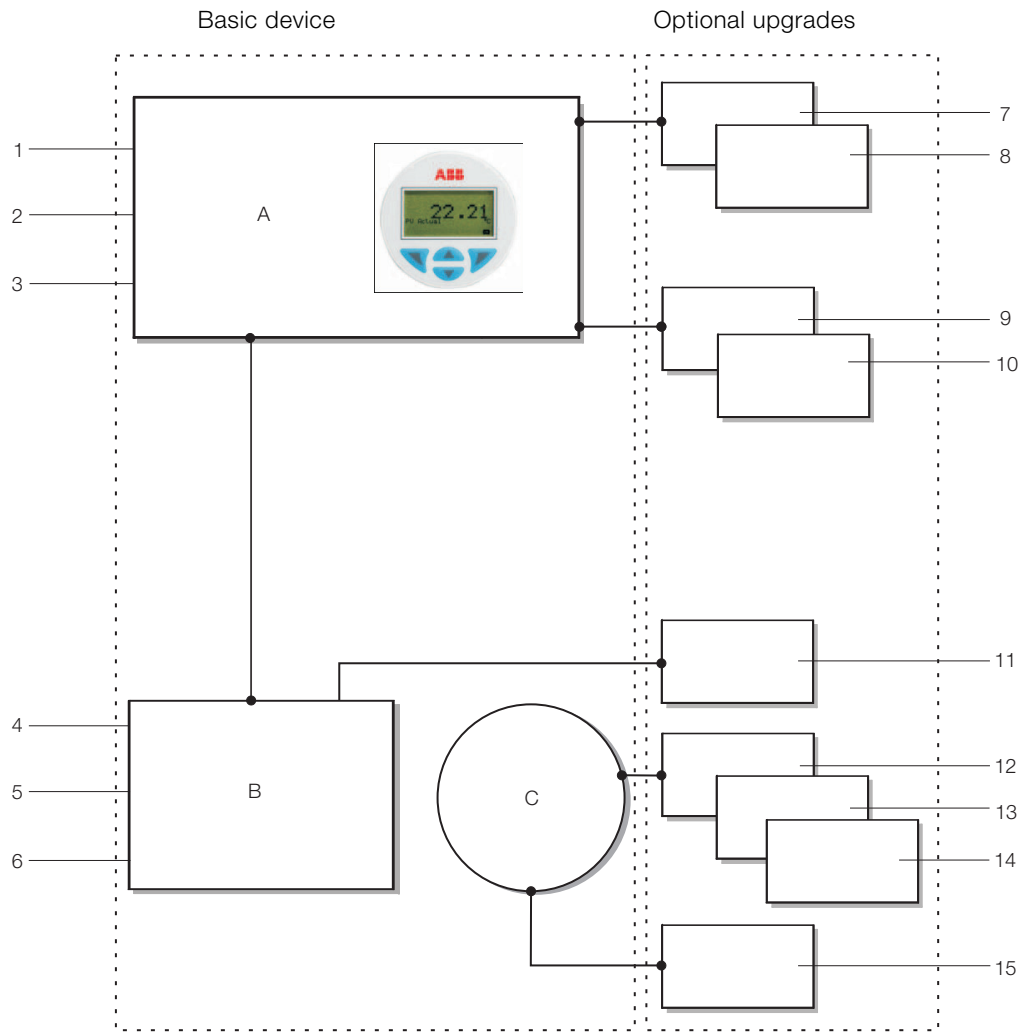
A module for a universal analog input can also be installed to which any device supplying a 4 ... 20 mA signal can be connected.

Additionally, a mechanical position indicator, proximity switches or 24 V microswitches are available for indicating the position independently of the mother board function.

#### Diagnostics

The positioner has three optional pressure sensors which can be used for reliable diagnostics of the valve, the pneumatic drive, and the positioner.

## Schematic representation



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Fig. 1: Schematic diagram of the positioner

A Electronic | B Pneumatic | C Position sensor |

1 4 ... 20 mA / bus connection | 2 Digital input | 3 Alarm output | 4 Supply air | 5 Output 1 | 6 Output 2 |

7 Analog feedback | 8 Binary feedback | 9 Shutdown module | 10 Universal input | 11 Pressure sensor |

12 Mechanical end position switch 24 V microswitch | 13 Proximity switches (NC) | 14 Proximity switches (NO) |

15 Optical position indicator

### IMPORTANT (NOTE)

With optional upgrades either the “mechanical feedback with proximity switches” (13 or 14) or the “mechanical feedback with microswitch 24 V” (12) can be used.

Only two different plug-in modules can ever be used.

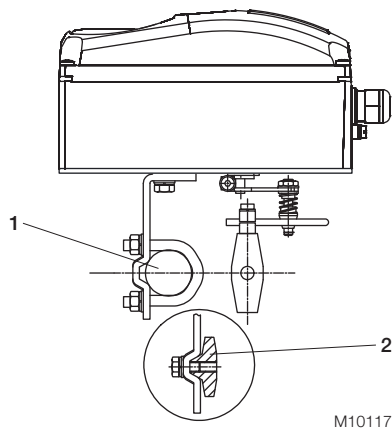
# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Mounting versions

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

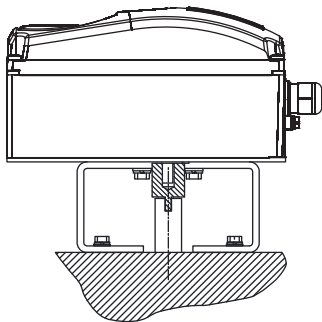
Lateral attachment is in accordance with DIN / IEC 534 (lateral attachment to NAMUR). The required attachment kit is a complete set of attachment material, but does not include the screwed pipe connections and air pipes.



**Fig. 2: Mounting to linear actuators to DIN/IEC 534**  
1 Columnar yoke | 2 Cast iron yoke

#### 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.



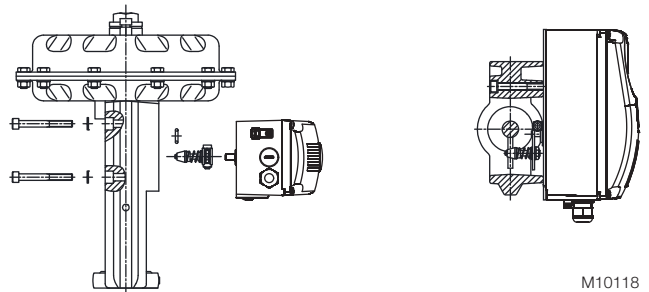
**Fig. 3: Mounting to rotary actuators to VDI/VDE 3845**

#### Integral mounting to control valves

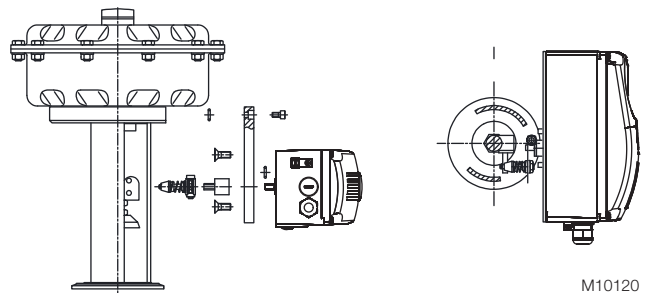
The positioner featuring standard pneumatic action is available as an option for integral mounting.

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.



**Fig. 4: Integral mounting to control valves**



**Fig. 5: Integral mounting to control valves by using an adapter panel**

#### Special actuator-specific mounting

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

## Device parameters

### General remarks

Microprocessor-based position control in the positioner optimizes control. The positioner features high-precision control functions and high operational reliability. Due to their elaborate structure and easy accessibility, the device parameters can be quickly adapted to the respective application.

The total range of parameters includes:

- Operating parameters
- Adjustment parameters
- Monitoring parameters
- Diagnostics parameters
- Maintenance parameters

### Operating parameters

The following operating parameters can be set manually if required:

#### Setpoint signal

0 ... 100 % freely selectable for split-range operation

For 4 ... 20 mA and HART version:

- Signal min. 4 mA, max. signal 20 mA (0 ... 100 %)
- Min. range 20 % (3.2 mA)
- Recommended range > 50 % (8.0 mA)

Action (setpoint signal)

Increasing:

Position value 0 ... 100 % = direction 0 ... 100 %

Decreasing:

Setpoint signal 100 ... 0 % = direction 0 ... 100 %

Characteristic curve (travel = f {setpoint signal})

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

### 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 parameter can be set separately for each end position. When the respective configured limit value is exceeded, the shut-off function causes immediate travel of the actuator until reaching the set end position.

When the shut-off value is set to "0", the position is further controlled, even in the respective 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.

### Switching points for the position

You can use these parameters to define two position limits for signaling (see option "Module for digital position feedback").

### Alarm output

The alarms generated in the positioner can be polled via the digital output as a collective alarm.

The desired information can be selected via the LCD display or remotely via the configuration program.

The output can be set to "active high" or "active low", as required.

### Digital input

For the digital input, one of the following safety options can be selected. You may use the LCD display or configuration program to select an option.

- No function (default)
- Move to position substitute value (freely selectable)
- Start "Partial Stroke Test"
- Ventilate output 1, evacuate output 2
- Ventilate output 2, evacuate output 1
- Service required
- Move to 0 % position
- Move to 100 % position
- Hold previous position
- Disable local configuration
- Disable local configuration and operation
- Disable all access (no local or remote access via a PC)

The selected function is activated once the 24 V DC signal is no longer applied (< 11 V DC).

# PositionMaster EDP300

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### Adjustment parameters

The positioner has a special function for automatic adjustment of the parameters. Additionally, the control parameters can be set automatically (in adaptive control mode) or manually to optimally adapt them to the process requirements.

### Zone

Upon reaching this value, the position is readjusted more slowly until the dead band is reached.

### Dead band (sensitivity)

When reaching the dead band, the position is held.

### Display 0 ... 100 %

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

### Diagnostics

Various functions for permanent operational monitoring are implemented in the PositionMaster EDP300 operating program. The following states will be detected and indicated, e. g.:

- Setpoint signal out of range 0 ... 100 % or 4 ... 20 mA
- Position out of the adjusted range
- Positioning time-out (adjustable time parameter)
- Position controller inactive
- Counter limit values exceeded (can be set via DTM/EDD)

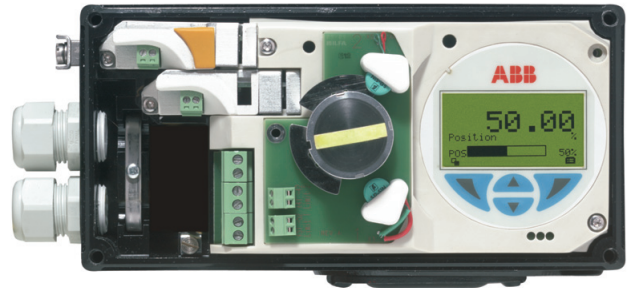
### LCD display

The LCD indicator has a cover to protect against unauthorized operation.

Commissioning the positioner is especially easy. Autoadjust is triggered by pressing just a few pushbuttons. Detailed configuration knowledge is not necessary in order to start the device.

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

Besides this standard function, a customized “Autoadjust” function is available. The function is launched either via the LCD display or HART communication.



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Fig. 6: Open positioner with view of LCD indicator

The built-in LCD indicator with four pushbuttons supports the following functions:

- Operational monitoring
- Manual intervention during live operation
- Device configuration
- Fully automatic commissioning
- Display of diagnostic messages



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Fig. 7: LCD indicator with pushbuttons and LCD display

A menu-controlled configuration is available via the pushbuttons on the device.

The multi-line LCD indicator is permanently updated and adapted during operation to provide the user with optional information as relevant.

During control operation (control with or without adaptation) the following data can be called up by pressing the pushbuttons briefly:

- Position Pos [%]
  - Position Pos [°]
  - Setpoint SP [%]
  - Setpoint SP [mA]
  - Control deviation DEV [%]
  - Electronics temperature [°C, °F, °R, K]
  - Supply pressure PIN [unit]
  - Pressure output 1 PY1 [unit]
  - Pressure output 2 PY2 [unit]
  - Differential pressure DP [unit]
  - Universal input value UIN [unit]
  - Malfunctions, alarms, messages
- The possible reason is also displayed, along with the recommended remedial action.
- In the event of an error, a message consisting of an icon and text (e.g., electronics) appears at the bottom of the process display. The text displayed provides information about the area in which the error has occurred.
- The error messages are divided into four groups in accordance with the NAMUR classification scheme:

Symbol	Description
	Error / Failure
	Functional check
	Out of specification
	Maintenance required

(The group assignment can only be changed using a DTM or EDD.)

Additionally, the error messages are divided into the following areas:

Area	Description
Actuator	Diagnostics messages affecting the valve or the pneumatic actuator
Operation	Diagnostics messages affecting the operation of the positioner
Process	Diagnostics messages relating to the process and displaying problems or states
Sensor	Alarms informing of problems affecting the reading of the valve position
Electronic	Displays errors in the device electronics
Configuration	Detects if the positioner configuration is missing or faulty

Histograms recording

- Positioning time-outs
- Valve movements
- Valve strokes
- Most used valve position
- Universal input

Access to extended monitoring parameters is possible via HART communication, the DTM, and the EDD.

The diagnostics parameters in the operating program provide information about the operating conditions of the actuator.

For example:

- Dead band time limit
- Leakage detection
- Temperature monitoring
- Stiction detection
- Sliding friction detection
- Hysteresis
- Valve seat wear

From this information the operator can derive what maintenance work is required, and when.



# PositionMaster EDP300 Electro-Pneumatic Positioner

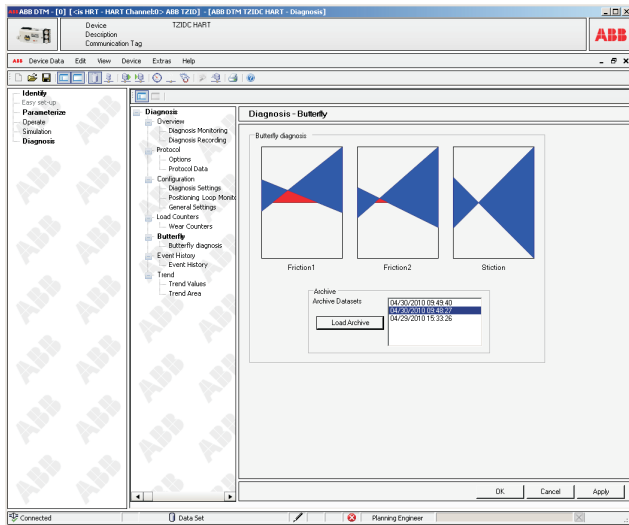
## Diagnostics with DTM

Access to extended monitoring parameters is possible via HART communication, in particular the DTM (reduced functions only with the EDD).

## Butterfly diagnostics

The trend (which relates to a number of relevant positioner parameter values) can be used to draw conclusions about the stiction and friction of a valve with a view to enabling preventive maintenance.

If the diagnostic parameters have changed, a triangle is displayed in signal color. The color and size of this triangle represent the direction and scope of the change.

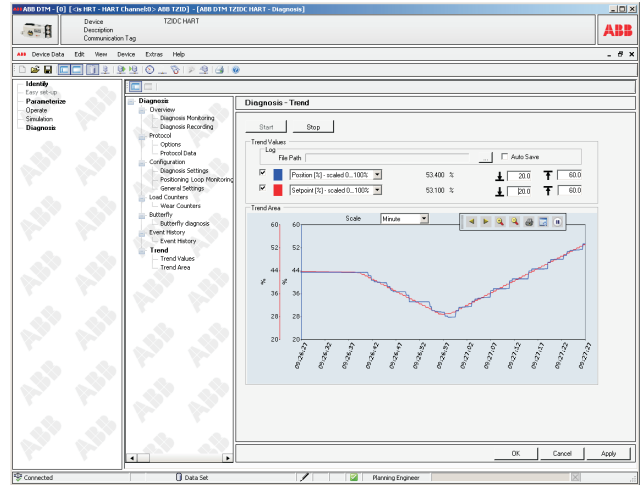


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Fig. 8: Example for increased friction

## Online trend archive

The online trend archive does not merely indicate the current setpoint and actual value, but also the associated patterns, which can stretch back over a matter of hours. When you start the online trend archive, the saved data is read out and transmitted at such a high transmission rate (100 ms via HART) that the latest data is displayed in next to no time.

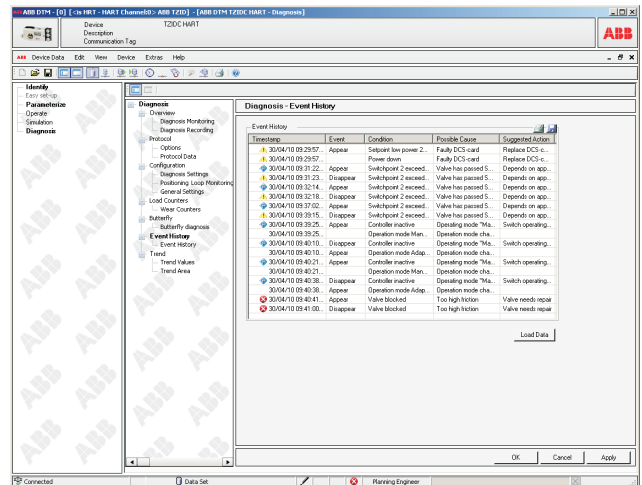


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Fig. 9: Example for online trend archive

## Event history

Up to 100 events are saved in the event history in the device. The time each event occurred is also displayed, along with a suggested approach to solving the problem. The limit values for (pre-)alarms, e.g. a friction alarm, can be set.



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Fig. 10: Example event history

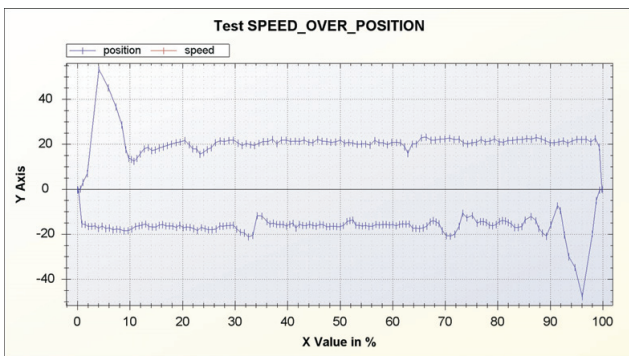
### Valve signature (only with pressure option)

When the valve signature starts, the entire valve operating range is covered for the "open and closed directions". High-resolution plots are generated for the pressure patterns at the diagnostic pressure sensors. In addition, the signal waveform for the universal input is recorded. Once the signature has expired, the parameters selected by the user are loaded from the device and displayed. Depending on the quantity of data selected, it may take several minutes to transfer all the parameter values. Up to 5 valve signatures can be saved in the device; these can be compared so that valve diagnostics can be performed for the purpose of preventive maintenance.

### Speed in relation to position test

When the "Speed in relation to position test" is started, the entire valve operating range is covered for the valve's "open and closed directions" in an uncontrolled manner using an adjustable degree of openness for the pneumatics. The positioning times for opening and closing the valves are displayed.

The pattern of the graph provides information about friction in the valve and actuator. Up to 5 archived graphs can be saved in the device; these can be compared so that valve diagnostics can be performed for the purpose of preventive maintenance.



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Fig. 11: Example of Speed Over Position Test

### Step response test

The step response allows the user to define the start position for the step change. When the start button is pressed, a setpoint step change is generated internally and a high-resolution plot is created for the valve position, pressure patterns, etc. At the end of the step response, the actuator automatically moves to the defined start position and reverts to control mode. Depending on the quantity of data selected, it may take several minutes to transfer all the parameter values and display them in the form of a graph.

The pattern of the graph provides information about friction in the valve and actuator. Up to 5 archived graphs can be saved in the device; these can be compared so that valve diagnostics can be performed for the purpose of preventive maintenance.

### Valve seat test

During the valve seat test, the actuator is moved in the direction of the 0 % position with maximum force.

If the user-defined tolerance window for the 0 % position or the universal input signal is exceeded, this will be shown as an error. This error may be indicative of deposits or extreme wear of the valve seat.

If an ultrasonic sensor is used at the universal input for the purpose of measuring noise at the valve seat, even minor leakage at the valve fitting can be detected.

At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.

### Leakage test (only with pressure option)

During the leakage test, the positioner closes all pneumatic outputs. Then, if the valve position changes or there is a change in the pressure patterns at the diagnostic pressure sensors, the positioner will be able to detect leakage. It outputs a message indicating the area of the pneumatic piping or actuator that is leaking.

At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Partial Stroke Test

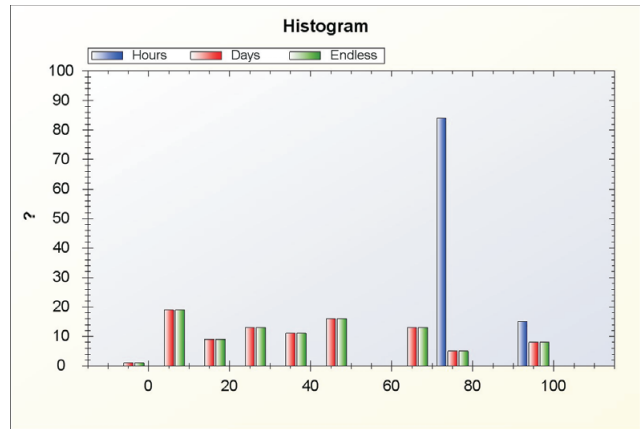
The Partial Stroke Test is used to check the function of the safe position of ESD (emergency shutdown) valves. The test can be started both locally on the device, time-controlled or using the DTM. The positioner evacuates output 1 until the position change defined in advance occurs. If this does not happen within the set time, an alarm can be output. This helps prevent unexpected failures of the valve. At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode. There are two separate parameters available for reducing the speed at which the valve moves in the corresponding direction.

### Drag indicator

This diagram shows the minimum, maximum, and average values for a selectable parameter in 3 different intervals, which are offset in relation to one another. The drag indicator trend, which is plotted against time, makes it possible to plan preventive action so that a failure in terms of the valves and fittings can be avoided.

### Trend histogram

This histogram shows, for example, the position range of the valve within which control is most frequently performed. The parameters to be displayed can be selected by the user. This graph can be used, for example, to determine the most commonly used valve position so that the valve design can be evaluated. The friction within a valve range can be determined on the basis of the differential pressure, dead band time limit alarms, etc.



M10122

Fig. 12: Example trend histogram

### Trend diagram

This diagram indicates in which valve positioning range the greatest control deviation has occurred. This allows you to derive the valve friction, actuator size or supply air pressure.

#### Friction detection test (only with pressure option)

Once the function is initiated, a high-resolution plot of the differential pressure and universal input signal is generated for the valve's entire operating range.

At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.

Limit values for the dynamic friction, stiction and universal input signal can be defined, using 11 reference points in each case. If the corresponding alarms are also activated in "Diagnostics -> Configure diagnostics", alarms can be output during operation as soon as the defined limit values are overshoot.

Further diagnostic parameters are possible with the optional pressure sensors. They include:

- Supply air pressure too low
- Supply air pressure too high
- Pressure shocks in the supply air
- Valve signature
- Leakage localization

Additionally, limit values can be defined for these parameters. When they are exceeded, an alarm is reported.

The following values are e.g. determined:

- Number of movements performed by the actuator
- Total travel

#### Test cycles

Characteristic curves mapping a setpoint cyclically and internally are stored in the device. The DTM can be used to track the position of the actuator. This provides a means of checking the dynamic response of the entire actuator, for example, and determining the limit frequency automatically.

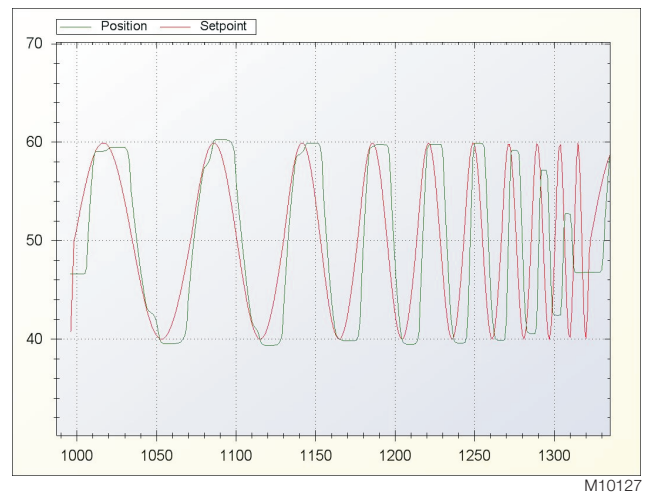


Fig. 13: Example test cycles

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Communication

#### DTM

The DTM (Device Type Manager) for the positioner PositionMaster EDP300 is based on FDT/DTM technology (FDT 1.2/1.2.1) and can be either integrated into a control system or loaded on a PC with DAT200 Asset Vision Basic. This allows you to work with the same user interface in the commissioning phase, during operation, and for service tasks involving monitoring the device, setting parameters, and reading out data.

Communication is based on the HART protocol. Reading data out from the device has no effect on active operation.

Newly set parameters are saved in the non-volatile memory directly upon download to the device, and become active immediately.

#### EDD

The EDD (Electronic Device Description) is used to read and modify simple device parameters on handheld terminals or in the vicinity of the system.

## Dimensions

Mounting drawings  
All dimensions in mm (inch)

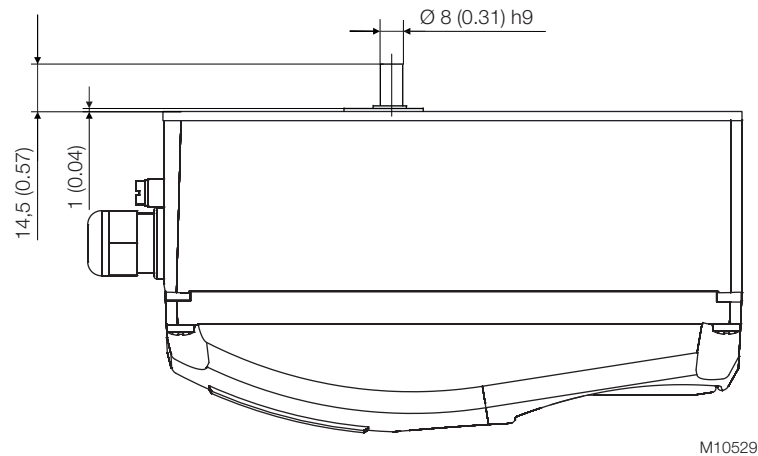


Fig. 14: Top view

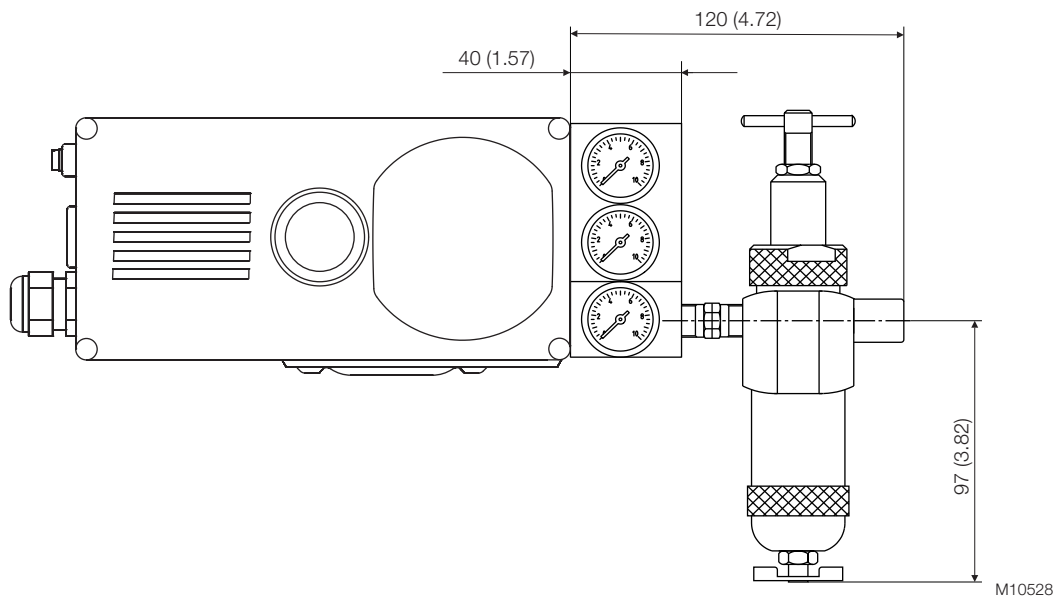
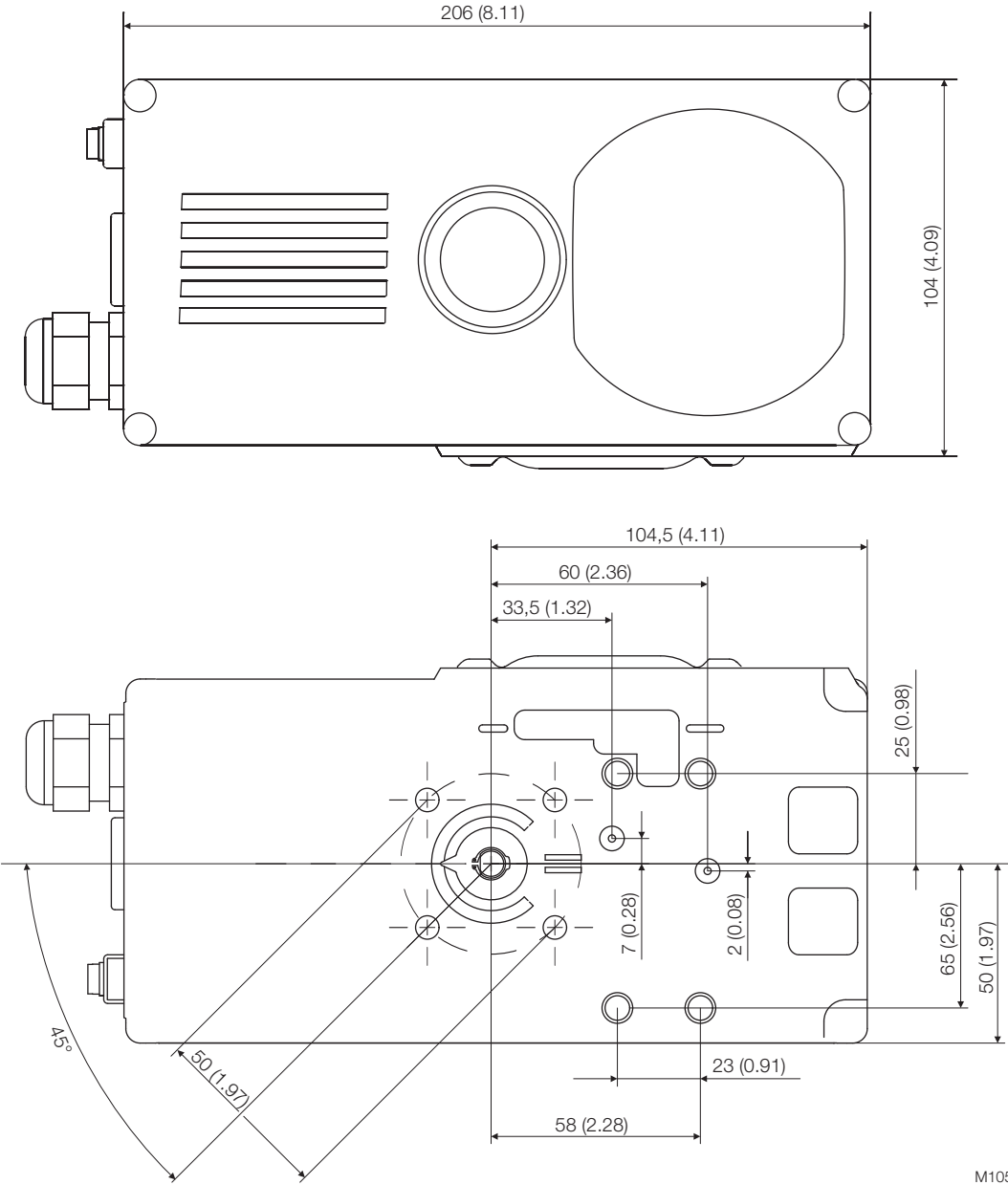


Fig. 15: EDP300 positioner with pressure gauge block and filter regulator mounted

# PositionMaster EDP300

## Electro-Pneumatic Positioner



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Fig. 16: Front and rear views

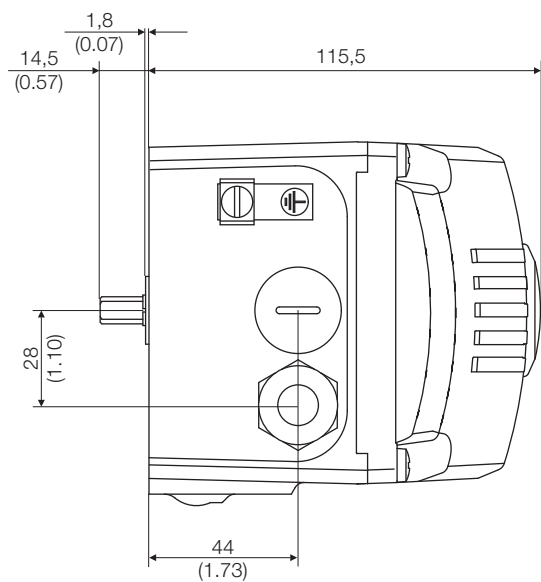
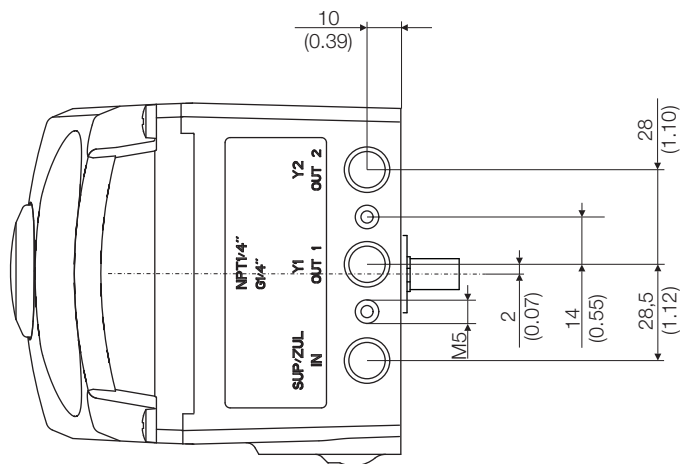
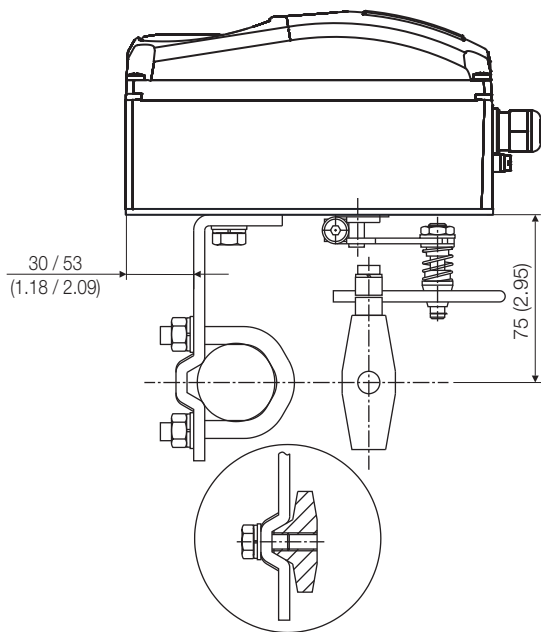


Fig. 17: Side view (from left to right)

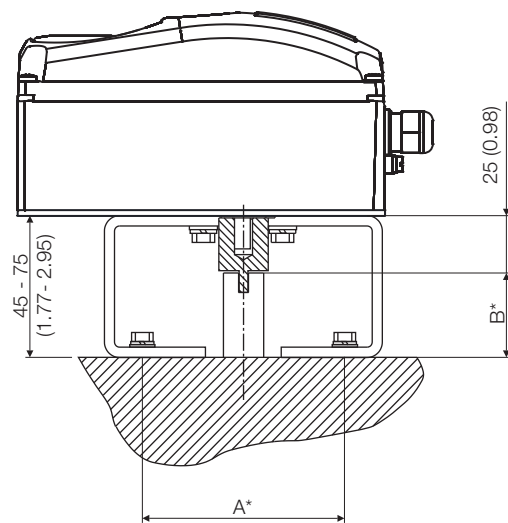


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Fig. 18: Mounting to linear actuators to DIN/IEC 534



M10135

Fig. 19: Mounting to rotary actuators to VDI/VDE 3845

\*) Dimensions A and B are dependent on the rotary actuator



# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Remote sensor dimensions (aluminum housing)

All dimensions in mm (inch)

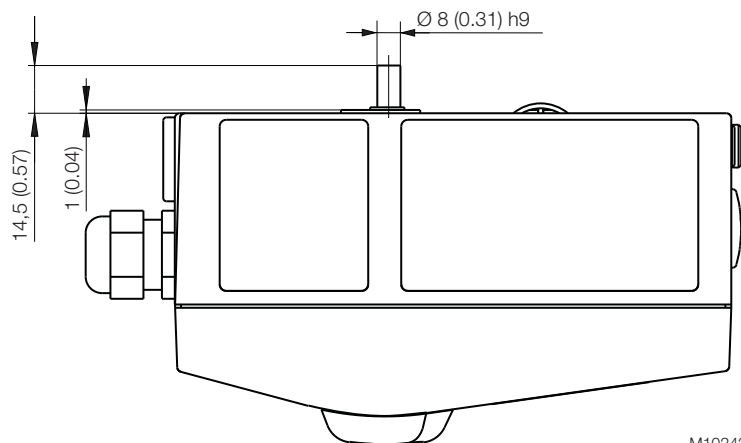


Fig. 20: Top view

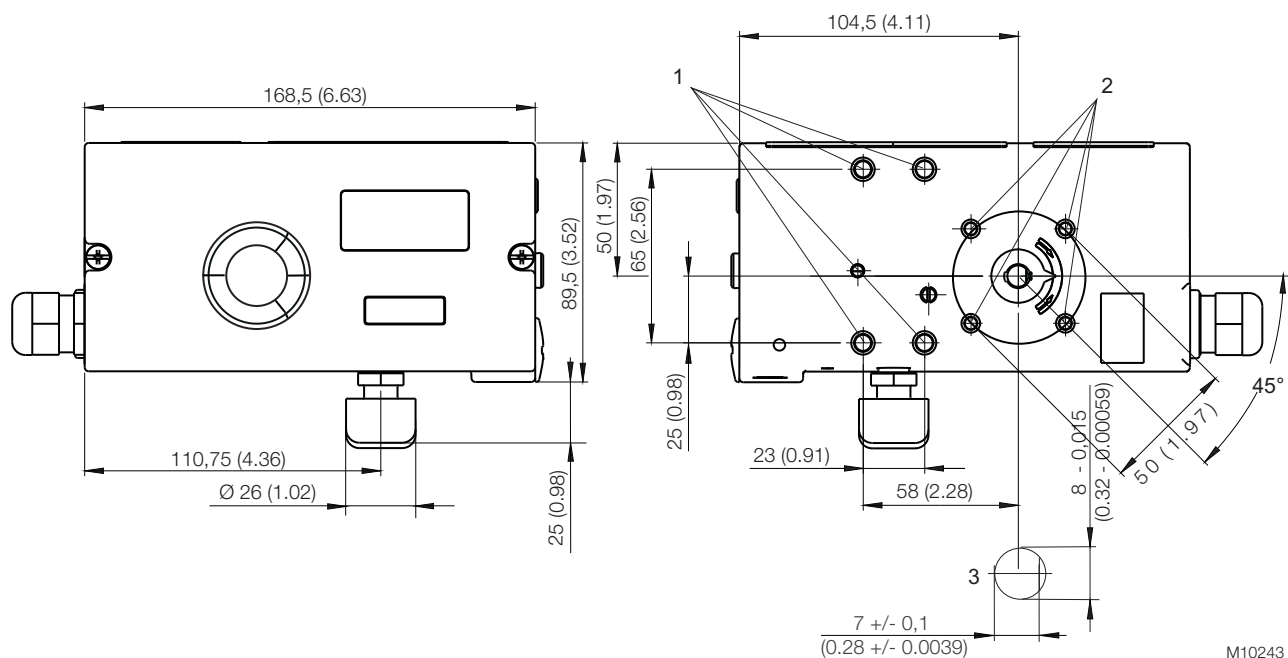


Fig. 21: Front and rear views

1 Threaded hole M8 (10 mm (0.39 inch) deep) | 2 Threaded hole M6 (8 mm deep (0.31 inch)) | 3 Sensor shaft (shown enlarged)

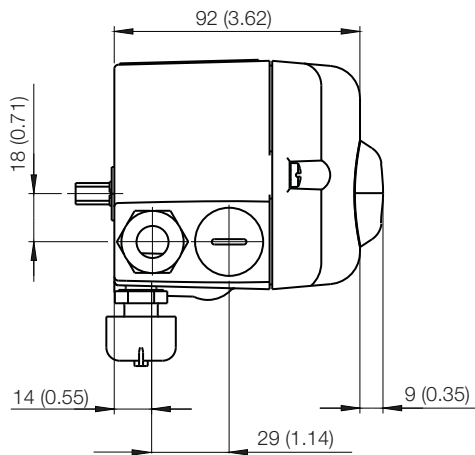
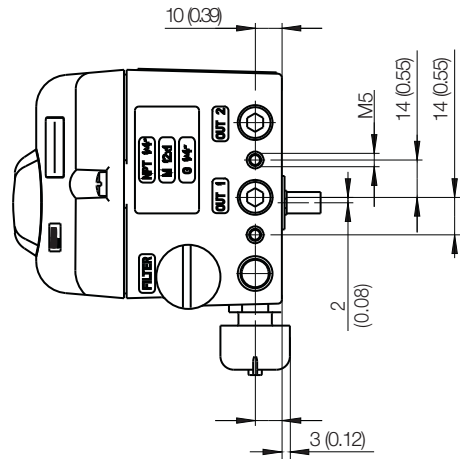
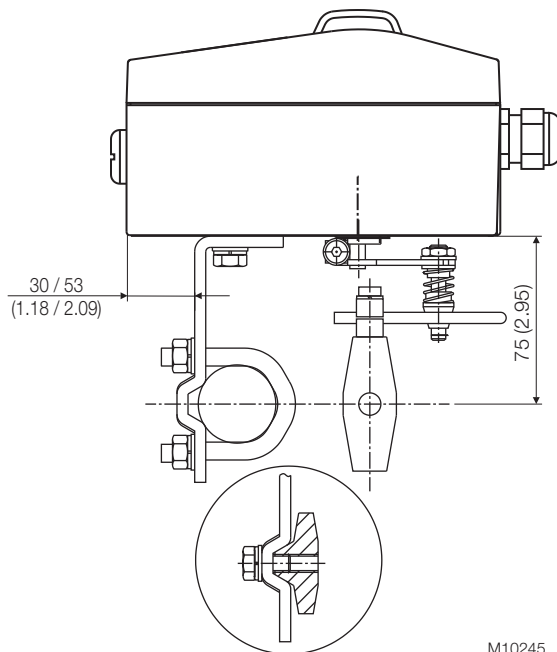


Fig. 22: Side view (from left to right)

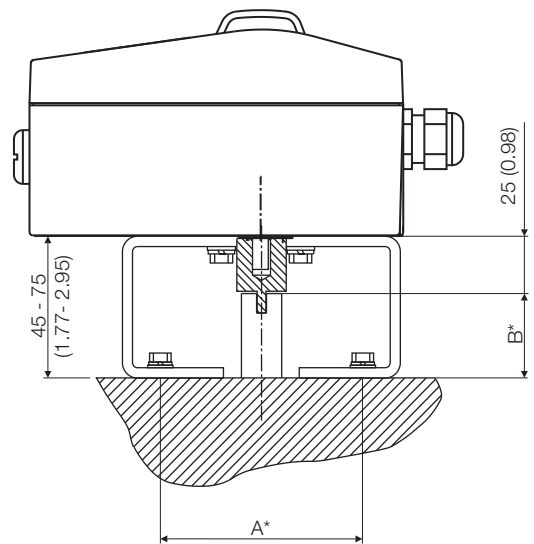


M10244



M10245

Fig. 23: Mounting to linear actuators to DIN/IEC 534



M10246

Fig. 24: Mounting to part-turn actuators to VDI/VDE 3845

\*) Dimensions A and B are dependent on the part-turn actuator

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Electrical connections

#### PositionMaster EDP300 with remote sensor

The PositionMaster EDP300 version with remote sensor includes an adjusted unit with two housings.

Housing 1 (EDP300 control unit) contains the electronics and pneumatics along with the following options (where applicable):

- Analog position feedback
- Digital position feedback
- Shutdown module
- Universal input

Housing 2 (EDP300 remote sensor) contains the position sensor and is suitable for mounting on linear or part-turn actuators. The following options can be installed if required:

- Optical position indicator
- Mechanical feedback contacts (proximity switch or microswitch design).

The two housings can be or are connected to a shielded 3-wire cable. The maximum cable length is 10 m.

For Housing 1 (control unit) an attachment kit is available for pipe and wall mounting (see Accessories).

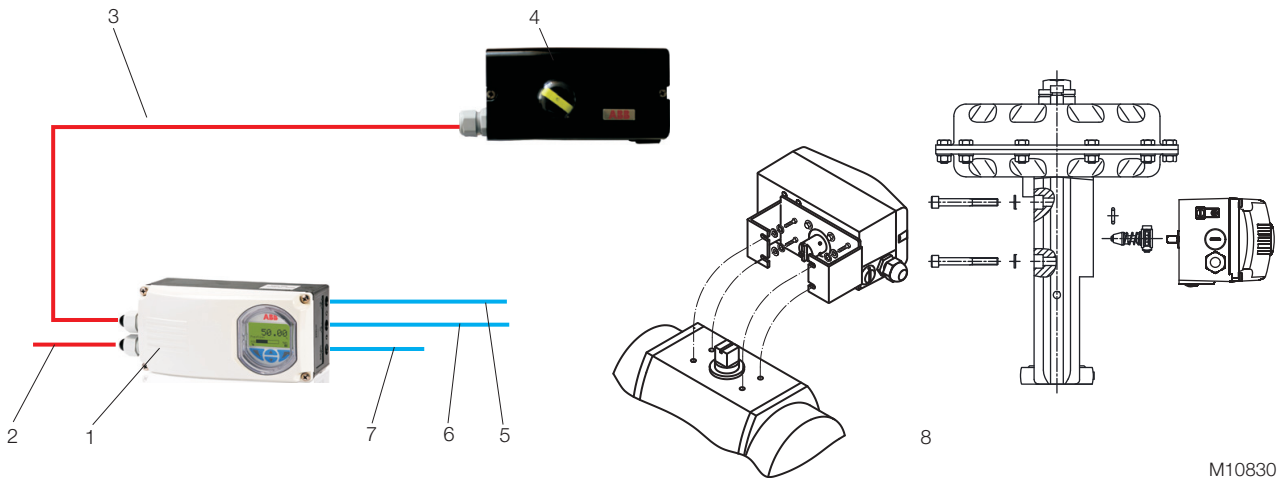
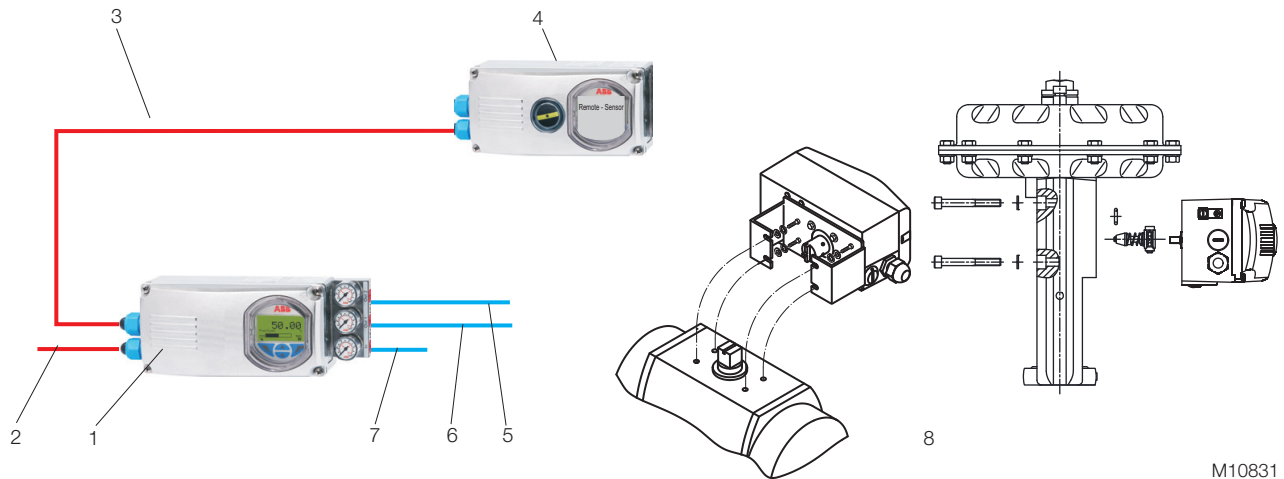


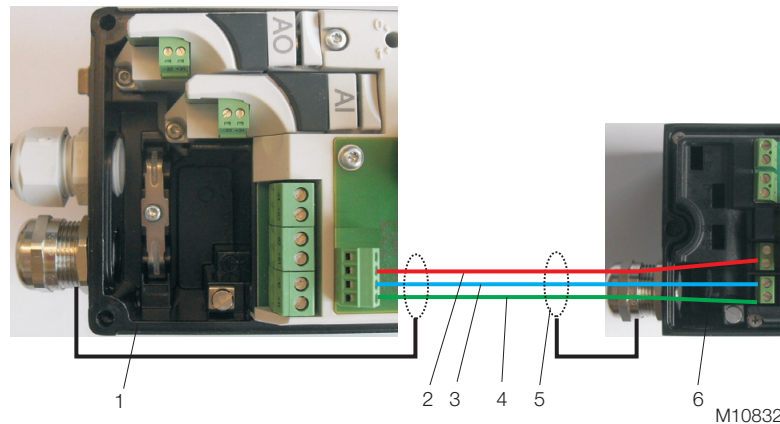
Fig. 25: EDP300 control unit with remote sensor

1 Housing 1 (control unit) | 2 Setpoint signal | 3 Connection cable | 4 Housing 2 (remote sensor) | 5 Pneumatic output 2 | 6 Pneumatic output 1 | 7 Supply air | 8 Pneumatic drive

Optionally, both housings of the “EDP300 stainless steel remote sensor” design are available in stainless steel. The housing dimensions are identical in this case - and the attachment kits are suitable for all versions.



**Fig. 26: EDP300 control unit made of stainless steel with EDP300 remote sensor made of stainless steel**  
 1 Housing 1 (control unit) | 2 Setpoint | 3 Connection cable | 4 Housing 2 (remote sensor) | 5 Pneumatic output 2 |  
 6 Pneumatic output 1 | 7 Supply air | 8 Pneumatic drive



**Fig. 27: Electrical connection**  
 1 EDP300 control unit | 2 Remote sensor connection cable no. 3 | 3 Remote sensor connection cable no. 2 |  
 4 Remote sensor connection cable no. 1 | 5 Shielding | 6 EDP300 remote sensor

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### PositionMaster EDP300 for external remote sensor

In the PositionMaster EDP300 design for remote sensor, the positioner is supplied without position detection.

The housing (EDP300 control unit) contains the electronics and pneumatics along with the following options (where applicable):

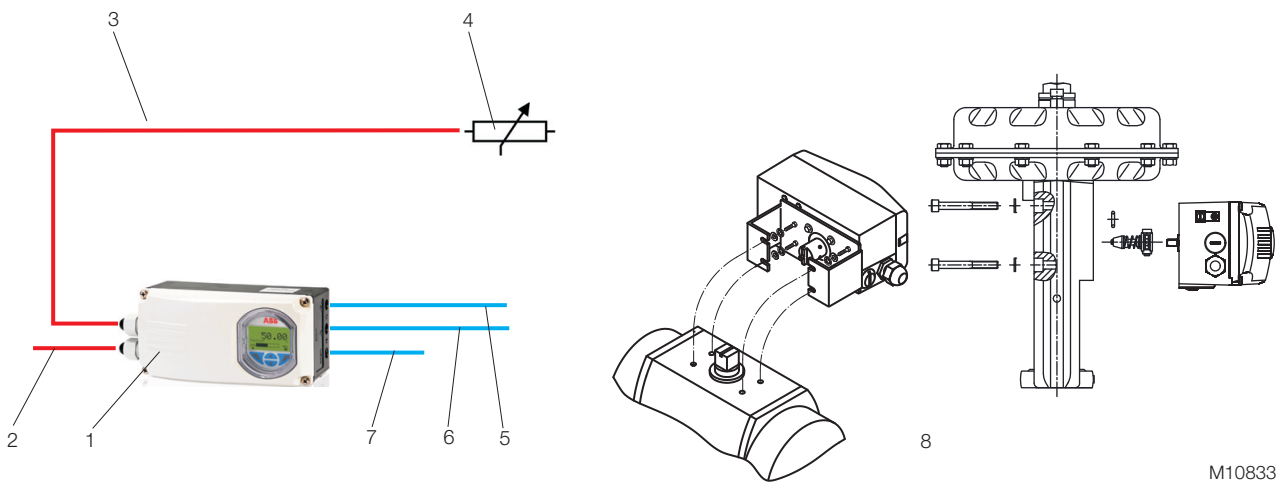
- Analog position feedback
- Digital position feedback
- Shutdown module
- Universal input

The EDP300 for remote sensor can be connected to any position sensor (4 ... 80 kohms).

The length of the shielded 3-core cable must be a maximum of 10 m.

The installation and commissioning is carried out according to the respective chapters in the operating instructions.

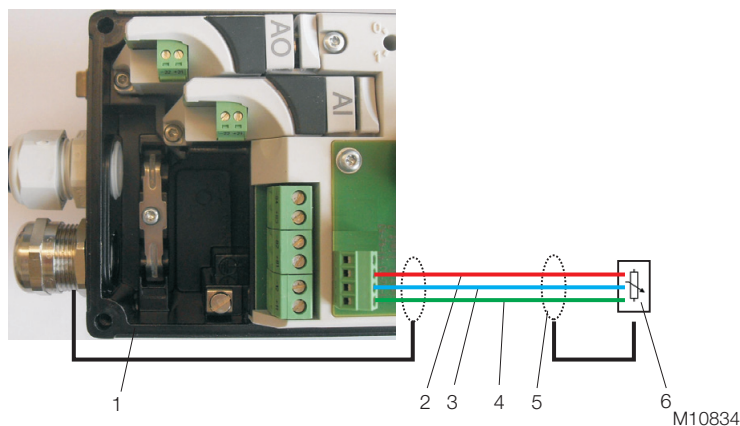
For the housing (EDP300 control unit) an attachment kit is available for pipe and wall mounting. (See Accessories).



M10833

Fig. 28: EDP300 control unit for remote sensor

1 Housing (control Unit) | 2 Setpoint signal | 3 Connection cable | 4 External remote sensor | 5 Pneumatic output 2 |  
6 Pneumatic output 1 | 7 Supply air | 8 Pneumatic drive

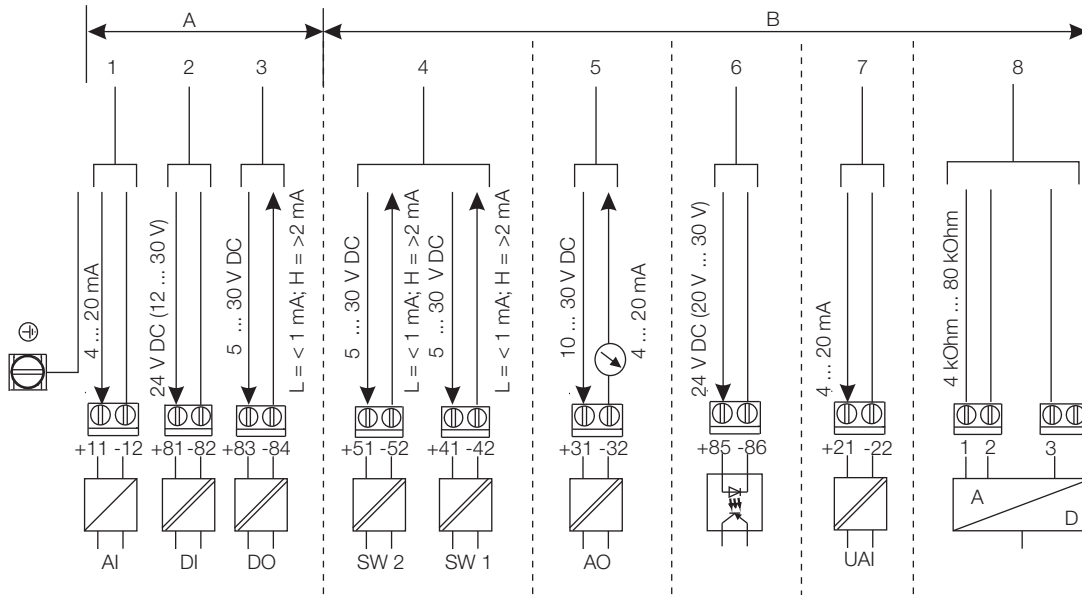


M10834

Fig. 29: Electrical connection

1 EDP300 control unit | 2 Remote sensor connection cable No. 3 | 3 Remote sensor connection cable No. 2 |  
4 Remote sensor connecting cable no. 1 | 5 Shielding | 6 External remote sensor

## Terminal connection diagrams

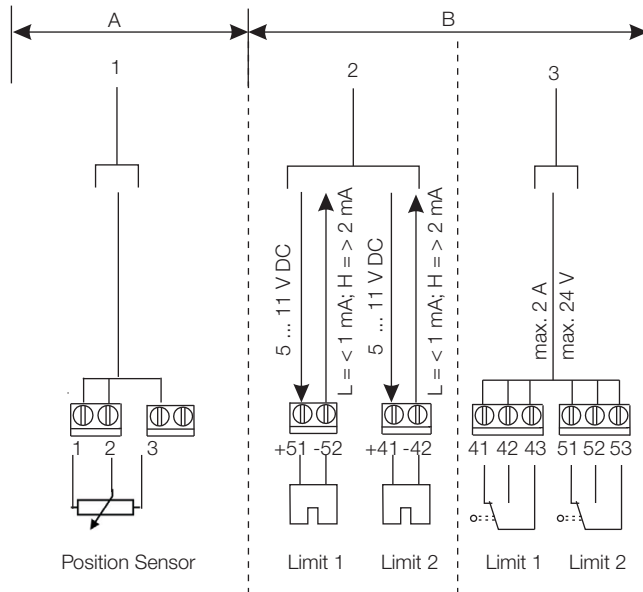


M10835

Fig. 30: Connection diagram of the EDP300 control unit

A Basic device | B Options

1 Setpoint signal | 2 Digital input | 3 Digital output | 4 Digital feedback | 5 Analog feedback |  
6 Emergency shutdown module | 7 Universal input | 8 Remote sensor



M10836

Fig. 31: Connection diagram to the EDP300 remote sensor

A Basic device | B Options

1 EDP300 control unit | 2 Proximity switches | 3 Microswitch

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Technical Data

#### Inputs

<b>Two-wire technology</b>	
Nominal range	4 ... 20 mA
Limit values	Max.: 50 mA (overload) Min.: 3.6 mA
Start	≥ 3.8 mA
Load voltage at 20 mA	9.7 V
Impedance at 20 mA	485 Ω

<b>Digital input</b>	
Control voltage	0 ... 5 V DC (switching state logical "0") 11 ... 30 V DC (switching state logical "1")
Current	max. 4 mA

#### Outputs

<b>Digital output (control circuit to DIN 19234/NAMUR)</b>	
Supply voltage	5 ... 30 V DC
Switching state logical	"0": Current > 0.35 mA ... < 1.2 mA "1": Current > 2.1 mA
Effective direction (configurable)	normally logical "0" or logical "1"

#### Cable connections

<b>Electrical connections</b>	
4 ... 20 mA input	Screw terminals max. 2.5 mm <sup>2</sup> (AWG 14)
Options	Screw terminals max. 1.0 mm <sup>2</sup> (AWG 18)
Cable entry	2 threaded bores 1/2-14 NPT/M20 x 1.5 (cable gland/pipe plug optional)

<b>cross section</b>	
Rigid / flexible wires	0.14 ... 2.5 mm <sup>2</sup> (AWG 26 ... AWG 14)
Flexible with wire end sleeve	0.25 ... 2.5 mm <sup>2</sup> (AWG 23 ... AWG 14)
Flexible with wire end sleeve no plastic sleeve	0.25 ... 1.5 mm <sup>2</sup> (AWG 23 ... AWG 17)
Flexible with wire end sleeve with plastic sleeve	0.14 ... 0.75 mm <sup>2</sup> (AWG 26 ... AWG 20)

<b>Multi-wire connection capacity (2 wires of the same cross section)</b>	
Rigid / flexible wires	0.14 ... 0.75 mm <sup>2</sup> (AWG 26 ... AWG 20)
Flexible with wire end sleeve no plastic sleeve	0.25 ... 0.75 mm <sup>2</sup> (AWG 23 ... AWG 20)
Flexible with wire end sleeve with plastic sleeve	0.5 ... 1.5 mm <sup>2</sup> (AWG 21 ... AWG 17)

#### Options

<b>cross section</b>	
Rigid / flexible wires	0.14 ... 1.5 mm <sup>2</sup> (AWG 26 ... AWG 17)
Flexible with wire end sleeve no plastic sleeve	0.25 ... 1.5 mm <sup>2</sup> (AWG 23 ... AWG 17)
Flexible with wire end sleeve with plastic sleeve	0.25 ... 1.5 mm <sup>2</sup> (AWG 23 ... AWG 17)

<b>Multi-wire connection capacity (2 wires of the same cross section)</b>	
Rigid / flexible wires	0.14 ... 0.75 mm <sup>2</sup> (AWG 26 ... AWG 20)
Flexible with wire end sleeve no plastic sleeve	0.25 ... 0.5 mm <sup>2</sup> (AWG 23 ... AWG 22)
Flexible with wire end sleeve with plastic sleeve	0.5 ... 1 mm <sup>2</sup> (AWG 21 ... AWG 18)

## Travel

Rotation angle	
Used range	25 ... 270° for rotary actuator 25 ... 60° for linear actuator
Travel limit	Min. and max. limits, freely configurable in range 0 ... 100 % of total travel (min. range > 20 %)
Travel time prolongation	Range of 0 ... 200 seconds, separately for each direction
Dead band time limit	Setting range 0 ... 200 seconds (monitoring parameter for control until the deviation reaches the dead band)

## Pneumatic connections

Input / Output	
Threaded holes	G 1/4 1/4-18 NPT
Compressed air output	
Range	0 ... 10 bar (0 ... 145 psi)
Air capacity	> 7 kg/h = 5.5 Nm <sup>3</sup> /h = 3.2 scfm at 1.4 bar (20 psi) supply air pressure
	> 50 kg/h = 40 Nm <sup>3</sup> /h = 23 scfm at 10 bar (145 psi) supply air pressure
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 %

## Air supply

Instrument air <sup>1)</sup>	
Purity:	
max. particle size	5 µm
Purity:	
max. particle density	5 mg/m <sup>3</sup>
Oil contents:	
max. concentration	1 mg/m <sup>3</sup>
Pressure dew point	10 K below operating temperature
Supply pressure	1.4 ... 10 bar (20 ... 145 psi)
Air consumption	< 0.03 kg/h / 0.015 scfm <sup>2)</sup>

1) free of oil, water and dust acc. to DIN / ISO 8573-1

Pollution and oil content according to Class 3

2) Independent of supply pressure

## Accessories

### Mounting material

- Attachment kit for linear actuators to DIN/IEC 534/NAMUR
- Attachment kit for rotary actuators to VDI/VDE 3845
- Attachment kit for integral mounting to control valves
- Attachment kit for actuator-specific mounting to control valves

### Pressure gauge block (optional)

- With pressure gauges for supply and output pressure. Pressure gauges with housing ø 28 mm (1.10 in), with connection block in aluminum, black

### PC adapter for communication

USB-HART modem for HART communication (see data sheet 63-6.71)

### PC software for remote configuration and operation

DAT200 Asset Vision Basic with DTM for EDP300 (see data sheet DS/DTM/DAT200)



# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Housing

Material / Degree of protection	
Aluminum with ≤ 0.1% copper	Optional stainless steel 1.4404 (316L)
Degree of protection	IP 65 / NEMA 4X (NEMA 4X does not permit overhead mounting)

Surface / color (aluminum housing only)	
Dipping varnish	With epoxy resin, stove-hardened
Housing varnished black	RAL 9005 RAL 9002

Weight	
Aluminum	2.4 kg (5.29 lb)
Stainless steel 1.4404 (316L)	5.5 kg (12.13 lb)

### Mounting orientation

Any

### Transmission data and influences

Output Y1	
Increasing setpoint signal	0 ... 100 % Increasing pressure at output
Decreasing setpoint signal	0 ... 100 % Decreasing pressure at output

Action (setpoint signal)	
Increasing setpoint	4 ... 20 mA = actuator position 0 ... 100 %
Decreasing setpoint	20 ... 4 mA = actuator position 0 ... 100 %

Characteristic curve (travel = f {setpoint signal})	
Linear	Equal percentage 1:25 or 1:50 or 25:1 or 50:1 <sup>1)</sup>
Deviation	< 0.5 %
Configurable zone	0 ... 100 %,
Configurable dead zone	0.1 ... 10 %,
Resolution (A/D conversion)	> 16,000 steps
Sample rate	20 ms
Ambient temperature influence	< 0.5 % for each 10 K
Influence of vibration	< 1 % to 10 g and 80 Hz

1) Freely configurable with 20 reference points

### Seismic vibration

Meets requirements of DIN/IEC 60068-3-3 Class III for strong and strongest earthquakes.

### Influence of mounting orientation

Not measurable.

### Noise emissions

Max. 100 db (A)

Noise-reduced version max. 85 db (A)

### Environmental capabilities

Ambient temperature range	
For operation, storage, and transport	-40 ... 85 °C (-40 ... 185 °F)
When using proximity switches SJ2-S1N (NO)	-25 ... 85 °C (-13 ... 185 °F)

Relative humidity	
Operational with housing closed and air supply switched on	95 % (annual average), condensation permissible
Transport and storage	75 % (annual average)

### Explosion protection

#### FM certificate 3043773

IS, C1. I, Div 1, Grp. A, B, C, D, T4 or T6

IS, C1. II, Div 1, Grp. E, F, G, T4 or T6

IS, C1. III, Div 1, T4 or T6

Class I Zone 0, AEx ia IIC, T4 or T6

NI,CI. I,Div.2, Grp. A, B, C, D, T4 or T6

NI,CI. II,Div.2, Grp. E, F, G, T4 or T6

NI,CI. III,Div.2, T4 or T6

Class I Zone 2, IIC, T4 or T6

Enclosure type 4X

#### CSA Certification 2419437

Class I, Division 1, Groups A, B, C, D;

Class II, Division 1, Groups E, F, G;

Class III T4

Ex ia IIC T4

Class I, Zone =, AEx ia IIC T4

## Optional upgrades

### Module for analog position feedback <sup>1)</sup>

Signal range	4 ... 20 mA (configurable split ranges)
Supply, 2-wire circuitry	24 V DC (10 ... 30 V DC)
Characteristic curve (configurable)	Increasing or decreasing
Deviation	< 1 %

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

### Module for binary position feedback <sup>1)</sup>

Two switches for digital position feedback (position adjustable within the range of 0 ... 100 %, ranges cannot overlap)  
Current circuits acc. to DIN 19234 / NAMUR

Supply voltage	5 ... 30 V DC
Signal current	< 1.2 mA: Switching state logical "0" > 2.1 mA: Switching state logical "1"
Direction of action	normally logical "0" or logical "1" (configurable)

### Module for universal input <sup>1)</sup>

Module for a 4 ... 20 mA input for universal use.  
The range can be scaled. It is used for advanced valve diagnostics. For example, an ultrasonic sensor can be connected to detect a faulty valve seat or a phonometer can be connected to detect cavitation. The limit values for detecting overshoot can be freely selected.

<b>Universal input</b>	
Nominal range	4 ... 20 mA
Load voltage at 20 mA	8 V
Impedance at 20 mA	400 Ω

### Module for the emergency shutdown function <sup>1)</sup>

Supply voltage	24 V DC (20 ... 30 V DC) (electrically isolated from input signal)
Safe position active	At voltage < 5 V

Explosion protection: see certificate (operating instructions)

<sup>1)</sup> There are two slots for the option modules. Any combination of different option modules is possible. However, identical option modules cannot be combined.

A separate 24 V DC signal is applied to the emergency shutdown module; it connects the signal from the microprocessor through to the I/P module.  
When the 24 V DC signal is interrupted, the pneumatic module executes the respective safety function, depending on the mechanical construction:  
The positioner output 1 is depressurized, and the valve is moved to the safe position. In case of a "double-acting" actuator the second output 2 is additionally pressurized.  
The emergency shutdown module works independently of the mother board, i.e., all information from the actuator is available in the control system at any time.

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Binary 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	< 1.2 mA: Switching state logical "0" > 2.1 mA: Switching state logical "1"

### Direction of action (logical state)

	Position			
Proximity switch	< Lim. 1	> Lim. 1	< Lim. 2	> Lim. 2
SJ2-SN (NC)	0	1	1	0
SJ2-S1N (NO)	1	0	0	1

When using proximity switch SJ2\_S1N (NO), the positioner may only be used at an ambient temperature range of -25 ... 85 °C (-13 ... 185 °F).

### Binary 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.

### Contactless position sensor (option)

In difficult ambient conditions (constant valve movements, for example, which are transmitted to the sensor axis by the process pressure), the positioner can be fitted with a contactless position sensor.

### Pressure option

The pressure option comprises 3 absolute pressure sensors which facilitate pressure-based valve diagnostics (valve signature, for example).

The supply air pressure and the output pressures can also be monitored. The zero points of the pressure sensors can be calibrated both locally on the device and using the DTM.

These options are also available for retrofitting by Service.

## Ex relevant specifications

### Intrinsic safety gas and dust ATEX / IECEx

#### ZELM 11 ATEX 0456 X (EC type examination certificate)

II 1G Ex ia IIC T6 or T4 Ga
II 1D Ex iaD IIIC T55°C or T100°C Da
Ta = -40 ° ... 40 ° or 85 °C

#### IECEx ZLM 11.0001 X

Ex ia IIC T6 or T4 Ga
Ex iaD IIIC T55 °C or T100°C Da
Ta = -40 ° ... 40 ° or 85 °C

Temperature class	Ambient temperature	Surface temperature
T4	-40 ... 85 °C (-40 ... 185 °F)	100 °C (212 °F)
T6	-40 ... 40 °C (-40 ... 104 °F)	55° C (131 °F)

### Electrical connections gas and dust ATEX / IECEx

Signal circuit (AI) (terminals +11 -12 )

Temperature class T1 – T4	Temperature class T6
U <sub>i</sub> = 30 V	U <sub>i</sub> = 28 V
I <sub>i</sub> = 320 mA	I <sub>i</sub> = 320 mA
P <sub>i</sub> = 1.1 W	P <sub>i</sub> = 0.8 W
C <sub>i</sub> = 6.5 nF without pressure option	
C <sub>i</sub> = 8.8 nF with pressure option	
L <sub>i</sub> = negligibly small	

Switching input (DI) (terminals +81 -82)

Temperature class T1 – T4	Temperature class T6
U <sub>i</sub> = 30 V	U <sub>i</sub> = 28 V
P <sub>i</sub> = 500 mW	P <sub>i</sub> = 400 mW
C <sub>i</sub> = 4.2 nF	
L <sub>i</sub> = negligibly small	

Switching output (DO) (terminals +83 -84)

Temperature class T1 – T4	Temperature class T6
U <sub>i</sub> = 30 V	U <sub>i</sub> = 28 V
P <sub>i</sub> = 500 mW	P <sub>i</sub> = 400 mW
C <sub>i</sub> = 4.2 nF	
L <sub>i</sub> = negligibly small	

Shutdown module (terminals +41 -42)

#### Temperature class T1 – T6

U <sub>i</sub> = 30 V
P <sub>i</sub> = 1 W
C <sub>i</sub> = 5.3 nF
L <sub>i</sub> = negligibly small

Analog feedback module (terminals +31 -32)

#### Temperature class T1 – T4      Temperature class T6

U <sub>i</sub> = 30 V	U <sub>i</sub> = 28 V
I <sub>i</sub> = 320 mA	I <sub>i</sub> = 320 mA
P <sub>i</sub> = 1 W	P <sub>i</sub> = 0.8 W
C <sub>i</sub> = 11.3 nF	
L <sub>i</sub> = 150µH	

Universal analog input module (terminals +21 -22)

#### Temperature class T1 – T4      Temperature class T6

U <sub>i</sub> = 30 V	U <sub>i</sub> = 28 V
I <sub>i</sub> = 320 mA	I <sub>i</sub> = 320 mA
P <sub>i</sub> = 1 W	P <sub>i</sub> = 0.8 W
C <sub>i</sub> = 11.3 nF	
L <sub>i</sub> = 150µH	

Digital feedback module

(terminals: SW 1: +41 -42, SW 2: +51 -52)

#### Temperature class T1 – T4      Temperature class T6

Per output:	Per output:
U <sub>i</sub> = 30 V	U <sub>i</sub> = 28 V
P <sub>i</sub> = 0.5 W	P <sub>i</sub> = 0.4 W
I <sub>i</sub> = 250 mA	
C <sub>i</sub> = 2.2 nF per output	
L <sub>i</sub> = negligibly small	

Digital output module (proximity switches)<sup>1</sup>

(terminals limit 1: +51 -52, limit 2: +41 -42)

#### Temperature class T1 – T4      Temperature class T6

According to EC type examination certificate
PTB 00 ATEX 2049X

<sup>1</sup> No IECEx

# PositionMaster EDP300

## Electro-Pneumatic Positioner

### Equipment in type of protection "n" or device dust ignition protection through housing "tb"

<b>ZELM 11 ATEX 0456 X (EC type examination certificate)</b>		
II 3G Ex nA IIC T6 or T4 Gc		
II 2D Ex tb IIIC T55 °C or T100 °C Db		
Ta = -40 ° ... 40 ° or 80		
<b>IECEX ZLM 11.0001 X</b>		
Ex nA IIC T6 or T4 Gc		
Ex tb IIIC T55 °C or T100 °C Db		
Ta = -40 ° ... 40 ° or 80		
Temperature class	Ambient temperature	Surface temperature
T4	-40 ... 80 °C (-40 ... 176 °F)	100 °C (212 °F)
T6	-40 ... 40 °C (-40 ... 104 °F)	55 °C (131 °F)

### Electrical connections non-sparking ATEX/IECEX

Equipment in type of protection "n" or device dust ignition protection through housing "tb"

Signal circuit (AI) (terminals +11 -12):

$$I_N \leq 22 \text{ mA}$$

$$U_{\max} \leq 30 \text{ V}$$

Switching input (DI) (terminals +81 -82):

$$U_N \leq 30 \text{ V}$$

Switching output (DO) (terminals +83 -84):

$$U_N \leq 30 \text{ V}$$

Shutdown module (terminals +41 -42):

$$U_N \leq 30 \text{ V}$$

Analog feedback module (UAI) (terminals +31 -32)

$$I_N \leq 22 \text{ mA}$$

$$U_N \leq 30 \text{ V}$$

Universal analog input module (terminals +21 -22)

$$I_N \leq 22 \text{ mA}$$

$$U_{\max} \leq 30 \text{ V}$$

Digital feedback module

(terminals: SW 1: +41 -42, SW 2: +51 -52)

Per output:

$$U_N \leq 30 \text{ V}$$

Digital output module (proximity switches)

(terminals limit 1: +51 -52, limit 2: +41 -42)

Per output:

$$I_N \leq 25 \text{ mA}$$

$$U_N \leq 16 \text{ V}$$

When using proximity switch SJ2\_S1N (NO), the positioner may only be used at an ambient temperature range of -25 ... 80 °C (-13 ... 176 °F).

# TZIDC

## Electro-Pneumatic Positioner

Measurement made easy

Compact, well-proven, and flexible



HART protocol

For 4 ... 20 mA two-wire technology

Low operating cost

Compact design

Well-proven technology

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

For SIL2 safety loops

## 1 Description

The TZIDC is an electronically configurable positioner with communication capabilities designed for 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 setpoint 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

The standard TZIDC model has a local communication interface (LKS connector). Additionally, a "HART communication" option for communication via the 20 mA signal is available. Both communications are based on the HART Protocol.

### 1.4 Inputs and outputs

In addition to its input for the analog position set point the TZIDC positioner is equipped with a digital input which can be used to activate various protective functions in the device via the process control system. A digital output allows you to output collective alarms or fault messages.

### 1.5 Modular design

The TZIDC basic model can be enhanced at any time by retrofitting optional equipment. Option modules for analog or digital position feedback or a shutdown-module 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.

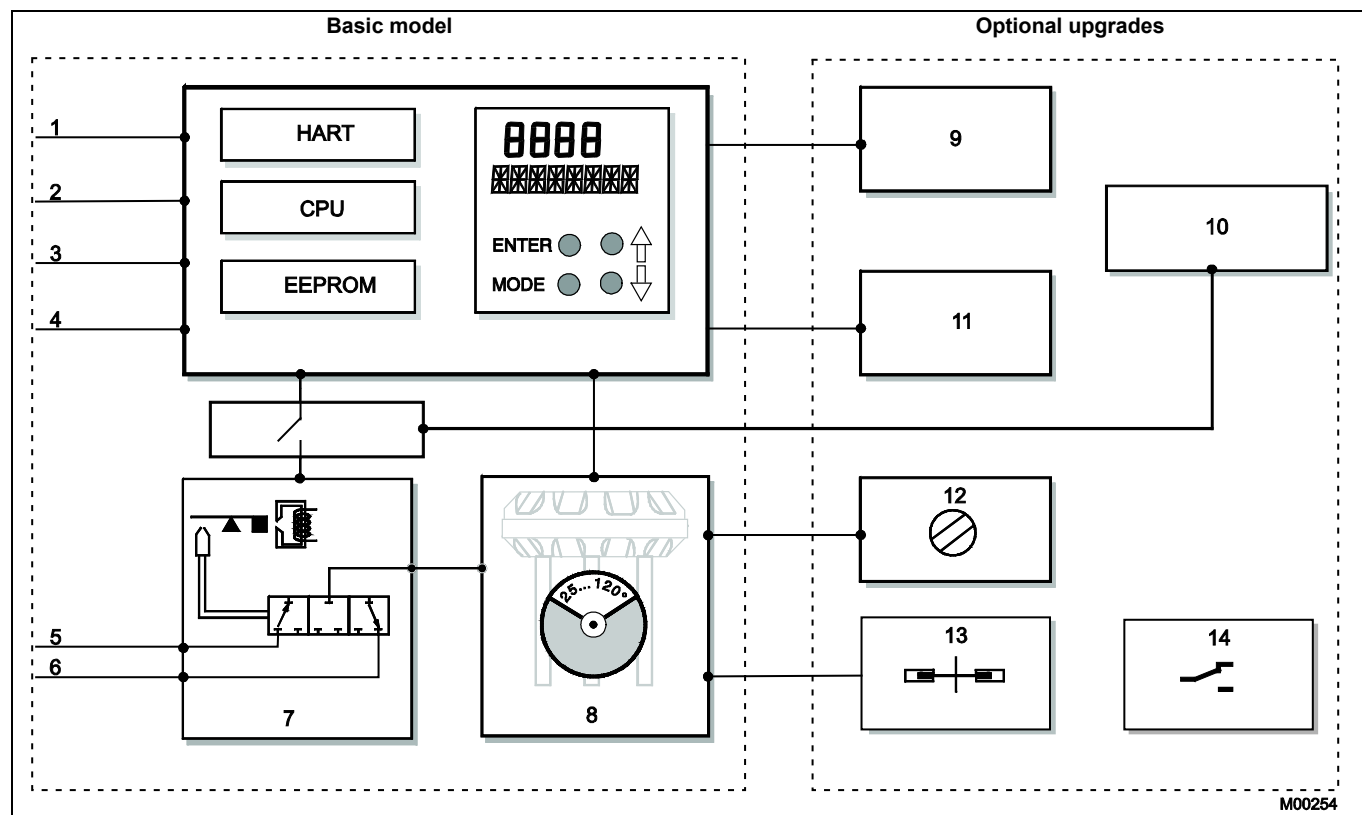


Fig. 1: TZIDC schematic diagram

#### Basic model

- 1 LKS plug
- 2 Setpoint signal 4 ... 20 mA
- 3 Digital input
- 4 Digital output DO
- 5 Supply, 1.4 ... 6 bar (20 ... 90 psi)
- 6 Exhaust
- 7 I/P module with 3/3-way valve
- 8 Position sensor (optional up to 270° rotation angle)

#### Optional upgrades

- 9 Plug module for analog feedback (4 ... 20 mA)
- 10 Plug-in module for safety shutdown (forced depressurization)
- 11 Plug module for digital feedback
- 12 Installation kit for mechanical position indicator
- 13 Installation kit for digital feedback with proximity switches
- 14 Installation kit for digital feedback with 24 V microswitches

**i**

#### IMPORTANT (NOTE)

With optional upgrades either the "Installation kit for digital feedback with proximity switches" (13) or the "Installation kit for digital feedback with microswitches 24 V" (14) can be used. In both cases, the "mechanical position indicator" (12) must be installed.



## **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 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.

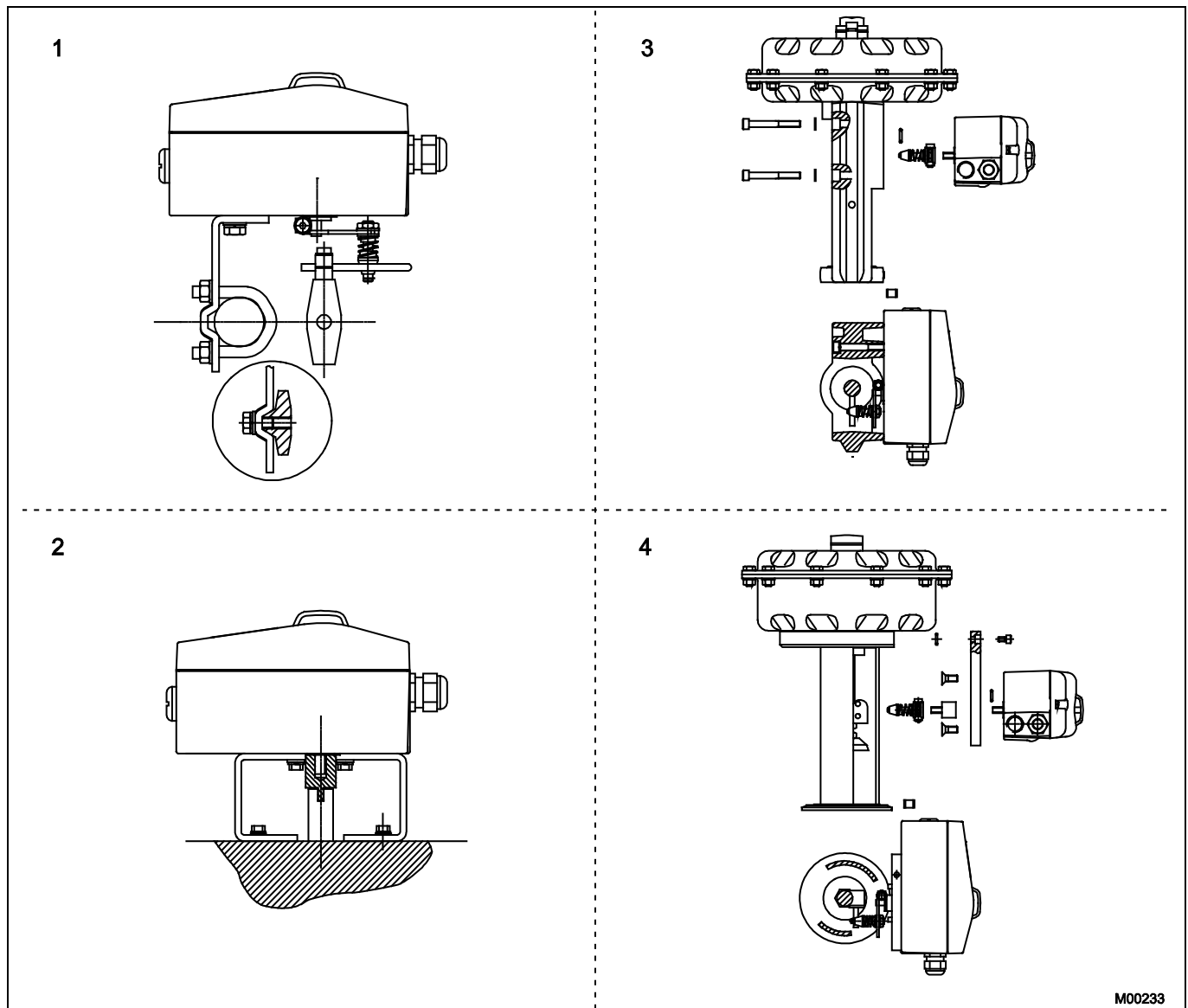


Fig. 2: Mounting options

- 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

Microprocessor-based position control in the TZIDC provides for optimal results. The positioner features high-precision control functions and high operational reliability. Due to their elaborate structure and easy accessibility, the device parameters can be quickly adapted to the respective application.

**The total range of parameters includes:**

- Operating parameters
- Adjustment parameters
- Monitoring parameters
- Diagnosis parameters
- Maintenance parameters

#### 3.1.1 Operating parameters

The following operating parameters can be set manually if required:

##### Setpoint Signal

Signal min. 4 mA, max. signal 20 mA (0 ... 100 %)

freely selectable for split-range operation

min. range 20 % (3.2 mA)

recommended range > 50 % (8.0 mA)

##### Action (setpoint signal)

Increasing: Setpoint Signal 4 ... 20 mA = position 0 ... 100 %

Decreasing: Setpoint Signal 20 ... 4 mA = position 0 ... 100 %

##### Characteristic curve (travel = f {setpoint signal})

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

##### 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 parameter can be set separately for each end position. When the respective configured limit value is exceeded, the shut-off function causes immediate travel of the actuator until reaching the set end position.

When the shut-off value is set to "0", the position is further controlled, even in the respective 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".

##### Switching points for the position

This parameter allows you to define two position limits for signaling (see option "Module for digital position feedback").

##### Digital output

The alarms generated in the TZIDC positioner can be polled via the digital output as a collective alarm.

The desired information can be selected via the operator panel or remotely via the configuration program.

The output can be set to "active high" or "active low", as required.

##### Digital input

For the digital input, one of the following safety options can be selected. You may use the operator's panel or configuration program to select an option.

- No function (default)
- Move to 0 % position
- Move to 100 % position
- Hold previous position
- disable local configuration
- Disable local configuration and operation
- Disable any access (no local or remote access via a PC)

The selected function is activated once the 24 V DC signal is no longer applied (< 11 V DC).

#### 3.1.2 Adjustment parameters

The TZIDC positioner has a special function for automatic adjustment of the parameters.

Additionally, the control parameters can be set automatically (in adaptive control mode) or manually to optimally adapt them to the process requirements.

##### Tolerance band

Upon reaching the tolerance band, the position is slowly re-adjusted until the dead band has been reached.

##### Dead band (sensitivity)

When reaching the dead band, the position is held. The factory setting for this parameter is 0,1 %.

##### Actuator spring action

Selection of the sensor shaft rotating sense (looking into the open case), if the valve is moved to the safe position by the actuator spring (actuator is depressurized via Y1 / OUT1).

For double-acting actuators the actuator spring action corresponds to pressurizing the pneumatic output (OUT2).

##### Display 0 ... 100 %

Adjusting the display (0 ... 100%) according 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 operating program. The following states will be detected and indicated, e.g.:

- 4 ... 20 mA setpoint signal out of range
- position out of the adjusted range
- positioning time-out (adjustable time parameter)
- position controller inactive
- counter limits (settable in the diagnosis phase) exceeded

While automatic commissioning is in progress, the current state is continuously indicated on the integrated LCD.

During operation, the LCD shows the most important process variables:

- current position (in %),
- malfunctions, alarms, messages (as code)

Access to extended monitoring parameters is possible via HART communication and the DTM.

### 3.1.4 Diagnosis parameters

The diagnosis parameters of the TZIDC program inform the operator about the operating conditions of the valve.

From this information the operator can derive which maintenance works are required, and when.

Additionally, limit values can be defined for these parameters. When they are exceeded, an alarm is reported.

The following values are e.g. determined:

- Number of movements performed by the valve
- Total travel

The diagnosis parameters and limit values can be called up, set, and reset via HART communication, using the configuration program.

## 3.2 Operator panel

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

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

The operator panel is protected by a cover which avoids unauthorized access to the operating elements.

### 3.2.1 Single-button commissioning

Commissioning the TZIDC 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 HART communication.

### 3.2.2 Display

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

During control operation (control with or without adaptation) the following TZIDC data can be called up by pressing the pushbuttons briefly:

- Up button: Current setpoint (mA)
- Down button: Temperature in device
- Up + Down buttons: Current control deviation



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

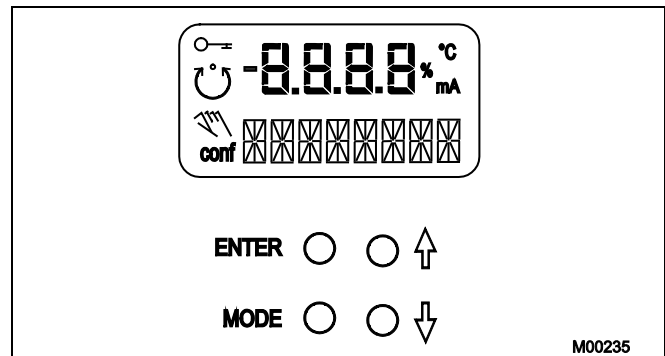


Fig. 4: TZIDC operating elements and display

## 4 Communication

### 4.1 DTM

The DTM (Device Type Manager) for TZIDC is based on the FDT / DTM technology (FDT 1.2) and can be integrated in a process control system or loaded in a PC with the DSV401 (SMART VISION) program. This allows you to work with the same user interface in the commissioning phase, during operation, and for service tasks for monitoring the device, setting parameters, and uploading data.

Communication is based on the HART protocol. It occurs via a local interface connection (LKS) or in frequency-modulated mode using an FSK-modem connected at any chosen point of the 20 mA signal line. Communication has no effect on operation. Newly set parameters are saved in the non-volatile memory directly upon the download into the device, and become active immediately.

### 4.2 LKS adapter (RS-232 interface converter)

You can easily connect your TZIDC positioner to a PC, e.g., in the workshop or in the commissioning phase, by using the positioner's LKS adapter (LKS = local communication interface).

An RS-232 interface converter adapts the signals on the serial PC port to the level of the positioner's LKS.

### 4.3 FSK Modem

The FSK modem establishes a digital frequency-modulated communication (Frequency Shift Keying) with the TZIDC positioner.

Tapping is possible at any chosen point of the 20 mA signal line.

We recommend that you use an electrically isolated FSK modem. It is bus-compatible when used with isolating amplifiers. Even connecting explosion-protected field devices is possible, on condition that the FSK modem is run outside the hazardous area.

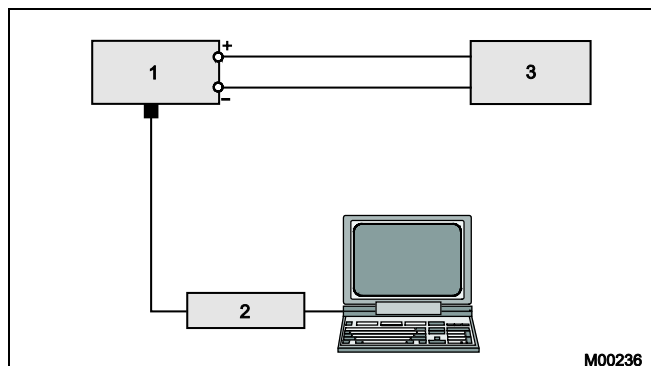


Fig. 5: Local communication via LKS adapter

1 TZIDC  
2 LKS adapter  
3 Controller

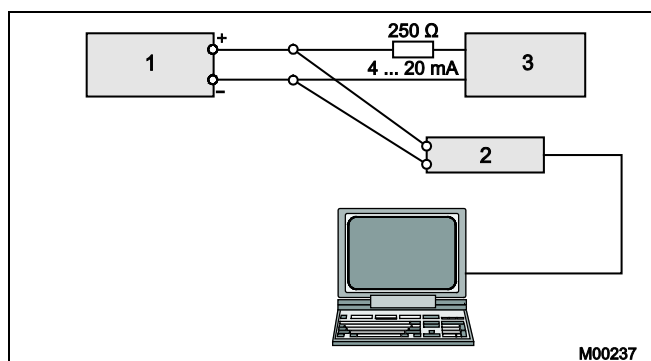


Fig. 6: HART communication with FSK modem via 20 mA signal line

1 TZIDC  
2 FSK modem  
3 Controller

## 5 Specifications

### 5.1 Input

#### Setpoint signal (two-wire technology)

Nominal range	4 ... 20 mA
Split range configuration between	20 ... 100 % of the nominal range
Max.	50 mA
Min.	3.6 mA
Starting at	3.8 mA
Load voltage at 20 mA	9.7 V
Impedance at 20 mA	485 Ω

#### Digital input

Control voltage	0 ... 5 V DC logical switching state "0"
	11 ... 30 V DC logical switching state "1"
Current	max. 4 mA

### 5.2 Output

#### Compressed air output

Range	0 ... 6 bar (0 ... 90 psi)
Air capacity	5.0 kg/h = 3.9 Nm <sup>3</sup> /h = 2.3 scfm at 1.4 bar (20 psi) supply pressure 13 kg/h = 10 Nm <sup>3</sup> /h = 6.0 scfm at 6 bar (90 psi) supply pressure
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 %

#### Digital output (control circuit to DIN 19234 / NAMUR)

Supply voltage	5 ... 11 V DC
Current > 0.35 mA ... < 1.2 mA	Switching state logical "0"
Current > 2.1 mA	Switching state logical "1"
Effective direction (configurable)	normally logical "0" or logical "1"

### 5.3 Travel

#### Rotation angle

Used range	25 ... 120° (rotary actuators, optional 270°) 25 ... 60° (linear actuators)
Travel limit	Min. and max. limits, freely configurable between 0 ... 100 % of total travel (min. range > 20 %)
Travel time prolongation	Range of 0 ... 200 s, separately for each direction
Dead band time limit	Setting range 0 ... 200 s (monitoring parameter for control until the deviation reaches the dead band)

### 5.4 Air supply

#### Instrument air

free of oil, water and dust to DIN/ISO 8573-1. Pollution and oil content according to Class 3 (purity: max. particle size = 5 µm, max. particle density = 5 mg / m<sup>3</sup>; oil content: max. concentration = 1 mg / m<sup>3</sup>; pressure dew point: 10 K below operating temperature)

#### Supply pressure

1.4 ... 6 bar (20 ... 90 psi)

#### **i** IMPORTANT (NOTE)

Do not exceed the maximum operating pressure of the actuator!

#### Air consumption

< 0.03 kg/h / 0.015 scfm (independent of supply pressure)

### 5.5 Transmission data and influences

#### Output Y1

Increasing	Increasing setpoint signal 0 ... 100 % Increasing pressure at output
Decreasing	Increasing setpoint signal 0 ... 100 % Decreasing pressure at output

#### Action (setpoint signal)

Increasing	Signal 4 ... 20 mA = Position 0 ... 100 %
Decreasing	Signal 20 ... 4 mA = Position 0 ... 100 %

#### Characteristic curve (travel = f {setpoint signal})

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

Deviation	≤ 0.5 %
Tolerance band	0.3 ... 10%, adjustable
Dead band	0.1 ... 10%, adjustable
Resolution (A/D conversion)	> 16,000 steps
Sample rate	20 ms
Influence of ambient temperature	≤ 0.5% per 10 K
Reference temperature	20 °C
Influence of vibration	≤ 1 % to 10 g and 80 Hz

#### Seismic vibration

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

#### Influence of mounting orientation

Not measurable

#### Complies with the following directives

- EMC directive 2004/108/EC from December 2004
- EC Directive for CE conformity marking

#### Communication

- HART protocol 5.9
- Local connector for LKS (not in explosion protection area)
- HART communication via 20 mA signal line with (optional) FSK modem

## 5.6 Environmental capabilities

### Ambient temperature

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

When using proximity switches SJ2-S1N (NO): -25 ... 85 °C (-13 ... 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

## 5.7 Housing

### Material / Degree of protection

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

### Surface / Color

Electrostatic dipping varnish with epoxy resin, stove-hardened.  
Case varnished black, RAL 9005, matte, 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> (14 AWG) for bus connector



### IMPORTANT (NOTE)

Do not expose the terminals to 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 pipe plugs if necessary)

### Weight

1,7 kg (3,75 lb)

### Mounting orientation

Any

## 5.8 Safety Integrity Level



### IMPORTANT (NOTE)

Applies to applications with single-acting and depressurizing pneumatics.

The positioner TZIDC / TZIDC-200 and the emergency shutdown module for meet the requirements regarding:

- functional safety acc. to IEC 61508
- explosion protection (depending on the model)
- electromagnetic compatibility in accordance with EN 61000

Without the input signal, the pneumatic module in the positioner vents the drive and the installed spring in it moves the valve in a predetermined end position (OPEN or CLOSED).

SIL specific safety-related characteristics:

Device	SFF	PFDav	$\lambda_{dd} + \lambda_s$	$\lambda_{du}$
TZIDC / TZIDC-200 as shutdown module	94 %	$1.76 \cdot 10^{-4}$	718 FIT	40 FIT
TZIDC / TZIDC-200 with supply current 0 mA	94 %	$1.76 \cdot 10^{-4}$	651 FIT	40 FIT

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

## 5.9 Options

### Module for analog position feedback <sup>1)</sup>

Signal range	4 ... 20 mA (configurable split ranges)
Supply, 2-wire circuitry	24 V DC (10 ... 30 V DC) 48 V DC (20 ... 48 V DC, no ignition protection)
Characteristic curve (configurable)	Rising or falling
Deviation	< 1 %

#### **i** IMPORTANT (NOTE)

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

### Module for digital position feedback <sup>1)</sup>

Two switches for digital position feedback (position adjustable within the range of 0 ... 100 %, ranges cannot overlap)

Current circuits acc. to DIN 19234 / NAMUR

Supply voltage	5 ... 11 V DC
Signal current < 1.2 mA	Switching state logical "0"
Signal current > 2.1 mA	Switching state logical "1"
Direction of action	normally logical "0" or logical "1" (configurable)

### Module for the emergency shutdown function <sup>2)</sup>

Supply voltage	24 V DC (20 ... 30 V DC) (galvanically isolated from input signal)
Safe position is activated when	Voltage < 5 V
SIL	See "Safety Integrity Level"

A separate 24 V DC signal is normally applied to the emergency shutdown module, which connects through the signal from the microprocessor to the I/P module.

When the 24 V DC signal is interrupted, the I/P module executes the respective safety function, depending on the mechanical construction.

The positioner output 1 is depressurized, and the valve is moved to the safe position. In case of a double-acting actuator the second output 2 is additionally pressurized.

#### **i** IMPORTANT (NOTE)

The emergency shutdown module can only be used with pneumatics with the safe position "fail-safe".

The emergency shutdown module works independently of the mother board, i.e. all information from the final control element is available in the supervisory process control system at any time.

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

### 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 < 1.2 mA	Switching state logical "0"
Signal current > 2.1 mA	Switching state logical "1"

### Direction of action (logical state)

Proximity switch	Position			
	< Lim. 1	> Lim. 1	< Lim. 2	> Lim. 2
SJ2-SN (NC)	0	1	1	0
SJ2-S1N (NO)	1	0	0	1



#### IMPORTANT (NOTE)

When using proximity switch SJ2\_S1N (NO), the TZIDC positioner may only be used at an ambient temperature range -25 ... 85 °C (-13 ... 185 °F).

### Digital position feedback with 24 V microswitches

Two microswitches for independent position signaling. Switching points can be adjusted from 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.



#### 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

- With pressure gauges for supply and output pressure.
- Pressure gauges with housing ø 28 mm
- Aluminum connection block in black
- Installation material in black for mounting to TZIDC

### Filter regulator

All metal version in brass, varnished black, bronze filter element, (40 µm), with condensate drain.  
max. pre-pressure 16 bar (232 psi), output adjustable to 1.4 ... 6 bar (20 ... 90 psi).



#### IMPORTANT (NOTE)

The filter regulator may only be installed in combination with the pressure gauge block (accessory).

### PC adapter for communication

LKS adapter for plug-in connection to TZIDC  
FSK modem for HART communication

### PC software for remote configuration and operation

DAT200 Asset Vision Basic with DTM for TZIDC on CD-ROM



## 6 Ex relevant specifications

### 6.1 ATEX

#### 6.1.1 ATEX Ex i

Designation:	II 2 G Ex ia IIC T6 resp. T4 Gb II 2 G Ex ib IIC T6 resp. T4 Gb II 2 D Ex ia IIC T51°C resp. 70°C Db
Type Examination Test Certificate:	TÜV 04 ATEX 2702 X
Type:	Intrinsically safe equipment
Device class:	II 2 G
Standards:	EN 60079-0:2009 EN 60079-11:2007
Device class:	II 2D
Standards:	EN 60079-0:2009 EN 61241-11:2006

II 2 G Temperature class	Ta Ambient temperature range
T4	-40 ... 85 °C
T5	-40 ... 50 °C
T6 1)	-40 ... 40 °C

1) When using the plug-in module for "Digital Feedback" in Temperature Class T6, the maximum permissible ambient temperature range is -40 ... 35 °C.

II 2 D Housing surface temperature	Ta Ambient temperature range (II 2 D)
T81 °C	-40... 70 °C
T61 °C	-40 ... 50 °C
T51 °C	-40 ... 40 °C

#### Electrical data

In intrinsically safe explosion protection types Ex ib IIC/Ex ia IIC or Ex iaD, only for connection to a certified intrinsically safe circuit.

Current circuit	Electrical data
Signal circuit (terminal +11 / -12)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 1.1 \text{ W}$ $C_i = 6.6 \text{ nF}$ $L_i$ negligibly small
Contact input (terminal +81 / -82)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 1.1 \text{ W}$ $C_i = 4.2 \text{ nF}$ $L_i$ negligibly small
Switch output (terminal +83 / -84)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 500 \text{ mW}$ $C_i = 4.2 \text{ nF}$ $L_i$ negligibly small
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	For max. values, see EC type examination test certificate number PTB 00 ATEX 2049 X Proximity switches manuf. by Pepperl & Fuchs

Current circuit	Electrical data
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 500 \text{ mW}$ $C_i = 3.7 \text{ nF}$ $L_i$ negligibly small
Plug-in module for analog position feedback (terminal +31 / -32)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 1.1 \text{ W}$ $C_i = 6.6 \text{ nF}$ $L_i$ negligibly small
Plug-in module for shutdown contact input (Terminal +51 / -52) or +85 / -86)	$U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 1.1 \text{ W}$ $C_i = 3.7 \text{ nF}$ $L_i$ negligibly small
Optional interface to remote sensor (Terminal X2-2: +U <sub>ref</sub> X3-2: GND X3-1: Signal	Maximum values: $U_0 = 5.4 \text{ V}$ $I_0 = 74 \text{ mA}$ $P_0 = 100 \text{ mW}$ $C_i$ negligibly small $L_i$ negligibly small  Ex ia or Ex ib type of ignition protection IIC: $L_0 = 5 \text{ mH}$ $C_0 = 2 \mu\text{F}$  IIB: $L_0 = 5 \text{ mH}$ $C_0 = 10 \mu\text{F}$
Local communication interface (LKS)	Only for connection to a programmer outside the potentially explosive area. (See special conditions)

#### Special Requirements

- The local communication interface (LKS) may only be operated at  $U_m \leq 30 \text{ V DC}$  outside the potentially explosive area.
- Variants with special certification confirming that they meet the requirements for the "flameproof enclosure" type of ignition protection may not be used as "intrinsically safe", if they have been previously used as a flameproof type of ignition protection.
- When used with gases from group IIA and a temperature class of T1 for auxiliary power, the TZIDC positioner may only be used outdoors or inside sufficiently ventilated buildings.
- The gas supplied must be kept sufficiently free of air and oxygen to prevent an ignitable atmosphere from forming.
- The equipment may only be used as a II 2 D type device in areas where the level of mechanical hazard is "low".
- Cable and wire entries that meet the requirements of EN 61241-11 for Category II 2 D as well as the ambient temperature range must be used.
- Prevent electrostatic charging due to propagating brush discharge when the equipment is used for applications involving combustible dust.

## 6.1.2 ATEX Ex n

Designation:	II 3 G Ex nA IIC T6 or T4 Gc
Declaration of conformity:	TÜV 02 ATEX 1943 X
Type:	"n" type of protection
Device class:	II 3 G
Standards:	EN 60079-15:2010 EN 60079-0:2009

II 3 G Temperature class	Ta Ambient temperature range
T4	-40 ... 85 °C
T6	-40 ... 50 °C

### Electrical data

Current circuit	Electrical data
Signal circuit (terminal +11 / -12)	U = 9.7 V DC I = 4 ... 20 mA, max. 21.5 mA
Contact input (terminal +81 / -82)	U = 12 ... 24 V DC; 4 mA
Switch output (terminal +83 / -84)	U = 11 V DC
Mechanical digital feedback (terminal limit1 +51 / -52 or limit2 +41 / -42)	U = 5 to 11 V DC
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / - 42)	U = 5 ... 11 V DC
Plug-in module for analog position feedback (terminal +31 / -32)	U = 10 ... 30 V DC I = 4 ... 20 mA, max. 21.5 mA
Plug-in module for shutdown contact input (Terminal +51 / -52) or +85 / -86)	U = 20 ... 30 V DC

### Special Requirements

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Note: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2\_S1N (NO) proximity switch is used, the positioner may only be operated at an ambient temperature range from -25 ... 85 °C.

## 6.2 IECEx

Designation:	Ex ia IIC T6 or T4 Gb Ex ib IIC T6 or T4 Gb Ex nA IIC T6 or T4 Gc
Certificate No.:	IECEx TUN 04.0015X
Issue No.:	5
Type:	Intrinsic safety "i" or "n" type of protection
Standards:	IEC 60079-0:2011 IEC 60079-11:2011 IEC 60079-15:2010

Type and designation	TZIDC Ex ia IIC or Ex ib IIC	
Temperature class	Ambient temperature range	
T4	-40 ... 85 °C	T4
T6 <sup>1)</sup>	-40 ... 40 °C	T6 <sup>1)</sup>

- 1) When using the plug-in module for "Digital Feedback" in Temperature Class T6, the maximum permissible ambient temperature range is -40 ... 35 °C.

### 6.2.1 IECEx i

Electrical data for a TZIDC designated as Ex ia IIC or Ex ib IIC With the intrinsically safe Ex ib IIC / Ex ia IIC types of ignition protection, only for connection to a certified intrinsically safe circuit.

Electrical data	
Signal circuit (terminal +11 / -12)	Maximum values: U <sub>i</sub> = 30 V I <sub>i</sub> = 320 mA P <sub>i</sub> = 1.1 W C <sub>i</sub> = 6.6 nF L <sub>i</sub> negligibly small
Contact input (terminal +81 / -82)	Maximum values: U <sub>i</sub> = 30 V I <sub>i</sub> = 320 mA P <sub>i</sub> = 1.1 W C <sub>i</sub> = 4.2 nF L <sub>i</sub> negligibly small
Switch output (terminal +83 / -84)	Maximum values: U <sub>i</sub> = 30 V I <sub>i</sub> = 320 mA P <sub>i</sub> = 500 mW C <sub>i</sub> = 4.2 nF L <sub>i</sub> negligibly small
Local communication interface (LKS)	Only for connection to a programmer outside the potentially explosive area. (See Special conditions)

The following modules may be operated as an option:

Electrical data	
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 500 \text{ mW}$ $C_i = 3.7 \text{ nF}$ $L_i$ negligibly small
Plug-in module for analog position feedback (terminal +31 / -32)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 1.1 \text{ mW}$ $C_i = 6.6 \text{ nF}$ $L_i$ negligibly small
Plug-in module for shutdown contact input (terminal +51 / -52 or +85 / -86)	Maximum values: $U_i = 30 \text{ V}$ $I_i = 320 \text{ mA}$ $P_i = 1.1 \text{ mW}$ $C_i = 3.7 \text{ nF}$ $L_i$ negligibly small

#### Special Requirements

- Devices may only be connected to circuits in zone 2 if they are suitable for operation in zone 2 potentially explosive atmospheres and for the conditions prevailing at the installation location (manufacturer's declaration or certificate from an inspection authority).
- For the "digital feedback with proximity switches" circuit, external measures must be implemented to prevent the rated voltage from being exceeded by more than 40 % in the event of transient disturbances.
- It is only permissible to connect, disconnect, and switch live circuits during installation or maintenance, or for the purpose of carrying out repairs. Note: It is considered very unlikely that a potentially explosive atmosphere would be present in zone 2 at the same time that installation or maintenance/repair work was being carried out.
- Only non-flammable gases may be used for the pneumatic auxiliary power.
- Only use suitable cable entries which meet the requirements of IEC 60079-15.
- If the SJ2\_S1N (NO) proximity switch is used, the positioner may only be operated in an ambient temperature range from -25 ... 85 °C.

### 6.2.2 1.1.3 IECEx n

Electrical data	
Signal circuit (terminal +11 / -12)	$U = 9.7 \text{ V DC}$ $I = 4 \dots 20 \text{ mA, max. } 21.5 \text{ mA}$
Contact input (terminal +81 / -82)	$U = 12 \dots 24 \text{ V DC; } 4 \text{ mA}$
Switch output (terminal +83 / -84)	$U = 11 \text{ V DC}$

The following modules may be operated as an option:

Electrical data	
Plug-in module for digital position feedback (terminal +51 / -52 or +41 / -42)	$U = 5 \dots 11 \text{ V DC}$
Plug-in module for analog position feedback (terminal +31 / -32)	$U = 10 \dots 30 \text{ V DC}$ $I = 4 \dots 20 \text{ mA, max. } 21.5 \text{ mA}$
Plug-in module for shutdown contact input (Terminal +51 / -52) or +85 / -86)	$U = 20 \dots 30 \text{ V DC}$

## 6.3 FM/CSA

### 6.3.1 CSA International

Certificate:	1052414
Class 2258 02	PROCESS CONTROL EQUIPMENT – For Hazardous Locations
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations

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

Model TZIDC, P/N V18345-x0x2x2xx0x Intelligent Positioner	
Input rated	30 V DC; max. 4 ... 20 mA
Max output pressure	90 psi
Max. ambient	85 Deg C

Class I, Div 1, Groups A, B, C and D;  
Class II, Div 1, Groups E, F and G  
Class III, Enclosure Type 4X:

Model TZIDC, P/N V18345-x0x2x2xx0x Intelligent Positioner intrinsically safe with entity parameters of:	
Terminals 11 / 12	V max = 30 V I max = 104 mA C <sub>i</sub> = 6.6 nF L <sub>i</sub> = 0 uH
Terminals 81 / 82	V max = 30 V I max = 110 mA C <sub>i</sub> = 4.2 nF L <sub>i</sub> = 0 uH
Terminals 83 / 84	V max = 30 V I max = 90 mA C <sub>i</sub> = 4.2 nF L <sub>i</sub> = 0 uH
Terminals 31 / 32	V max = 30 V I max = 110 mA C <sub>i</sub> = 6.6 nF L <sub>i</sub> = 0 uH
Terminals 41 / 42 and 51 / 52	V max = 30 V I max = 96 mA C <sub>i</sub> = 3.7 nF L <sub>i</sub> = 0 uH
Terminals Limit2 41 / 42 and Limit1 51 / 52	V max = 15.5 V I max = 52 mA C <sub>i</sub> = 20 nF L <sub>i</sub> = 30 uH

When installed per installation Drawing No 901064	
Temperature Code	Temperature Code
Max. Ambient	Max. Ambient



#### IMPORTANT (NOTE)

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

### 6.3.2 CSA Certification Record

Certificate:	1649904 (LR 20312)
Class 2258 04	PROCESS CONTROL EQUIPMENT – Intrinsically Safe, Entity – For Hazardous Locations

Class I, Div 1, Groups A, B, C and D;  
Class II, Div 1, Groups E, F, and G,  
Class III, Div 1, Enclosure Type 4X:

Model TZIDC, P/N V18345-x0x2x2xx0x Intelligent Positioner	
Input rated	30 V DC; max.4 ... 20 mA
Output pressure	Max. 90 psi
Intrinsically safe with entity parameters of:	
Terminals 11 / 12	V max = 30 V I max = 104 mA C <sub>i</sub> = 6.6 nF L <sub>i</sub> = 0 uH
Terminals 81 / 82	V max = 30 V I max = 110 mA C <sub>i</sub> = 3.7 nF L <sub>i</sub> = 0 uH
Terminals 83 / 84	V max = 30 V I max = 96 mA C <sub>i</sub> = 3.7 nF L <sub>i</sub> = 0 uH
Terminals 31 / 32	V max = 30 V I max = 110 mA C <sub>i</sub> = 6.6 nF L <sub>i</sub> = 0 uH
Terminals 41 / 42 and 51 / 52	V max = 30 V I max = 96 mA C <sub>i</sub> = 3.7 nF L <sub>i</sub> = 0 uH
Terminals Limit2 41 / 42 and Limit1 51 / 52	V max = 15.5 V I max = 52 mA C <sub>i</sub> = 20 nF L <sub>i</sub> = 30 uH

When installed per installation Drawing No 901064	
Temperature Code	T4
Max. Ambient	85 Deg C



#### IMPORTANT (NOTE)

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

### **6.3.3 FM Approvals**

TZIDC Positioner, Model V18345-a0b2c2de0f

IS/I,II,III/1/ABCDEFG/T4 Ta = 85 °C – 901064/7/4; Enity;

NI/II/2/ABCD/T4 Ta = 85 °C;

S/II,III/2/FG/T4 Ta = 85 °C; Type 4XMax Enity Parameters: Per Control Drawings

a = Case/mounting – 1, 2, 3, 4 or 9

b = Input/communication port – 1 or 2

c = Output/safe protection – 1, 2, 4 or 5

d = Option modules for analog or digital position feedback – 0, 1, 3 or 5

e = Mechanical kit (proximity switches) for digital position feedback (option) – 0, 1 or 3

f = Design (varnish/coding) – 1 or 2

### 6.3.4 FM Control Document

CONTROL DOCUMENT NO 901064			
Hazardous area		Nonhazardous area	
Class I, Div. I, Groups A, B, C, D Class II, Div. I, Groups E, F, G Class III, Div. I (Note 2)		Associated Apparatus Control Equipment	
TZIDC VI8345-X0X2X2XX0X (Input)		(Note 9) (Note 5) (Note 6)	
		(Note 3)	
Entity Parameters: $V_{max} = 30 \text{ Vdc}$ $I_{max} = 104 \text{ mA}$ $C_i = 6.6 \text{ nF}$ $L_i = 0 \text{ }\mu\text{H}$ $P_i = 1 \text{ W}$			
Notes 1. $V_{oc}$ or $V_i \leq V_{max}$ , $I_{sc}$ or $I_t \leq I_{max}$ , $C_a \geq C_i + C_{cable}$ , $L_a \geq L_i + L_{cable}$ ; $P_o \leq P_i$ 2. Dust-tight conduit seal must be used when installed in Class II and Class III environments. 3. Control equipment connected to barrier must not use or generate more than 250 Vrms or Vdc 4. Installation should be in accordance with ANSI/ISA RPI2.6 "Installation of Intrinsically Safe System for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70). 5. The configuration of associated apparatus must be FMRC Approved/CSA Approved as required. 6. Associated apparatus manufacturers installation drawing must be followed when installing this equipment. 7. When connecting conduit to the enclosure use conduit hubs that have the same environmental rating as the enclosure. 8. No revision to drawing without prior FMRC Approval/CSA Approval. 9. OUTPUT CURRENT MUST BE LIMITED BY A RESISTOR SUCH THAT THE OUTPUT VOLTAGE CURRENT PLOT IS A STRAIGHT LINE DRAWN BETWEEN OPEN CIRCUIT VOLTAGE AND SHORT CIRCUIT CURRENT. 10. Tampering and replacement with non-factory components may adversely affect the safe use of the system. Substitution of components may impair suitability for hazardous locations. 11. FOR FM DIV. 2 USE: Do not connect or disconnect unless the power was switched off or the area is known to be non hazardous. 12. For Div 2 Models: WARNING - EXPLOSION HAZARD - Substitution of components may impair suitability for Class I, Division 2. 13. For Div 2 Models: WARNING - EXPLOSION HAZARD - Do not connect while circuit is live unless area is known to be nonhazardous. 14. Local communication interface LKS shall not be used in hazardous locations. 15. To maintain intrinsic safety, wiring associated with each channel must be run in separate cable shields connected to intrinsically safe (associated apparatus) ground. 16. Caution: Substitution of components may impair intrinsic safety.			
All Dimensions in mm 		Title <b>CONTROL DOCUMENT</b>	
Date 08-Apr-99		Name Lasorzik	
Drawn		Checked	
<b>ABB</b> <b>ABB Automation</b>		Drawing No. (Part No) <b>901064</b>	
Rev. 10 Amendment Date 05.10.09 Name Lasorzik		Sheet <b>1 / 4</b>	
Replacement for: -		Category: -	

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# CONTROL DOCUMENT NO 901064

## Hazardous area

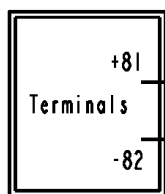
Class I, Div. I, Groups A, B, C, D  
Class II, Div. I, Groups E, F, G  
Class III, Div. I  
(Note 2)

## Nonhazardous area

TZ1DC  
VI8345-X0X2X2XX0X

Associated  
Apparatus

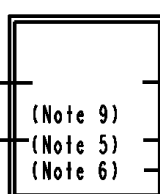
Control  
Equipment



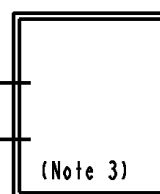
(Switching Input)

### Entity Parameters:

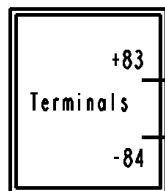
$V_{max} = 30 \text{ Vdc}$   $I_{max} = 110 \text{ mA}$   
 $C_i = 4.2 \text{ nF}$   $L_i = 0 \text{ }\mu\text{H}$   
 $P_i = 1 \text{ W}$



Int. Safe Gnd



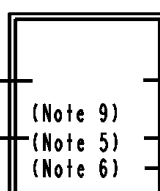
(Note 3)



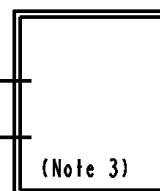
(Switching Output)

### Entity Parameters:

$V_{max} = 30 \text{ Vdc}$   $I_{max} = 96 \text{ mA}$   
 $C_i = 4.2 \text{ nF}$   $L_i = 0 \text{ }\mu\text{H}$   
 $P_i = 1 \text{ W}$



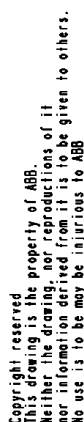
Int. Safe Gnd



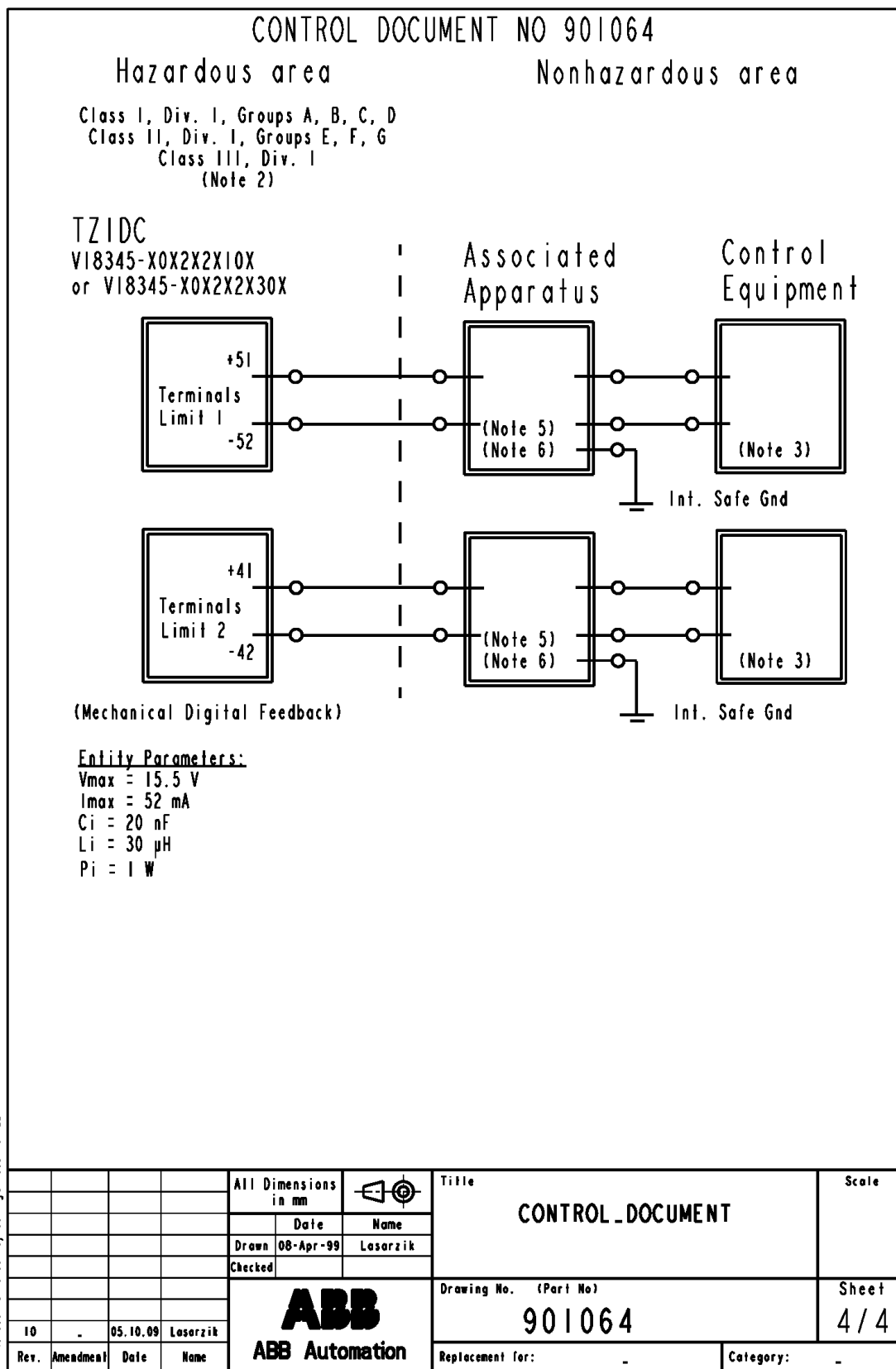
(Note 3)

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				All Dimensions in mm		Title  <b>CONTROL DOCUMENT</b>	Scale
				Date			
				Drawn 08-Apr-99	Lasarzik		
				Checked			
				<b>ABB</b> ABB Automation		Drawing No. (Part No) <b>901064</b>	Sheet <b>2 / 4</b>
10	-	05.10.09	Lasarzik				
Rev.	Amendment	Date	Name	Replacement for: -			Category: -







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## 7 Electrical connections

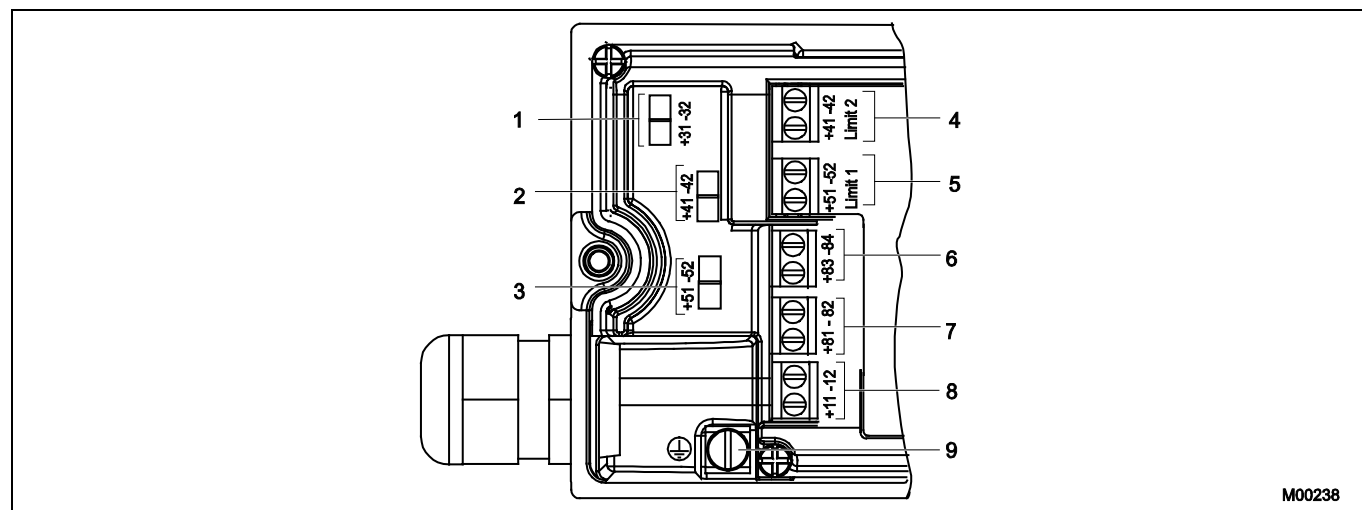


Fig. 7: Screw terminals, overview

- |  |  |
|--|--|
| 1 Module for analog position feedback  | 5 Digital position feedback, either proximity switches or 24 V microswitches |
| 2 Module for digital feedback or service switch of emergency shutdown module | 6 Digital output DO  |
| 3 Module for digital feedback or terminals for emergency shutdown module     | 7 Digital input  |
| 4 Digital position feedback, either proximity switches or 24 V microswitches | 8 Signal 4 ... 20 mA   |
|  | 9 Grounding screw  |

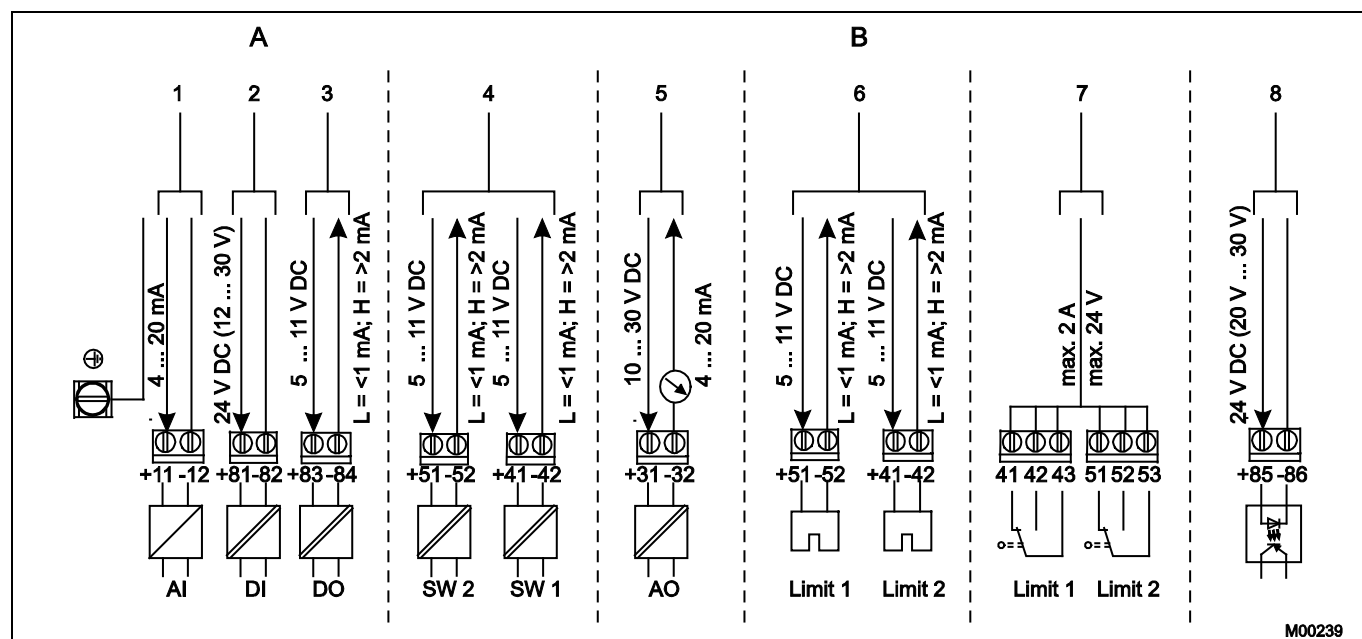


Fig. 8: Pin configuration

- |               |                             |
|---------------|-----------------------------|
| A Basic model | 1 Analog input              |
| B Options     | 2 Digital input             |
|               | 3 Digital output DO         |
|               | 4 Digital feedback          |
|               | 5 Analog feedback           |
|               | 6 Proximity switches        |
|               | 7 Microswitches             |
|               | 8 Emergency shutdown module |

## 7.1 TZIDC with remote sensor

In the case of the "TZIDC with remote sensor" design, the components are supplied in two housings, which together form one harmonized unit.

Housing 1 (control unit) contains the electronics and pneumatics along with the following options (where applicable):

- Analog position feedback
- Digital position feedback
- Shutdown module

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

The following options can be installed if required:

- Optical position indicator
- Mechanical feedback contacts (proximity switch or microswitch design)

The two housings can be or are connected to a shielded 3-wire cable. The maximum cable length is 10 m.

For Housing 1 (control unit) an attachment kit is available for pipe and wall mounting (see Accessories).

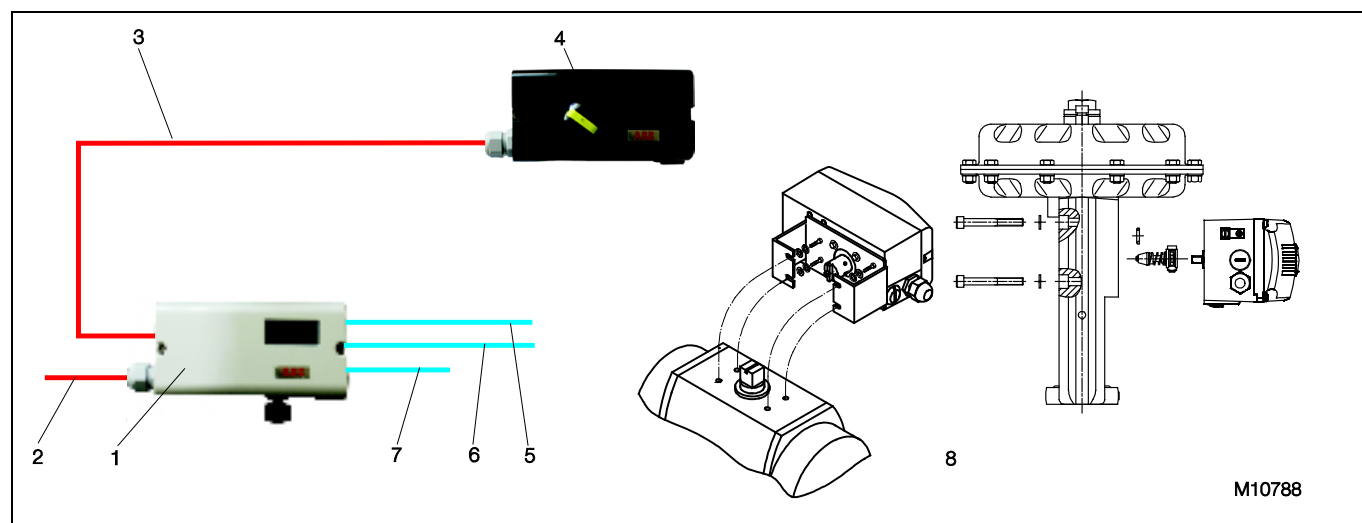


Fig. 9: TZIDC with remote position sensor

- |                             |                      |
|-----------------------------|----------------------|
| 1 Housing 1 (control unit)  | 5 Pneumatic output 2 |
| 2 Setpoint signal           | 6 Pneumatic output 1 |
| 3 Connecting cable          | 7 Air supply         |
| 4 Housing 2 (remote sensor) | 8 Pneumatic actuator |

## 7.2 TZIDC for external remote sensor

In the case of the TZIDC design for remote sensor, the positioner is supplied without position detection.

The housing (control unit) contains the electronics and pneumatics along with the following options (where applicable):

- Analog position feedback
- Digital position feedback
- Shutdown module

The TZIDC designed for the remote sensors can be connected to any position sensor (4 ... 30 k $\Omega$ , with open circuit detection 4 ... 18 k $\Omega$ ). The maximum length of the shielded 3-wire cable is 10 m.

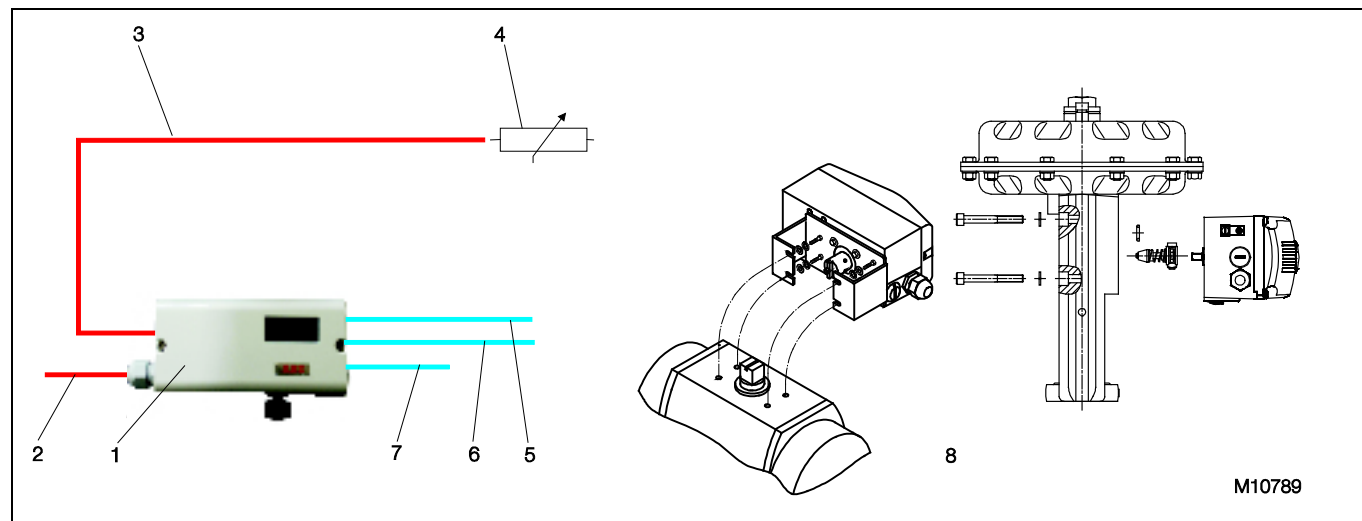


Fig. 10: TZIDC for remote sensors

- |                          |                      |
|--------------------------|----------------------|
| 1 Housing (control unit) | 5 Pneumatic output 2 |
| 2 Setpoint signal        | 6 Pneumatic output 1 |
| 3 Connecting cable       | 7 Air supply         |
| 4 Remote sensor          | 8 Pneumatic drive    |

## 8 Dimensions

All dimensions in mm (inch)

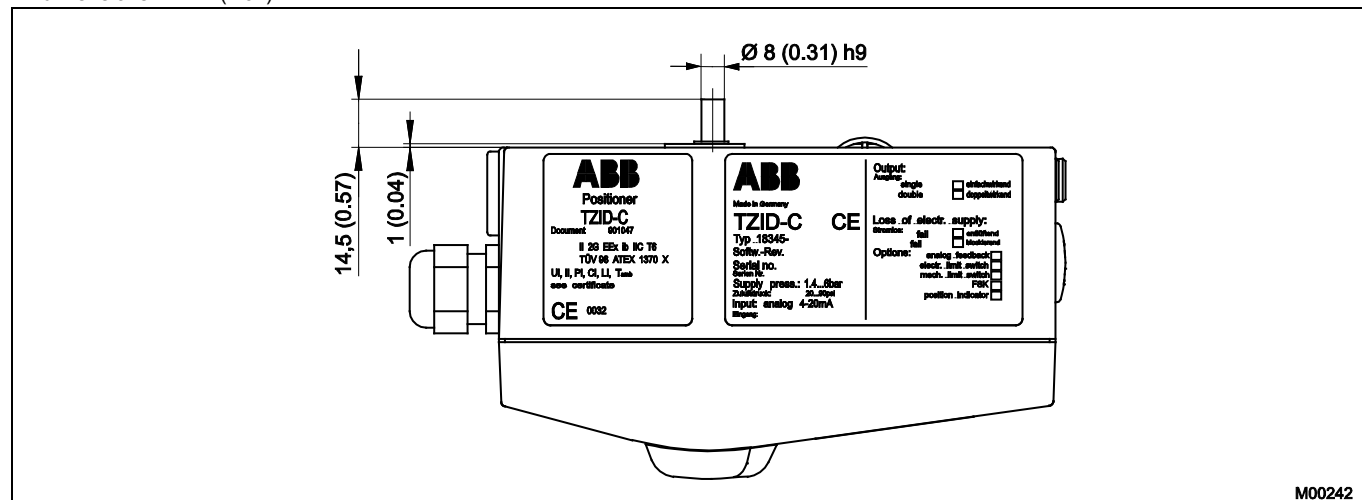


Fig. 11: Top view

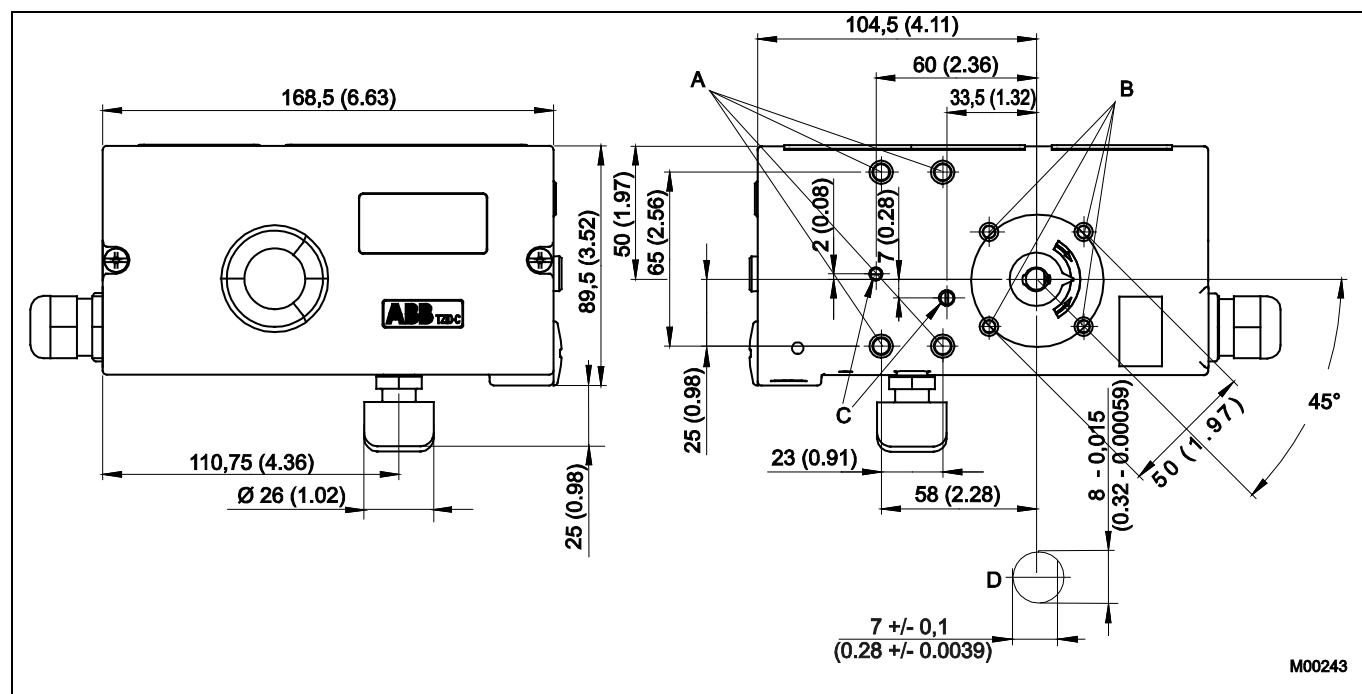


Fig. 12: Front and rear views

- A Tap hole M8 (10 mm low)
- B Tap hole M6 (8 mm low)

- C Tap hole M5 x 0.5 (air vents for direct mount)
- D Sensor shaft (larger than scale)

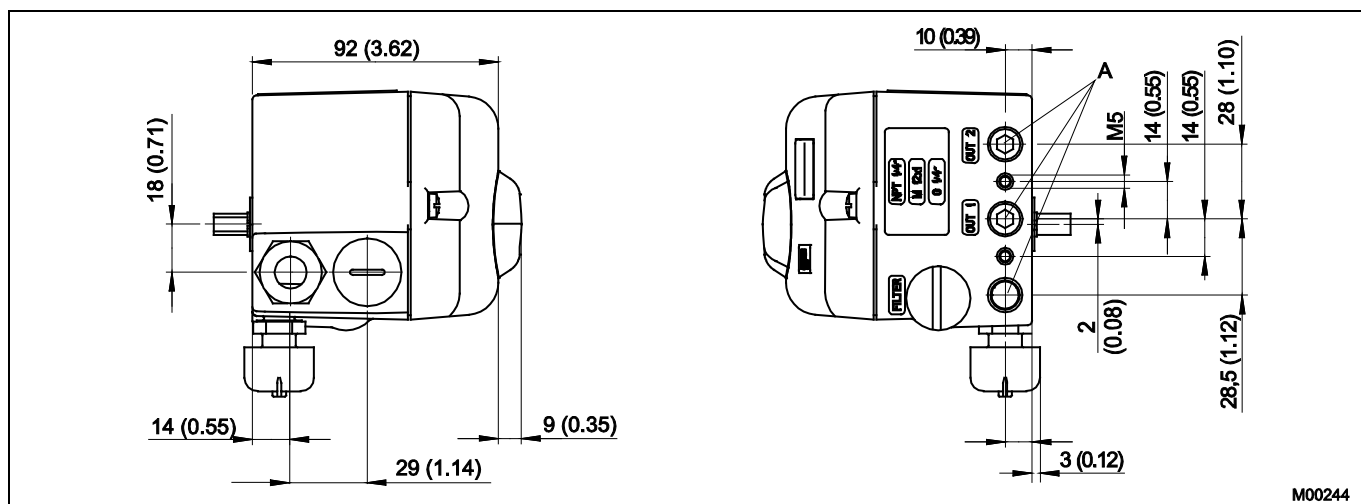


Fig. 13: side view (from left to right)  
A Pneumatic connections, NPT 1/4"-18 or G1/4"

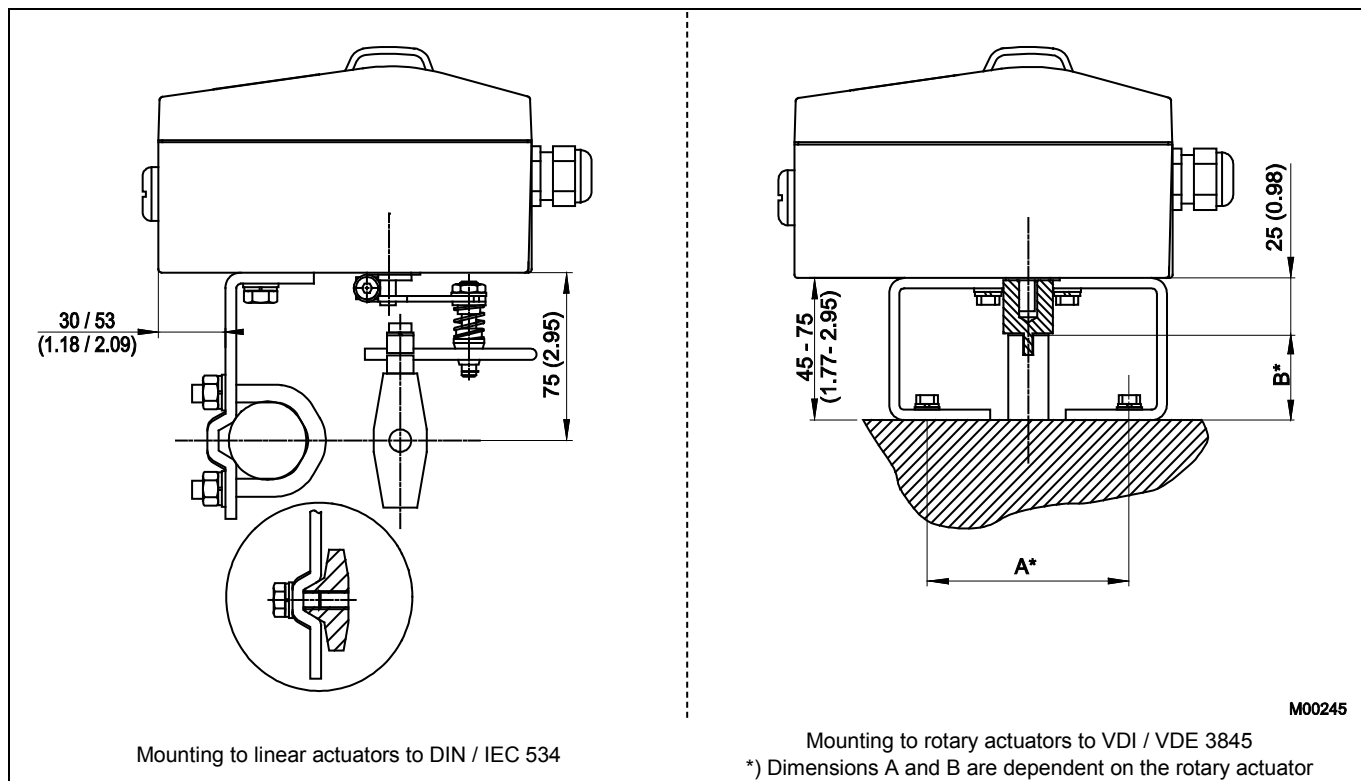


Fig. 14: Mounting drawings

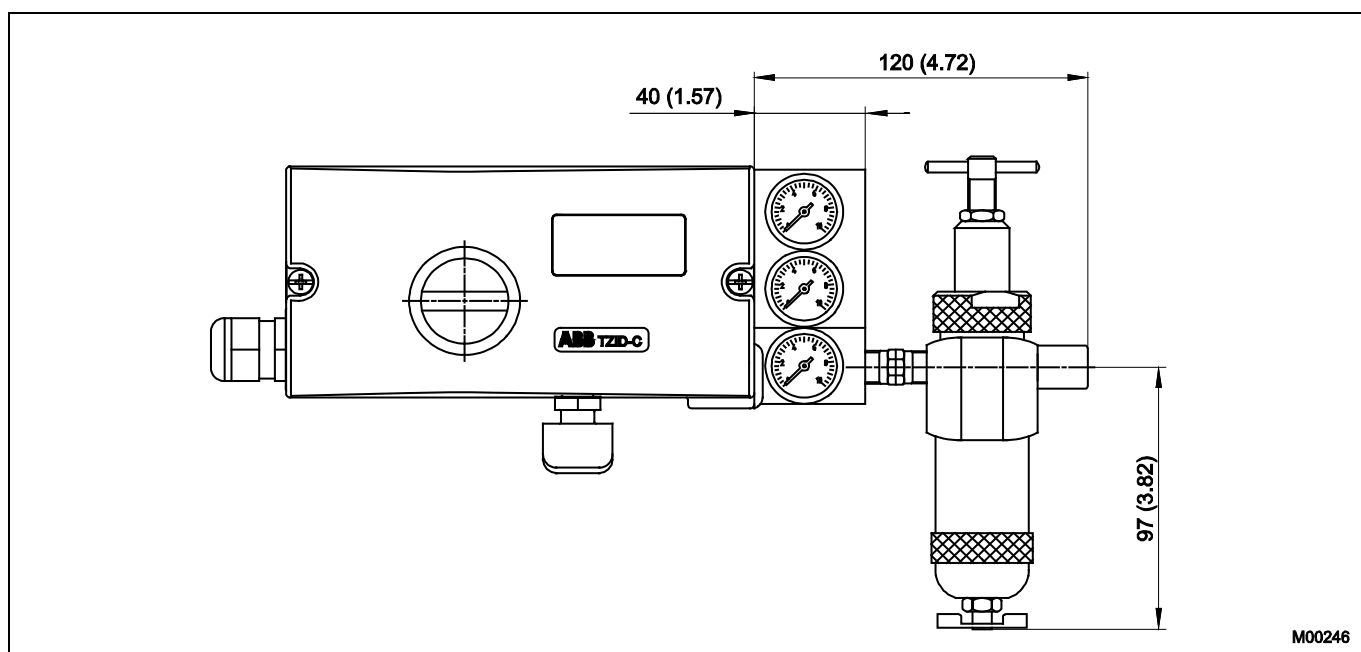


Fig. 15: Positioner TZIDC with pressure gauge block and filter regulator

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