

- Communication based on the “HART” protocol
- High operational reliability through regular operational tests
- Electronical adjustment of operating data, in parts automatic (autostroke) and in parts manual
- Easily understandable adjustment mode, adjustment via the built-in operator panel or remotely using the standardized configuration program
- Characteristic linear, equal percentage, or with 20 configurable reference points
- Explosion protection certificates: ATEX - FM - CSA and others, intrinsically safe
- 4...20 mA input, 2-wire, Supply voltage 9.8 V DC or 10.8 V DC
- Complies with the directives for EMC and CE conformity
- Wide operating temperature range, -40 bis +85 °C
- Robust aluminum or stainless steel case
- Influence of shock and vibration < 1 % with a load of up to 10 g and frequencies between 20 and 80 Hz
- Non-contact (inductive) position sensor
- Stable control loop through self-adaptation and continuous modulation of the output
- Easy to install, all connections on ones side, separate terminal box for wiring
- Attachment to linear or rotary actuator
- Low operating cost, air consumption only 0.03 kg/h



**Construction and mode of operation**

**The concept**

The TZID positioner is an intelligent and electronically configurable device with communication capabilities. High-tech electronics are coupled with a robust and well-proven mechanical construction on the pneumatic side to obtain an optimal design of positioner.

The functional heart of the TZID positioner is its CPU (see illustration below). The mechanical and pneumatic assembly groups only have secondary functions. The input signal (set point) and the position (actual value) are fed into the processor via A/D converter. An output signal is computed on the basis of the control deviation and a PD control algorithm. The signal is output to an I/P module via a D/A converter and is used for analog modulation of the I/P module. The I/P module provides for pneumatic, analog adjustment of a 3/3 way valve. The cross-sectional area of the valve air ducts for filling the actuator with air or evacuating air from the actuator is changed in proportion with the adjustment. Continuous signal modulation yields optimal results in terms of precise and rapid control until reaching the set point and in terms of the adaptation to actuators of different sizes and different supply pressures.

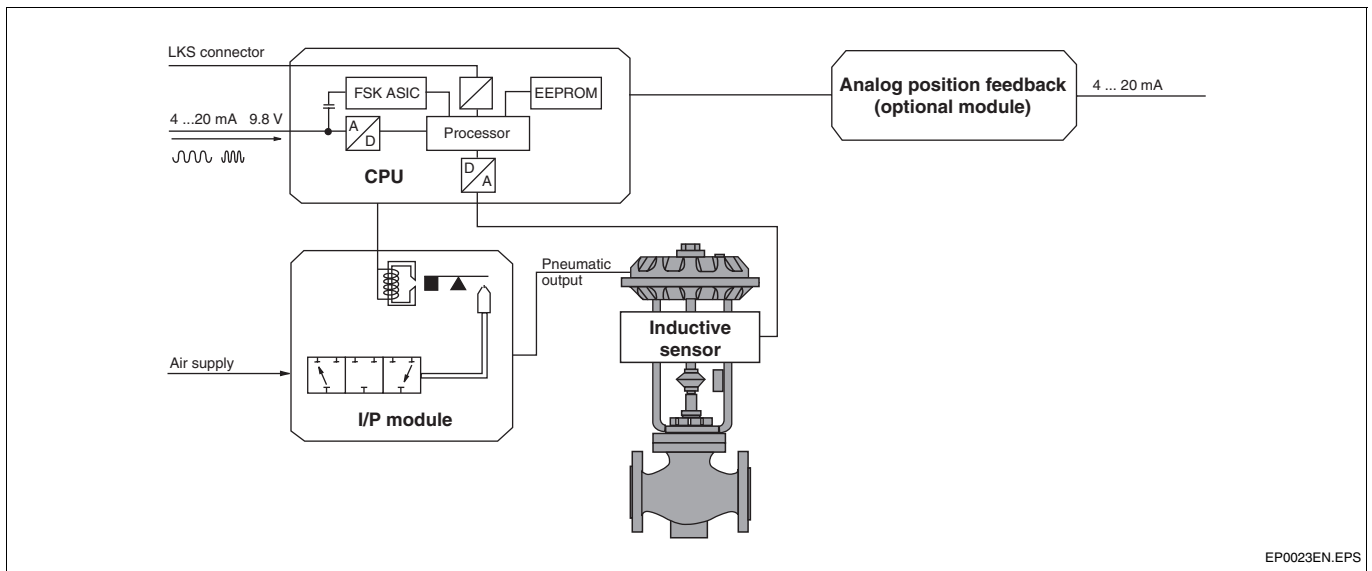
The I/P conversion is done with the same I/P module as used for the TEIP 11 signal converter. This well-proven module is already used in the field more than 1,000,000 times and has an unequaled immunity to shock and vibration.

The TZID positioner has a two-wire 4...20 mA input. The energy needed to power the electronic component parts is derived from the input signal. Compressed air (1.4...6 bar) is the only external energy required. The TZID has a low consumption of less than 4 mA due to the two-wire circuitry, and of only 0.03 kg compressed air per hour.

A rotating feedback shaft for determining the position is the only moving part of the TZID. An inductive, non-contact sensor converts the position into an electrical signal. As a result, the wear-rate is very low.

The TZID positioner provides for maximum operational reliability. Adherence to the EMC regulation ensures immunity to EMF and RFI. The robust IP 65 (NEMA 4X) metal case protects the TZID against harsh environments. Special functions for monitoring that the CPU works properly and that the control point is controlled correctly deliver an alarm message if an error occurs.

The TZID positioner is designed for the operating temperature range of -40 to +85 °C (-40 to +185 °F).



**Bild 1:** TZID schematic diagram

**Attachment**

The TZID can be attached to pneumatic actuators for linear (stroke) or rotary movement (angle of rotation), to actuators with spring return (single acting) or with double air action (double acting).

The off-the-shelf devices are designed for attachment conforming to the standard (lateral attachment to DIN/IEC 534 or attachment to rotary actuators to VDI/VE 3845). Customized actuator-specific versions for special attachment are available upon request.

When mounting the positioner to an actuator, a rough balancing of the mechanical link for converting the stroke suffices. The wide usable range of the angle of rotation dispenses with the need for a time-consuming mechanical adjustment. The fine adjustment is done automatically through the autostroke.

The air connections and the cable glands are located on the right hand side, making installation easy. NPT connections are provided for the air pipes, and screw terminals are available for connecting the electrical wires.

## Matching to the operating conditions

Various parameters can be set, helping the user to achieve optimal precise control until reaching the setpoint and a high operational reliability. The parameters can be changed while the positioner is on line and working, and are then immediately taken over.

### Operating parameters

- Signal range 4...20 mA or split-range
- Valve action  
Direct: Range 4...20 mA/direction 0...100 %  
Reverse: Range 20...4 mA/direction 0...100 %
- Characteristic curve (travel = f {positioning signal})  
linear,  
equal percentage 1:25 or 1:50 or 25:1 or 50:1,  
or user-configurable with 20 reference points
- Tolerance band (sensitivity limit)  
The factory setting of 0.3 % is a typical value, which only has to be increased in case of very short strokes or high hysteresis values of the valve. Normally, the controller automatically optimizes itself during the autostroke function.
- Travel limiting  
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 value  
This function causes immediate closing of the actuator. The threshold can be configured.
- Time-out monitoring  
This function is used to monitor the time needed to reach the set point. It triggers an alarm if the unit is not able to adjust the deviation such that it fits into the tolerance band within the set time.
- Adjusted speed for full travel 100 %  
This function is used to increase the natural speed for controlling the full travel until reaching the set point. The speed can be set independently for each direction.
- Alarm limits for minimum and maximum positions  
This parameter is used to define the switching points for the minimum and the maximum position.

## Monitoring functions

The TZID positioner is permanently monitored while it is working. The following list gives some examples for errors that can be detected and indicated:

- Watchdog alarm
- Leakage in the actuator or air pipe
- Signal < 4 or > 20 mA
- Position out of adjusted range (rotation angle) for position feedback
- User actions (manual) affecting CPU operation (controller is not active)
- Positioning time-out (adjustable time parameter)
- Limit of stroke counter or displacement meter exceeded (limits can be adjusted during diagnosis)

If any of these troubles occurs, an alarm is generated and reported, either by indication of an error code on the built-in display or via the option modules (if plugged in).

Extended monitoring is possible via the communication port. The registered troubles are indicated as plain text in a special window (in online mode). Additionally, the most important process variables like the output signal in mA, the position in % and the deviation are indicated.

The operator can decide whether or not the above-listed troubles shall generate an alarm. This can be configured via the communication port and the SMART VISION<sup>®</sup> configuration program.

### Functional check

When the option module for analog position feedback is connected, it can be checked for proper function and wiring. For this purpose, simulation values can be transmitted to the positioner, e. g. by using the "Simulation" window of the SMART VISION<sup>®</sup> configuration program. While the simulation is active, the TZID positioner is not working in control mode. After around 2 minutes the simulation is stopped automatically. It can also be terminated at any time by actuation of the "Cancel" button.

### Adjustment

The following adjustment parameters are available:

- Full travel of 100 %  
(stroke or angle of rotation)
- Effective direction of the actuator  
(direction with compressed air or spring action)
- Valve action  
(direction of action for opening/closing the valve)
- Controller parameters

Most of these parameters can be adjusted automatically by starting the autostroke function. Only the valve action needs to be adjusted manually.

## Operation and communication

### General

The TZID positioner has a built-in operator panel with special adjustment capabilities tailored to commissioning. The full range of TZID functions can only be accessed via the communication port.

On the built-in operator panel you can make any adjustment that is necessary to commission the positioner after attachment to the actuator. The panel is intuitively operable. Short instructions printed on the panel contain the required information.

The full range of functions described above is available via the communication port. Communication is based on the HART protocol. Signals can be tapped either locally at the connector or frequency-modulated at any chosen point of the 4...20 mA signal transmission. Communication is done on line while the system is running, without impairing operation. New parameter settings become active immediately after being downloaded into the device, but have to be stored in the non-volatile memory with a special command.

A special connector (LKS adapter or FSK modem), a standard off-the-shelf PC (which has to meet special hardware requirements), and a special software (e. g. SMART VISION<sup>®</sup>) are needed.

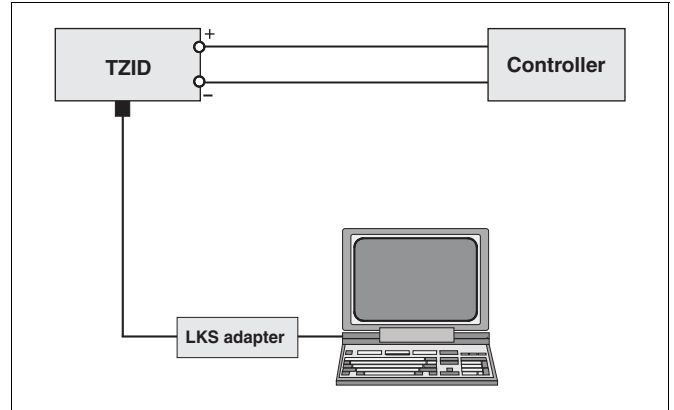
### LKS adapter as communication link

The LKS adapter is a connection solution which is both easy to install and cost-saving. On the TZID side a special connector (local communication interface) is used. On the PC side, a double sub-D connector with a 9-pole and a 25-pole connector is used. The connector also accommodates an RS 232 interface converter for connection to the PC.

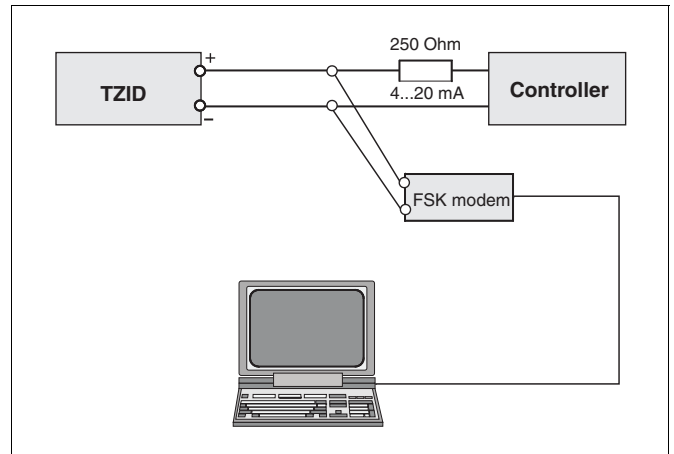
The TZID can be configured without requiring that a positioning signal is present. The CPU is powered by the PC.

### FSK modem (HART) as communication link

The FSK modem allows digital frequency-modulated communication (**F**requency **S**hift **K**eying). The digital signal "0" corresponds to 2.2 kHz, the digital signal "1" to 1.2 kHz. Tapping is possible at any chosen point of 4...20 mA transmission, i.e. directly on site at the TZID or in any remote place, e.g. at a PLS in the control room. Frequency-modulated communication requires a circuit with a resistance of at least 250 ohms.



**Bild 2:** Local communication via LKS adapter



**Bild 3:** Communication via HART protocol and FSK modem

## Technical Data

### Input

#### Signal range

Nominal range 4...20 mA  
Split ranges configurable between 20 and 100 %

#### Two-wire circuitry

Supply voltage      9.8 V DC without explosion protection  
                         9.8 V DC with Ex d approval  
                         10.8 V DC for intrinsically safe device  
Resistance          490 ohms at 20 mA and 9.8 V DC  
                         540 ohms at 20 mA and 10.8 V DC

### Output

#### Signal range

0...6 bar (0...90 psi)

#### Air capacity

At supply pressure of 1.4 bar (20 psi)  
5.5 kg/h = 4.5 Nm<sup>3</sup>/h = 2.5 scfm  
At supply pressure of 6 bar (90 psi)  
13 kg/h = 11 Nm<sup>3</sup>/h = 6.5 scfm  
(Booster for increase of capacity available on request)

#### Action

Single or double, air is evacuated from actuator or actuator is blocked in case of (electrical) power failure

#### Shut off value

Settable to 0...20 % of positioning signal  
(if the value falls below the set value, the positioner immediately sets the actuator to the closed position)

#### Stroke movement

##### Angle of rotation

60° nominal range for attachment to linear actuators  
in accordance with DIN/IEC 534  
120° nominal range for attachment to rotary actuators  
in accordance with VDI/VDE 3845  
Used range is 20...100 % of nominal range

##### Adjusted speed

Range 0...200 sec,  
individually configurable for each direction

##### Time-out monitoring

Range 0...200 sec (monitoring parameter for control until the deviation is within the tolerance band)

##### Stroke limiting

Min. and max. limits, settable between 0 and 100 % of the stroke

### Air supply

#### Instrument air

free of oil, water and dust to DIN/ISO 8573-1  
pollution and oil contents according to Class 3  
dew point 10 K below operating temperature

#### Supply pressure

1.4...6 bar (20...90 psi)  
**Caution:** Do not exceed the max. working pressure of the actuator!

#### Air consumption

< 0.03 kg/h (independent of supply pressure)

## Transmission data and influences

### Effective direction (output signal or pressure in actuator)

Increasing:            Increasing signal 4...20 mA  
                         Increasing pressure  $y_1$  in actuator  
Decreasing:          Increasing signal 4...20 mA  
                         Decreasing pressure  $y_1$  in actuator

### Valve action

Direct:                Range 4...20 mA = position 0..100 %  
Reverse:              Range 20...4 mA = position 0..100 %

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

linear,  
equal percentage 1:25 or 1:50 or 25:1 or 50:1,  
or user-configurable with 20 reference points

### Characteristic deviation

≤ 0.5 %

### Tolerance band (sensitivity)

Adjustable from 0.3...10 %

### Resolution (A/D conversion)

> 8000 steps

### Sample rate

20 msec

### Influence of ambient temperature

≤ 0.5 % for every 10 K

### Influence of vibration

≤ 1 % up to 10 g and 20...80 Hz

### Seismic requirements

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

### Influence of mounting orientation

No effect

### EMC

Meets EMC directive 89/336/EEC as of May 1989

### CE mark

Meets the EC directive for the CE conformity certification

### Communication port

Connector for LKS adapter (standard)  
FSK module (HART) for frequency-modulated tapping (optional)

## Environmental capabilities

### Climate class

GPF to DIN 40040

### Ambient temperature

-40 to +85 °C (-40 to +185 °F)  
for operation, storage and transport

## Explosion protection

### ATEX

EEx ia IIC T4/T5/T6, ATEX EEx n II T6

### FM

Intrinsically Safe CL I-II-III, Div 1, Grp A-B-C-D-E-F-G  
Non-incendive CL I-II-III, Div 2, Grp A-B-C-D-E-F-G

### CSA

Intrinsically Safe CL I, Div 1, Grp A-B-C-D  
CL II, Div 1, Grp E-F-G  
Non-incendive CL I, Div 2, Grp A-B-C-D  
CL II, Div 2, Grp E-F-G

### Case

#### Material

Aluminum, protection IP 65 (NEMA 4X)  
Surface  
Case black, RAL 9005, matt  
Cover light gray, RAL 9002  
with thick film epoxy resin electro-dipcoat  
Stainless steel 1.4581, protection IP 65 (NEMA 4X)

#### Electrical connections

Screw terminals, internal, for 2.5 mm<sup>2</sup>

#### Cable entry

Threads 1/2-14 NPT or M20 x 1.5 with cable gland

#### Pneumatic connections

G 1/4 or 1/4-18 NPT threads

#### Weight

2.9 kg (TZID, main catalog no.18341, with aluminum case)  
5.6 kg (TZID, main catalog no. 18341, with stainless steel case)

#### Mounting position

As required

## Options

### Option module for analog feedback

Signal range 4...20 mA (split ranges configurable)  
Two-wire circuitry, power supply 10...30 V DC  
Standard or intrinsically safe version  
Valve action direct or reverse (as configured)  
Characteristic deviation ≤ 1 %  
(Whether the module is to be used for alarm reporting and whether the output is to be modulated to < 4 or > 20 mA can be configured).

### Mechanical kit for digital position feedback

2 proximity switches for current circuits in acc. with DIN 19234  
Control voltage 5...25 V DC  
Control current < 1 mA = switching state logical "0"  
Control current > 2 mA = switching state logical "1"  
For min. or max. position  
Limits adjustable between 0 and 100 %  
(Function independent of the software and electronics of the positioner)

Direction of action (logical state):

Proximity switch	Position			
	< min	> min	< max	> max
SJ2-SN (NC)	0	1	1	0
SJ2-S1N (NO) <sup>2)</sup>	1	0	0	1

<sup>1)</sup> Lower limit of operating temperature range: - 25 °C

## Accessories

### Attachment material

Attachment kit for linear actuators, stroke 10...85 mm  
(lateral attachment meets DIN/IEC 534 or Namur)  
Lever 170 mm for linear actuators, stroke 10...150 mm  
Attachment bracket for rotary actuators 90°  
Attachment to VDI/VDE 3845,  
dimensions A/B = 80/20 mm  
= 80/30 mm  
= 130/30 mm  
= 130/50 mm

Attachment kit for actuator-specific attachment available on request

### Pressure gauges for supply pressure and output pressure

Plastic or stainless steel case, Ø 40 mm  
Supply pressure range 0...10 bar/0...140 psi  
Output pressure range 0...10 bar/0...140 psi  
or 0...4 bar/0...60 psi

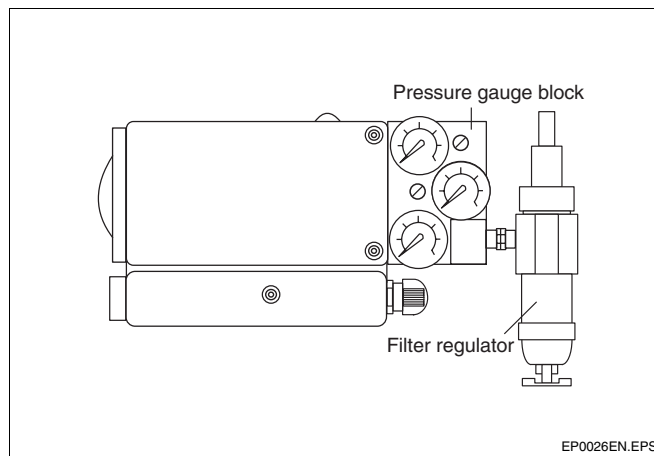
With connection block and attachment material for the TZID  
Connection block made of aluminum with black varnish or of stainless steel

### Filter regulator with attachment material

All metal version, brass, varnished black  
Bronze filter element, 40 µm, with condensate drain  
Max. pre-pressure 16 bar,  
output pressure adjustable to 1.4...6 bar

### PC adapter for communication

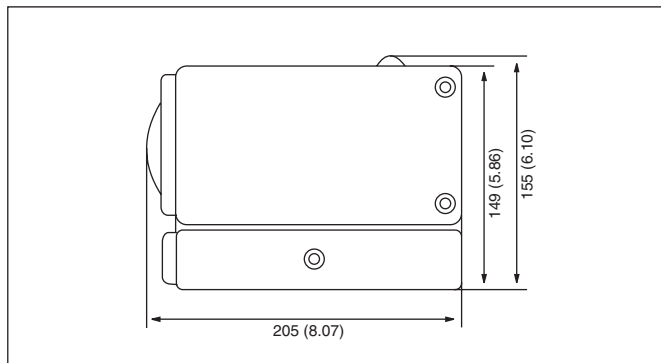
LKS adapter for connector on TZID  
FSK modem for frequency-modulated tapping



**Bild 4:** TZID positioner with attached pressure gauge block and filter regulator (if not otherwise agreed, the pressure gauge block and the filter regulator are delivered as separate units for mounting by the customer)

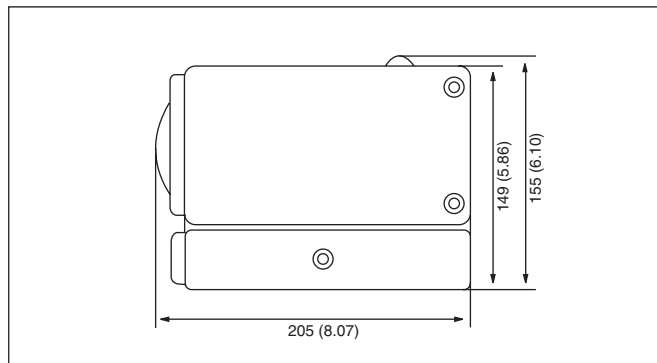
### Dimensional drawings

#### Lateral attachment to DIN / IEC 534

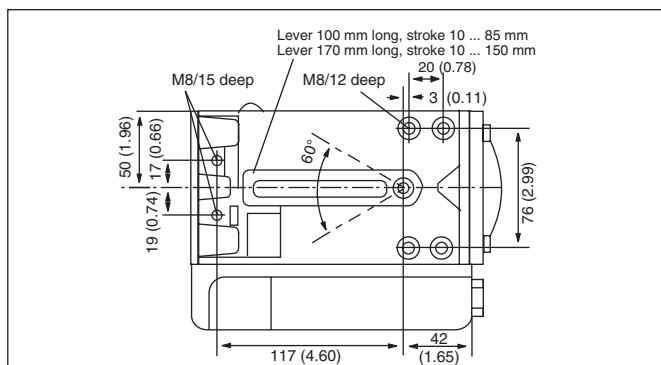


Front view

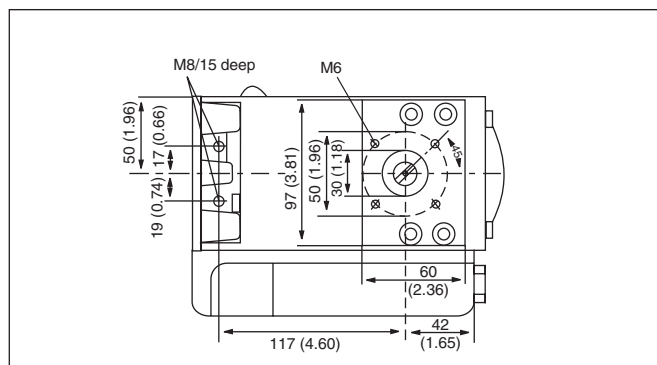
#### Attachment to rotary actuator to VDI / VDE 3845



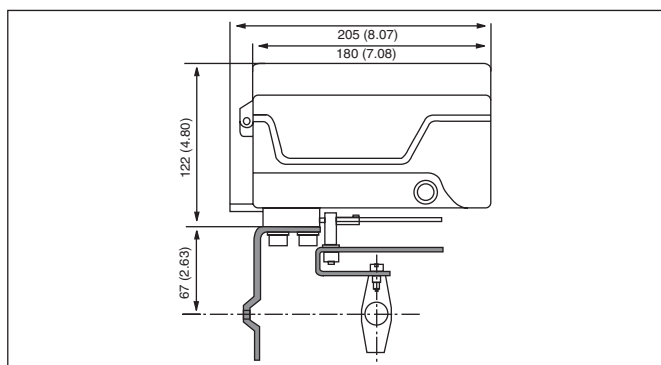
Front view



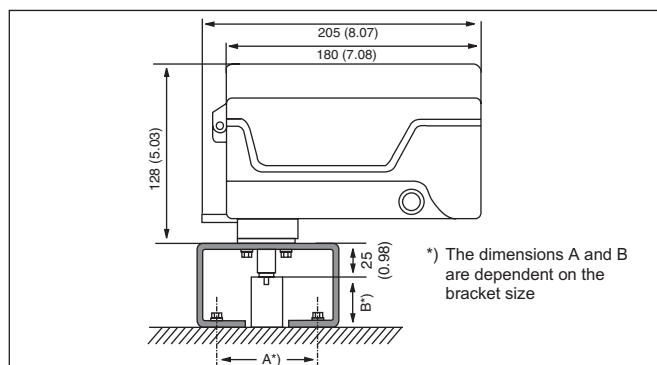
Rear view



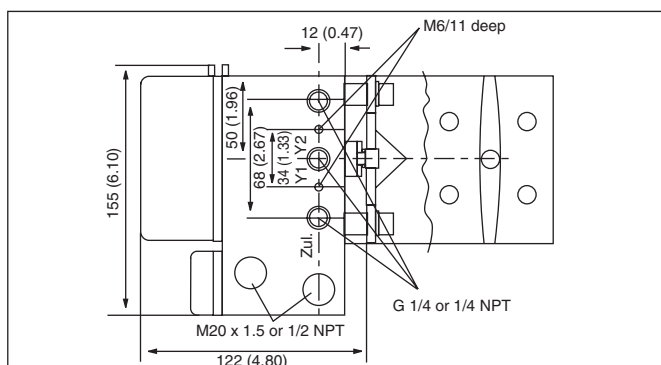
Rear view



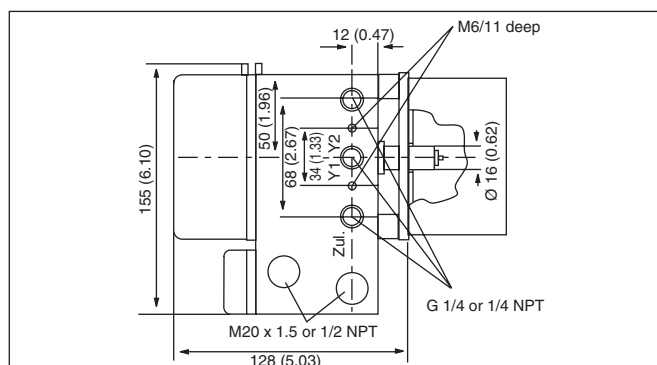
Bottom view



Bottom view



Side view (right)

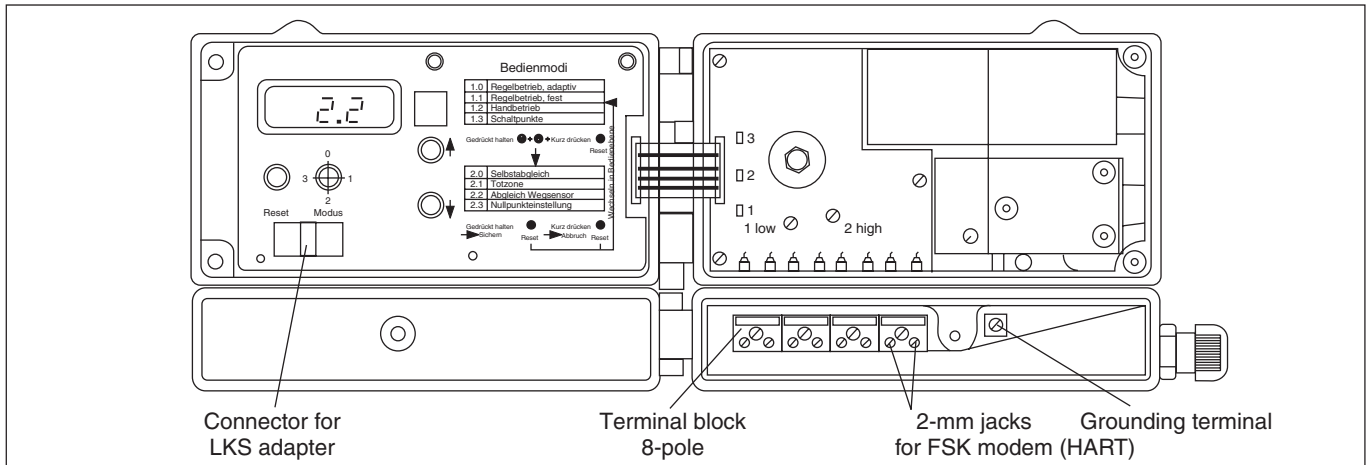


Side view (right)

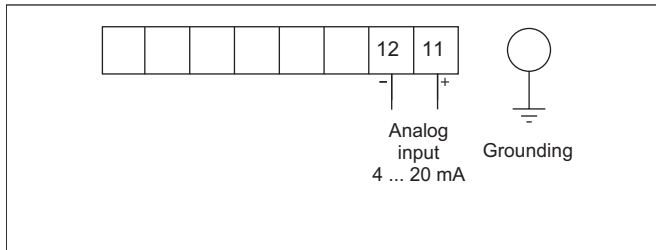
EP0029EN.EPS

## Connection diagrams

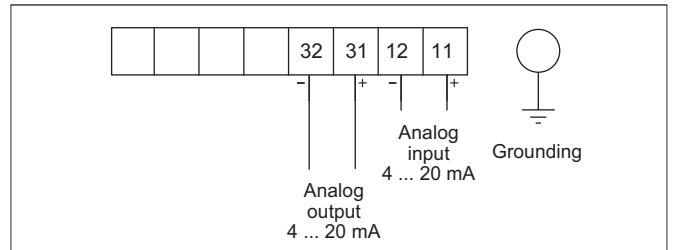
### Terminal layout of TZID



### Assignment of 8-pole terminal block



Basic model



Basic model with "analog position feedback" module



## Ordering information

Electro-Pneumatic Positioner TZID intelligent, configurable with display and operating panel signal input 4 ... 20 mA, two-wire	Variant digit No.	1-8	9	10	11	12	13	Code			
	Catalog No.	V18341H-									
<b>Case material</b> aluminium, varnished, protection IP 65 stainless steel 1.4581, protection IP 65			A S								
<b>Communication port / attachment</b> with plug connector for LKS adapter attachment to linear actuators to DIN/IEC 534 / NAMUR attachment to rotary actuators 90° to VDI/VDE 3845 for aluminium case for stainless steel case with plug connector for LKS adapter and FSK modem for HART communication attachment to linear actuators to DIN/IEC 534 / NAMUR attachment to rotary actuators 90° to VDI/VDE 3845 for aluminium case for stainless steel case with external position sensor and plug connector for LKS adapter aluminium case for attachment to linear actuators to DIN/IEC 534 / NAMUR aluminium case for attachment to rotary actuators 90° to VDI/VDE 3845 with external position sensor and plug connector for LKS adapter & FSK modem aluminium case for attachment to linear actuators to DIN/IEC 534 / NAMUR aluminium case for attachment to rotary actuators 90° to VDI/VDE 3845 <b>Note:</b> For attachment according to standard, additional mounting material is required (see "Accessories") Cable length with external position sensor, standard length 10 m Cable length 20 m can be ordered separately as Special feature				1 2 3 5 6 7 L M Y Z							
<b>Explosion protection</b> without ATEX EEx ia IIC ATEX EEx ia IIC, for inflammable gas for aluminium case for stainless steel case FM / CSA intrinsically safe ATEX Ex n other explosion protection certificates upon request					0 1 2 5 3 4						
<b>Controller output / safe position</b> single acting air is evacuated from actuator in case of electrical power failure actuator is blocked in case of electrical power failure double acting air is evacuated from actuator in case of electrical power failure actuator is blocked in case of electrical power failure					1 2 4 5						
<b>Connections</b> Cable: Thread 1/2-14 NPT      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					2 5 6						

1) Protection FM/CSA intrinsically safe only with cable connections 1/2-14 NPT

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**Ordering information (continued)**

Electro-Pneumatic Positioner TZID intelligent, configurable with display and operating panel signal input 4 ... 20 mA, two-wire	Variant digit No.	1-8	13	14	15	16	17	Code			
	Catalog No.	V18341H-									
<b>Option module</b> Prepared for retrofitting option modules for analog or digital position feedback											
Option module without Analog position feedback, signal range 4 ... 20 mA, two-wire without explosion protection intrinsically safe ATEX and FM / CSA				9	0						
				0							
				1							
				2							
<b>Mechanical kit for digital feedback of the min. / max. position</b> without with proximity switches SJ2-SN (NC or logical 1) without explosion protection intrinsically safe ATEX with proximity switches SJ2-S1N (NO or logical 0) without explosion protection intrinsically safe ATEX											
					0						
					1						
			2)		2						
			3)		3						
			2) 3)		4						
<b>Labeling (language)</b> German English French (other languages upon request)								1 2 3			
<b>Design (varnish / coding)</b> standard (other designs upon request)								1			

<b>Additional ordering information</b>												
									Code			
<b>Certificate of compliance</b>												
Certificate of compliance with the order acc. to EN 10204-2.1 (DIN 50049-2.1)									CF1			
Certificate of compliance with the order acc. to EN 10204-2.1 (DIN 50049-2.1) with item description									CF2			
Test Report acc. to EN 10204-2.2 (DIN 50049-2.2)									CF3			
<b>Constructors test certificate</b>												
Constructors test certificate O acc.to DIN 55350-18-4.2.2									CH1			
Constructors test certificate M acc.to DIN 55350-18-4.2.2 with item description									CH3			
Constructors test certificate M acc.to DIN 55350-18-4.2.2 with item description and diagram									CH4			
<b>Special features</b>												
Cable lengths with external position sensor, standard cable length 10 m									K10			
Cable lengths with external position sensor, special cable length 20 m									K20			

2) no FM/CSA certificate available  
3) only for ambient temperature range -25 °C to +85 °C

**Accessories**

TZID	Catalog No.			
<p><b>Attachment material and cost</b> <span style="float: right;">4)</span></p> <p>Attachment kit for linear actuators, stroke 10 ... 85 mm, for lateral attachment to DIN/IEC 534 (for aluminium case) (for stainless steel case)</p> <p>Lever 170 mm for stroke 10 ... 150 mm (to be ordered additionally for linear actuators with stroke &gt; 85 mm) (for aluminium case) (for stainless steel case)</p> <p>Attachment bracket for rotary actuators 90°, for mounting acc. to VDI/VDE 3845 bracket dimensions A/B 80/20 mm (for aluminium case) (for stainless steel case)</p> <p style="padding-left: 100px;">80/30 mm (for aluminium case) (for stainless steel case)</p> <p style="padding-left: 100px;">130/30 mm (for aluminium case) (for stainless steel case)</p> <p style="padding-left: 100px;">130/50 mm (for aluminium case) (for stainless steel case)</p>	<p>319601 7959054</p> <p>319602 7959055</p> <p>319603 7959056</p> <p>319604 7959057</p> <p>319605 7959058</p> <p>319606 7959059</p>			
<p><b>Attachment cost</b></p> <p>Attachment cost for attachment acc. to DIN/IEC 534 or acc. to VDI/VDE 3845 including material for piping and adjustment</p> <p style="padding-left: 100px;">piping with plastic tube piping with copper tube piping with stainless steel tube</p>	<p>319628 319629 319630</p>			
<p><b>Adapter and operating program for digital communication</b></p> <p>LKS adapter see Data Sheet 10/63-6.71 EN</p> <p>FSK modem see Data Sheet 10/63-6.71 EN</p> <p>DSV401 (SMART VISION) on CD-ROM see Data Sheet 10/63-1.20 EN</p>				

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4) additional attachment kits upon request



**Accessories**

<b>TZID</b>	<b>Catalog No.</b>			
<b>Attachment kit for Manufacturer/Type</b>				
Air Torque SC 30	319604			
Air Torque SC-P-60-4	319604			
Air Torque SR 30	319603			
AMG SAD 010 ...SAF 040	319603			
AMG SAD 040 ...SAF 050	319605			
ARCA ARKAPAQ 812, 30mm	319631			
ARCA ARKAPAQ 812, 60mm	319633			
Automax DA 85...DA150	319603			
bar GTE / GTD 045...127	319604			
bar GTE / GTD 143...254	319605			
Bray 92 / 93 series	319603			
El-O-Matic ED / ED / PE / PD 25...350	319603			
El-O-Matic ED / ED / PE / PD 500...4004	319605			
FESTO DRD-4-F05...DRD-50F10	319603			
FESTO DRD-77-F10...DRD-255-F14	319605			
Fisher 657, 667	7959155			
Fisher 1051/30, 1052/30	7959135			
Fisher 1051/60, 1052/60	7959169			
Flow Serve DA 85...150	319603			
Foxboro V724xxx, V726xxx, V713-20/35mm	319601			
GEFA AC 020 ...AC 1750	319604			
GEFA MC 063 FA	319603			
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Kinetrol Model 10	7959077			
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**ABB Limited**

Salterbeck Trading Estate  
Workington, Cumbria  
CA14 5DS  
UK  
Tel: +44 (0)1946 830 611  
Fax: +44 (0)1946 832 661

**ABB Inc.**

125 E. County Line Road  
Warminster, PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

**ABB Automation Products GmbH**

Schillerstr. 72  
32425 Minden  
Germany  
Tel: +49 551 905-534  
Fax: +49 551 905-555  
CCC-support.deapr@de.abb.com