Brief description

The TZIDC is an electronically configurable positioner with communication capabilities designed for mounting on 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 positioner allow for considerable time savings as well as optimum 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.
Dosing of the air flow for pressurizing or depressurizing the actuator is continuously adjusted. As a result, excellent control results are achieved. When reaching the setpoint, the 3/3-way valve is closed in center position to minimize the air consumption.
The pneumatic system can be supplied in four versions: for single acting and double acting actuators and each with the 'fail-safe' / 'fail-freeze' safety function.

'Fail-safe' safety function
If the electric power supply fails, the positioner output 1 is depressurized and the return spring in the pneumatic actuator moves the valve to the safe position. In case of a 'double-acting' version, output 2 is additionally pressurized.

'Fail-freeze' function
If the electric power supply fails, the positioner Output 1 (and Output 2 if applicable) is closed and the pneumatic actuator blocks the valve in the current position. If the compressed air supply power fails, the positioner depressurizes the actuator.

Use

The positioner has a built-in operating panel providing a 2-line LCD indicator and 4 operating buttons for commissioning, configuration and monitoring during live operation.
Alternatively, the appropriate configuration program can be used via the available communication interface.

Communication

The positioner has a local communication interface (LCI) as standard. Additionally, a 'HART® communication' option for communication via the 20 mA signal is available. Both communications are based on the HART® Protocol.
Alternatively, HART®5 or HART®7 are available.

Inputs / Outputs

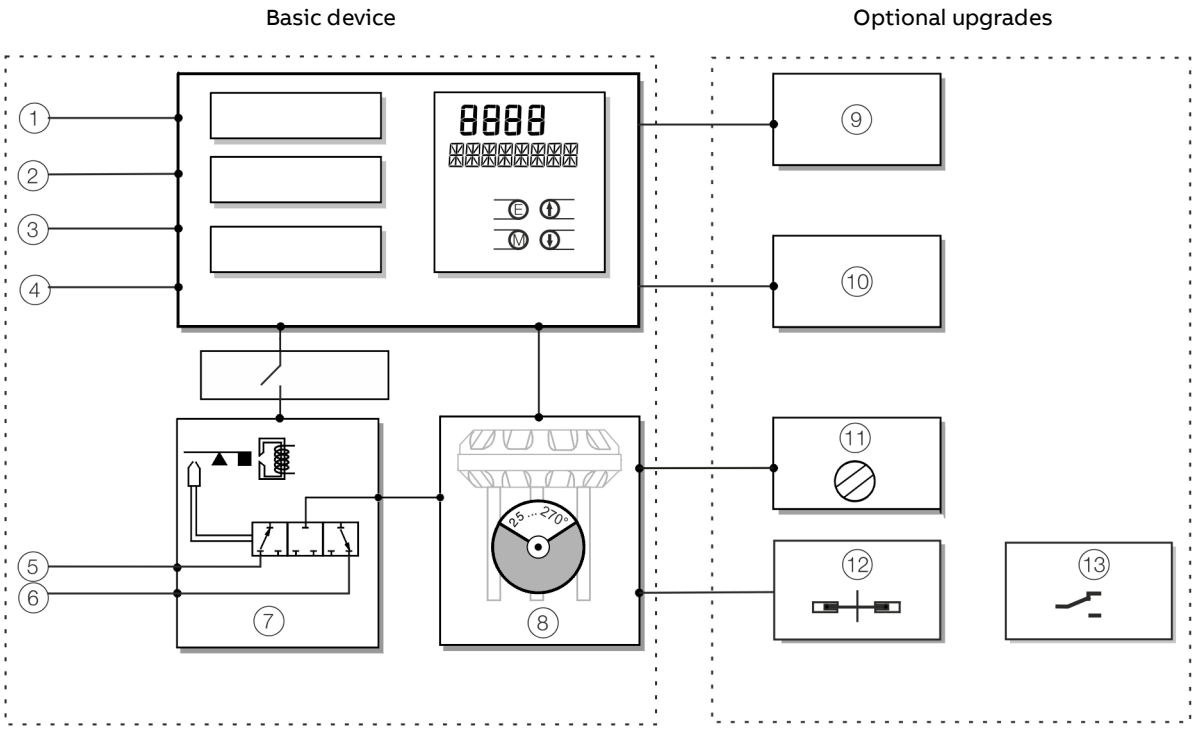
In addition to its input for the analog position setpoint, the positioner is equipped with a digital input which can be used to activate control system functions in the device. A digital output allows you to output collective messages (alarms / faults).

Modular design

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

… Brief description

Schematic diagram



1. LCI plug
2. Setpoint signal 4 to 20 mA
3. Binary input
4. Binary output
5. Supply air: 1.4 to 6 bar (20 to 90 psi)
6. Exhaust
7. I/P module with 3/3-way valve
8. Position sensor
9. Plug-in module for analog feedback (4 to 20 mA)
10. Plug-in module for digital feedback
11. Mechanical position indication
12. Feedback on the actuator position using proximity switches
13. Feedback on the actuator position using microswitches

Figure 1: Schematic diagram of the positioner

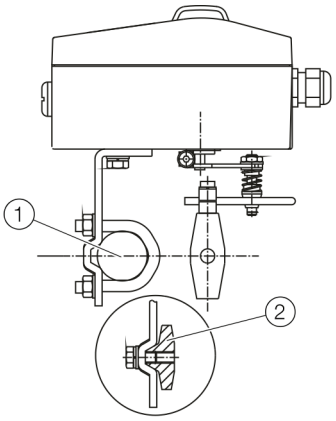
Note

With optional extensions, either the 'Feedback on the actuator position using proximity switches' (12) or the 'Feedback on the actuator position using microswitches' (13) can be used. The mechanical position indication (11) must be installed in both cases.

Mounting versions

Standardized mounting on pneumatic linear actuators

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 pipe fittings and air pipes.



① Columnar yoke ② Cast iron yoke

Figure 2: Mounting on linear actuators in accordance with DIN / IEC 534

Standardized mounting on pneumatic rotary actuators

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 corresponding feedback shaft adapter has to be ordered separately. Screwed pipe connections and air pipes have to be provided on site.

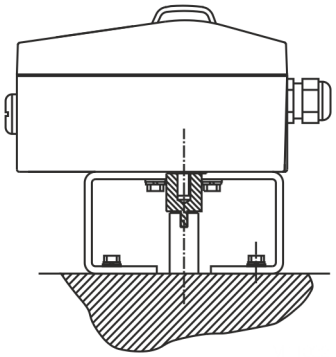


Figure 3: Mounting on rotary actuators in accordance with VDI / VDE 3845

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 advantage of integrated mounting is that the point for mechanical stroke measurement is protected and that the positioner and actuator are linked internally. No external tubing is required.

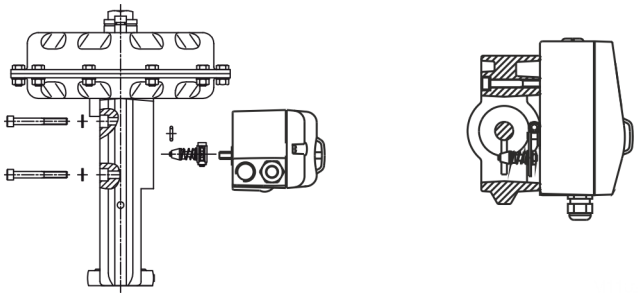


Figure 4: Integral mounting on control valves

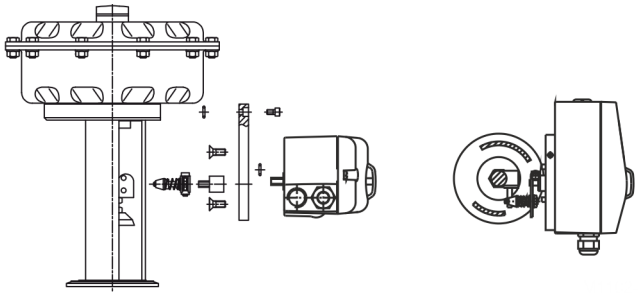


Figure 5: Integral mounting on control valves with adapter plate

Special actuator-specific mounting versions

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

Device parameters

General

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
- Operation monitoring parameters
- Diagnosis parameters
- Maintenance parameters

Operating parameters

The following operating parameters can be set manually if required:

Setpoint signal
0 to 100 % freely selectable for split-range operation

For 4 to 20 mA and HART version:

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

Action (set point signal)
Increasing:

- Position value 0 to 100 % = direction 0 to 100 %

Decreasing:

- Setpoint signal 100 to 0 % = direction 0 to 100 %

Characteristic curve (actuator travel = f {set point signal})
Linear, equal percentage 1:25 or 1:50 or 25:1 or 50:1 or freely configurable with 20 reference points.

Actuator travel limit
The actuator travel, i.e. the stroke or angle of rotation, can be reduced as needed within the full range of 0 to 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 associated limit value is up-scaled, the function causes immediate travel of the actuator to the selected end position.
If the value ‘0’ is entered for the corresponding parameter, the position is further controlled, even in the respective end position.

Actuator 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.
This function can only be used with the pneumatics with the safety function ‘fail-safe’.

Switching points for the position
You can use these parameters to define two position limit values for signaling, see option ‘Module for digital position feedback’.

Digital 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 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 (standard setting)
- Move to position 0 %
- Move to position 100 %
- Hold previous position
- Block local parameterization
- Block local parameterization and operation
- Block all access (no local or remote access via a PC)

The selected function is activated when the 24 V signal is no longer connected to the digital input (< 11 V DC).

… Device parameters

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.

Tolerance band
Upon reaching the tolerance band, the position is re-adjusted more slowly 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 direction of rotation of the sensor shaft (looking at the open housing), if the safe position is approached as a result of the spring force in the actuator (actuator is depressurized via Y1 / OUT1).
For double-acting actuators, the actuator spring action corresponds to pressurizing the pneumatic output (Y2 / OUT2).

Display 0 to 100 %
Adjust the display 0 to 100 % in accordance with the direction for opening or closing the final control element.

Operations monitoring parameters

Various functions for continuous device monitoring are implemented in the operating program for the positioner. The following states will be detected and indicated, e.g.:

- Setpoint signal out of range 4 to 20 mA
- Position out of the adjusted range
- Positioning time up-scaled (adjustable time parameter)
- Positioner inactive
- Counter limits up-scaled (adjustable in diagnosis)

While automatic commissioning is in progress, the current state is continuously indicated on the integrated LCD display. During operation, the LCD shows the most important process variables:

- Current position in %
- Faults, alarms, messages (coded)

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

Diagnosis parameters

The diagnostics parameters in the positioner's operating program provide information about the operating conditions of the valve.
From this information the operator can derive what maintenance work is required, and when.
Additionally, limit values can be defined for these parameters. When they are exceeded, an alarm is reported.
So, for example, the following operating values are determined:

- Number of movements of the final control element
- Sum of individual actuator travel events

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

Operator panel

The integrated operating panel of the positioner has four operating buttons which allow the device to be operated with an open housing cover. The following functions can be controlled via the function keys:

- Observe live operation
- Manual intervention during live operation
- Parameterization of the device
- Fully automatic commissioning

The operating panel has a cover to protect against unauthorized operation.



Figure 7: Open TZIDC with a view of the operating panel

'One-button' commissioning

Commissioning the positioner is especially easy. Standard Auto Adjust is triggered by pressing a single operating button. Detailed configuration knowledge is not necessary in order to start the device.

Depending on the selected actuator type (linear or rotary actuator), 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.

LCD display

The multi-line LCD indicator is automatically updated during operation to provide the user with relevant information as necessary.

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

- Current set point SP [mA] (up button)
- Electronics temperature [°C, °F, °R, K] (down button)
- Current control deviation DEV [%] (both direction buttons)

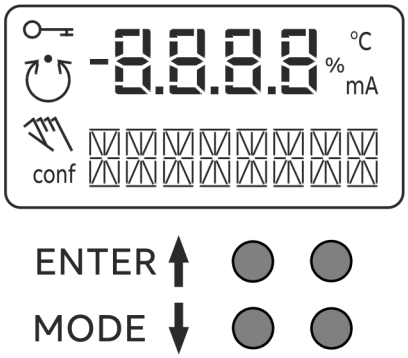


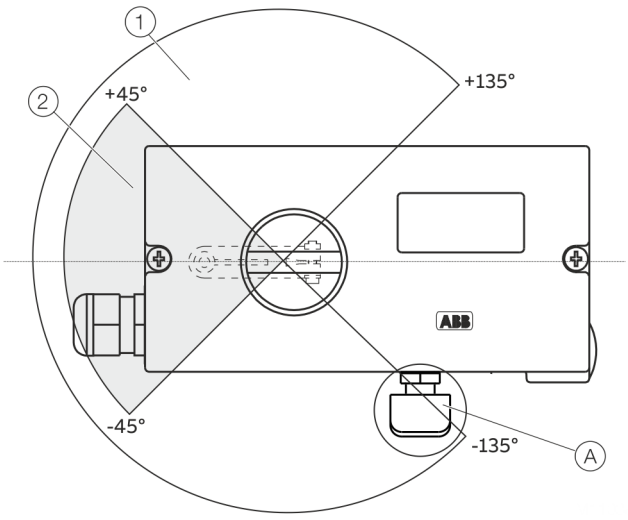
Figure 8: LCD display with operating buttons

Specification

Actuator travel

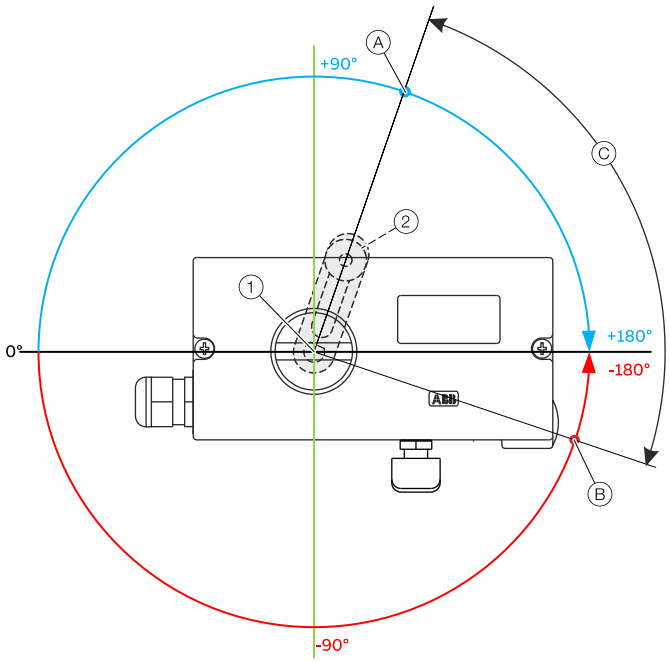
Rotation angle	
Meas. range	270° / 360°*
Operating range for linear actuators	min. 25°, max. 45°
Operating range for rotary actuators	min. 25°, max. <270°, see Figure 11 min. 25°, max. 350°*, see Figure 12
Actuator travel limit	Min. and max. limits, freely configurable in range of 0 to 100 % of total travel (min. range > 20 %)
Actuator travel time prolongation	Setting range of 0 to 200 seconds, separately for each direction
Dead band time limit	Setting range 0 to 200 seconds (monitoring parameter for the control deviation until the dead band is reached)

* From HW rev.: 5.01 with order option "**S1 – Contactless sensor**"



(1) Measuring range (2) Operating range

Figure 11: Measuring and operating ranges of the positioner



(A) Operating range 0% opening degree
(B) Operating range 100% opening degree
(C) Operating range of the valve/actuator
(1) Device feedback shaft
(2) Lever

Figure 12: Measuring and operating range of the positioner from HW rev.: 5.01 with optional contactless position feedback (example)

Housing

Material / IP rating	
Aluminum with ≤ 0.1% copper	
IP rating	IP 65 / NEMA 4X (NEMA 4X does not permit overhead mounting), (IP 66, optional)

Surface/color	
Dipping varnish	With epoxy resin, stove-hardened
Housing varnished matt black	RAL 9005
Case cover	Pantone 420

Weight	
Aluminum	1.7 kg (3.75 lb)

Mounting orientation

Any

Transmission data and contributing factors

Output Y1	
Increasing set point signal	0 to 100 % Increasing pressure at output
Decreasing set point signal	0 to 100 % Decreasing pressure at output

Action (set point signal)	
Increasing set point	4 to 20 mA = actuator position 0 to 100 %
Decreasing set point	20 to 4 mA = actuator position 0 to 100 %

Characteristic curve (actuator travel = f {set point signal})	
Linear	Equal percentage 1:25 or 1:50 or 25:1 or 50:1*
Deviation	≤ 0.5 %
Tolerance band	0.3 to 10 %, adjustable
Configurable dead zone	0.1 to 10 %, adjustable
Resolution (AD-conversion)	> 16,000 steps
Sampling frequency	20 ms
Ambient temperature effect	≤ 0.5 % per 10 K
Reference temperature	20 °C
Influence of vibration	≤ 1 % to 10 g and 80 Hz

* 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)

Ordering Information

Main ordering information TZIDC

Base model V18345	XX	X	X	X	X	X	XX	X
TZIDC digital positioner, intelligent, configurable, with indicator and operator panel								
Case / Mounting								
Case made of aluminium, varnished, for mounting to linear actuators acc. DIN / IEC 534 / NAMUR or to rotary actuators acc. VDI / VDE 3845	10							
Case made of aluminium, varnished, with mechanical position indicator, for mounting to linear actuators acc. DIN / IEC 534 / NAMUR or to rotary actuators acc. VDI / VDE 3845	20							
Case made of aluminium, varnished, for integral mounting to control valves (see dimensional drawing)	30							
Case made of aluminium, varnished, with mechanical position indicator, for integral mounting to control valves (see dimensional drawing)	40							
Remote sensor control unit	70*							
Input / Communication Port								
Input 4 to 20 mA, two-wire, with connector plug for LCI adapter		1						
Input 4 to 20 mA, two-wire, with connector plug for LCI adapter and FSK module for HART communication		2						
Explosion Protection								
Without			0					
ATEX II 2 G Ex ib IIC T6 resp. T4 Gb			1					
cFMus			2					
IECEx Ex ib IIC T6 resp. T4 Gb			5					
ATEX II 2 G Ex ia IIC T6 resp. T4 Gb			7					
UKEX Ex ia			A					
UKEX Ex ib			B					
EAC 1Ex ia IIC T6/T4 Gb X			H**					
EAC 1Ex ib IIC T6/T4 Gb X			J**					
IECEx ia IIC T6 resp. T4 Gb			K					
NEPSI Ex ia IIC T4/T6 Gb			U					
NEPSI Ex ib IIC T4/T6 Gb			V					
INMETRO Ex ib IIC Gb T4/T6 Gb			P					
KOSHA Ex ib			R					
Output / Safe Position (in case of an electrical power failure)								
Single acting, fail safe				1				
Single acting, fail freeze				2				
Double acting, fail safe				4***				
Double acting, fail freeze				5***				

* With standard characteristic curve, if delivered without remote sensor

** Reduced Functionality

*** Not for for integral mounting

Continued see next page

… Ordering Information

… Main ordering information TZIDC

TZIDC digital positioner, intelligent, configurable, with indicator and operator panel	**X**	**X**	**XX**	**X**
Connections				
Cable: Thread ½-14 NPT, air pipe: Thread ¼-18 NPT	2			
Cable: Thread M20 × 1.5, air pipe: Thread ¼-18 NPT	5			
Cable: Thread M20 × 1.5, air pipe: Thread G ¼	6			
Cable: Thread G ½, air pipe: Thread Rc ¼	7			
Option Modules for Analog or Digital Position Feedback				
Without		0		
Plug-in module for analog position feedback, signal range 4 bis 20 mA, two-wire		1		
Plug-in module for digital position feedback		3		
Plug-in module for analog position feedback, signal range 4 bis 20 mA, two-wire, and digital position feedback		5		
Optional Mechanical Kit for Digital Position Feedback				
Without			00	
Mechanical kit for digital position feedback with proximity switches SJ2-SN (NC or logical 1)			10*	
Mechanical kit for digital position feedback with 24 V AC / DC microswitches (change-over contacts)			50**	
Design (Varnish / Coding)				
Standard				1
Higher Stiffness + Lower Air Capacity				H***
Protection Class IP 66 / NEMA 4X				P
Increased Corrosion Protection				S

* Only for model with mechanical position indicator, no IECEx

** Not for explosion protected version and only for model with mechanical position indicator

*** Only with Type Double Acting

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