

## Electropneumatic Ex d Positioner Type 3731-5 with FOUNDATION™ fieldbus communication

### Application

Positioner for attachment to pneumatic control valves

**Travel: 3.6 to 200 mm · Opening angle: 24° to 100°**

Smart, bus-powered field unit conforming to FOUNDATION™ fieldbus specification based on IEC 61158-2 transmission technology. Integrated Function Blocks: PID Process Controller, AO Analog Output, one binary input for DC voltage signals (DI1) or for connection of one floating contact (DI2).



The positioner is used to ensure a preselected assignment between the valve stem position (controlled variable x) and the control signal (reference variable w). It compares the reference variable cyclically transmitted over the FOUNDATION™ fieldbus network to the travel or opening angle of the control valve and produces the corresponding signal pressure output (output variable y).

The Type 3731-5 Positioner communicates according to FOUNDATION™ fieldbus specification with field devices, programmable logic controllers and process control systems.

An integrated PID Function Block allows the control of required process variables directly in the field. The shift to distributed control reduces the number of control tasks to be performed by the higher-level automation system.

Other benefits provided by the smart positioner:

- Simple attachment to common linear actuators over SAMSON direct attachment interface, over NAMUR rib or to control valves with rod-type yokes according to IEC 60534-6-1 to rotary actuators according to VDI/VDE 3845
- Any desired mounting position
- Simple one-knob, menu-driven operation also in hazardous areas
- Variable, automatic start-up using four initialization modes
- LCD easy to read in any mounting position due to selectable reading direction
- Monitoring and diagnostics functions
- Extended diagnostics and partial stroke test in EXPERT+ version. Refer to Data Sheet T 8388 EN for more details.
- Control parameters can be changed online
- Automatic monitoring of zero point
- Two DI Blocks for analysis of binary input signals
- Calibrated travel sensor without gears susceptible to wear
- Permanent storage of all parameters in non-volatile EEPROM (protection against power failure)
- Adjustable output pressure limitation
- Adjustable tight-closing function
- Configurable with a PC over the SSP serial interface using the TROVIS-VIEW software

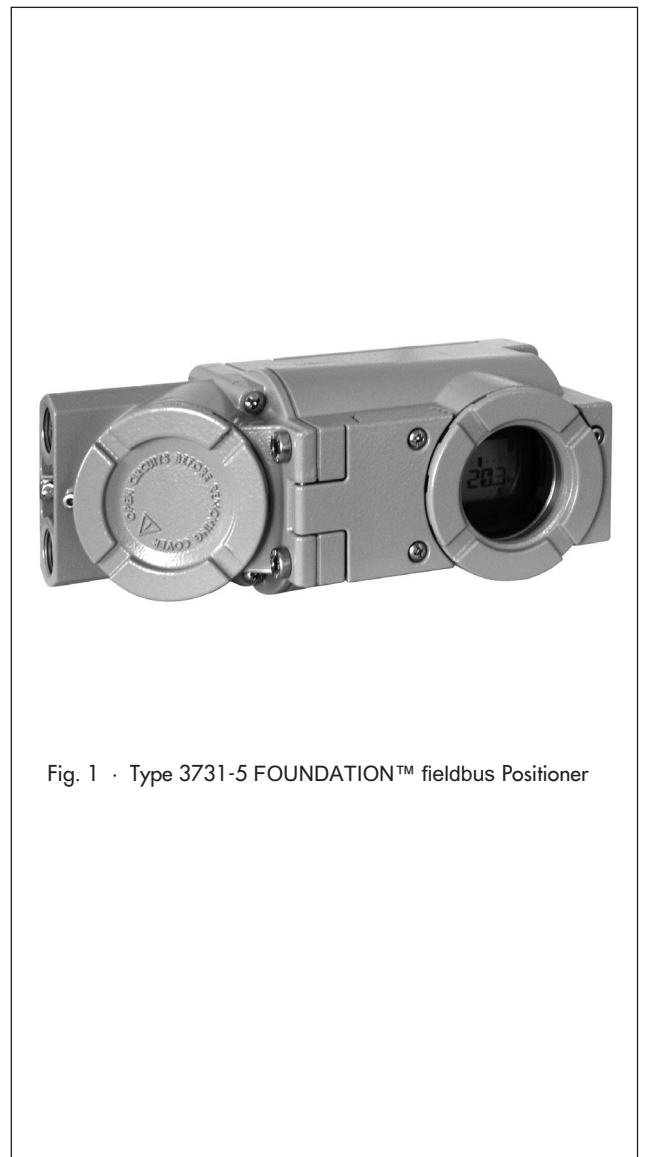


Fig. 1 · Type 3731-5 FOUNDATION™ fieldbus Positioner

### Additional options

The digital positioner functions can be optionally extended:

- Binary input
- Forced venting



**Table 1 · Technical data**

Type 3731-5 FOUNDATION™ fieldbus Positioner (technical data in test certificates additionally apply for explosion-protected devices)		
Rated travel	adjustable	Direct attachment to Type 3277 Actuator 3.6 to 30 mm
		Attachment according to IEC 60534-6 (NAMUR) 3.6 to 200 mm
		Attachment to rotary actuators (VDI/VDE 3845) 24 to 100° opening angle
Travel range	adjustable	Within the initialized travel/angle of rotation · Restricted to 1/5 at the maximum
Bus connection		Fieldbus interface IEC 61158-2, bus-powered Physical Layer Class 113 (without explosion protection) 111 (explosion-protected version) Field device acc. to FM 3610 entity and FISCO
<b>Communication</b>		
Local communication		SAMSON SSP interface and serial interface adapter
Software requirements (SSP)		TROVIS-VIEW with database module 3731-5
Fieldbus communication		Data transmission conforming to FOUNDATION™ fieldbus specification, Communication Profile Class: 31 PS, 32 L; Interoperability tested acc. to Interoperability System IST Rev. 4.6
Permissible operating voltage		9 to 32 V DC · Power over bus line The limits in the EC Type Examination Certificate additionally apply for explosion-protected devices.
Maximum operating current		15 mA
Additional current in case of error		0 mA
Supply air	Supply air Air quality	1.4 to 6 bar (20 to 90 psi) Acc. to ISO 8573-1: 2004 Particle size and density: Class 4 · Oil content: Class 3 · Humidity and water: Class 3 Pressure dew point at least 10 K below the lowest expected ambient temperature
Signal pressure (output)		0 bar up to capacity of supply pressure
Characteristics		Linear/equal percentage/reverse equal percentage · User-defined (over operating software and communication) · Butterfly valve linear/equal percentage · Rotary plug valve linear/equal percentage · Segmented ball valve linear/equal percentage Deviation from characteristic ≤ 1 %
Hysteresis		≤ 0.3 %
Sensitivity		≤ 0.1 %
Direction of action		Reversible
Air consumption		Independent of supply air <110 l <sub>n</sub> /h
Air output capacity	Actuator pressurized	At Δp = 6 bar: 8.5 m <sub>n</sub> <sup>3</sup> /h · At Δp = 1.4 bar: 3.0 m <sub>n</sub> <sup>3</sup> /h · K <sub>Vmax</sub> (20 °C) = 0.09
	Actuator vented	At Δp = 6 bar: 14.0 m <sub>n</sub> <sup>3</sup> /h · At Δp = 1.4 bar: 4.5 m <sub>n</sub> <sup>3</sup> /h · K <sub>Vmax</sub> (20 °C) = 0.15
Permissible ambient temperature		-40 to +80 °C The limits in the test certificate additionally apply for explosion-protected devices.
Influences	Temperature	≤ 0.15 %/10 K
	Supply air	None
	Vibrations	≤ 0.25 % up to 2000 Hz and 4 g acc. to IEC 770
Electromagnetic compatibility		Complying with the requirements of EN 61 000-6-2, 61 000-6-3, EN 61326-1 and NAMUR Recommendation NE 21
Electrical connections		Two threaded connections ½ NPT or optionally M20 x 1.5, screw terminals for 2.5 mm <sup>2</sup> wire cross-section
Degree of protection		IP 66 / NEMA 4X
<b>Materials</b>		
Housing		Die-cast aluminum EN AC-ALSi10Mg (Fe) (EN AC-43400) acc. to DIN 1706 Chromated and powder paint coated
External metal parts		Stainless steel 1.4571 and 1.4301
Weight		Approx. 2.5 kg

Options for Type 3731-5		
<b>Binary input</b> , galvanically isolated		
Connection	Terminals A-B Voltage input 0 to 30 V DC, reverse polarity protection	Terminals B-C for external floating contact
Input	Current consumption: 3.5 mA at 24 V	R < 100 Ω; contact load: 100 mA
	Static destruction limit: 40 V	Static destruction limit: 20 V/5.8 mA
	Signal "1" when U <sub>e</sub> > 5 V Signal "0" when U <sub>e</sub> < 3 V	
<b>Forced venting</b> , galvanically isolated		
Input	0 to 40 V DC/0 to 28 V AC, static destruction level 45 V DC/32 V AC, input resistance ≥ 7 kΩ	
Signal	Fail-safe position with an input voltage ≤ 3 V · Normal operation at an input voltage > 5.5 V	

### Explosion protection certificates

Type of approval	Certificate number	Date	Comments
EC Type Examination Certificate	PTB 11 ATEX 1014 X	2011-05-03	Ⓢ II 2 G Ex d IIC T6, T5, T4 Gb Ⓢ II 2 G Ex d e IIC T6, T5, T4 Gb Ⓢ II 2 D Ex tb IIIC T 80 °C Db IP 66
FM approval	3024956	2006-01-30	XP/I/1/BCD/T4 T <sub>a</sub> =80 °C, T5 T <sub>a</sub> =70 °C, T6 T <sub>a</sub> =60 °C; Type 4X/IP 66 XP/I/1/IIB+H <sub>2</sub> /T4 T <sub>a</sub> =80 °C, T5 T <sub>a</sub> =70 °C, T6 T <sub>a</sub> =60 °C; Type 4X/IP 66 DIP/II, III/1/EFG/T4 T <sub>a</sub> =80 °C, T5 T <sub>a</sub> =70 °C, T6 T <sub>a</sub> =60 °C; Type 4X/IP 66 Class I, Division 1 and 2, Groups B, C, D Class II and III, Division 1 and 2, Groups E, F, G Class I, Zone 1, IIB+H <sub>2</sub> ; Type 4X/IP 66
CSA approval	1709815	2005-10-04	Class I, Division 1 and 2, Groups B, C, D, T6...T4 Class II, Division 1 and 2, Groups E, F, G; Class III Class I, Zone 1, Group IIB+H <sub>2</sub> , T6...T4; Type 4X/IP 66
IECEx approval	PTB 11.0084X	2011-09-14	Ex d IIC T6, T5, T4 Gb; Ex d e IIC T6, T5, T4 Gb; Ex tb IIIC T 80 °C Db IP 66
JIS approval	TC17747	2006-09-12	Ex d IIC T6
GOST approval	B02637	2009-02-26	1 Ex d IIC T6

### Network and positioner configuration with NI-FBUS™ configurator

The positioner can also be configured over the NI-FBUS™ configurator from National Instruments.

The NI-FBUS™ configurator can be used to perform the planning of the FOUNDATION™ fieldbus network. It also allows the use of PID Controller to allow the implementation of an independent control in the field.

### Electrical and bus connection

The Type 3731-5 FOUNDATION™ fieldbus Positioner must be connected to bus segments conforming to IEC 61158-2. A shielded two-wire line is used for both supply power and data communication.

### Positioner attachment

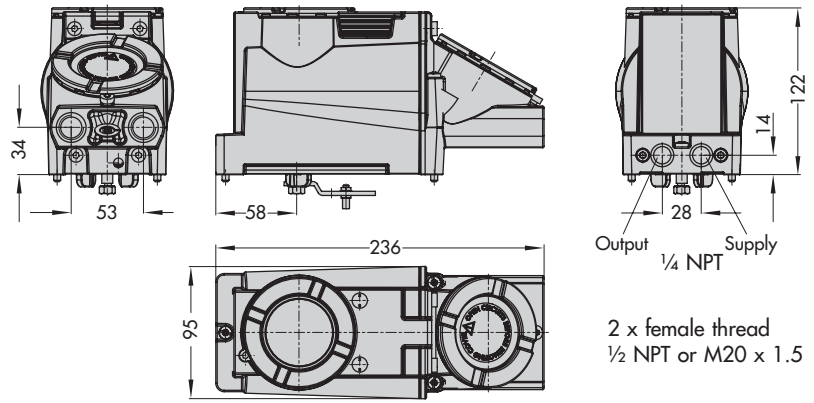
The Type 3731-5 FOUNDATION™ fieldbus Positioner can be attached directly to the Type 3277 Actuator with a connection block. In actuators with fail-safe action "Actuator stem extends" and Type 3277-5 Actuator (120 cm<sup>2</sup>), the signal pressure is transmitted over an internal bore in the actuator yoke to the actuator. In actuators with fail-safe action "Actuator stem retracts" and in actuators with effective diaphragm areas of 240 cm<sup>2</sup> or larger, the signal pressure is transmitted to the actuator over a ready-made external pipe connection.

Using the appropriate bracket, the positioner can also be attached according to IEC 60534-6 (NAMUR recommendation). The positioner can be mounted on any side of the control valve.

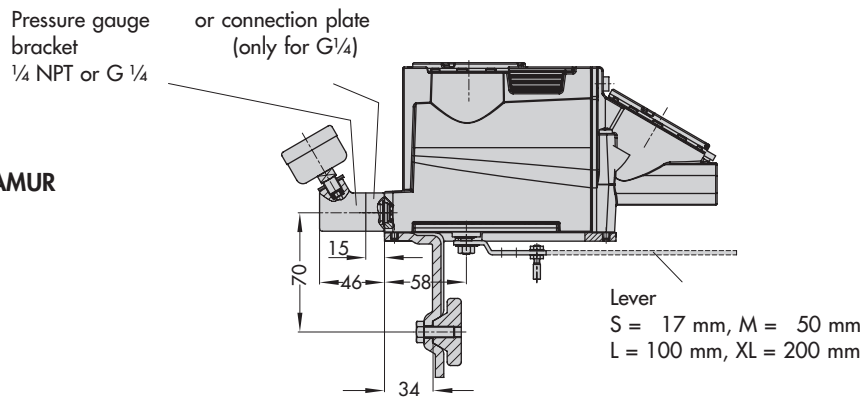
A pair of universal brackets is used for the attachment to Type 3278 Rotary Actuators or other rotary actuators according to VDI/VDE 3845. The rotary motion of the actuator is transferred over a coupling wheel to the positioner. The characteristic is set over the software.

Dimensions in mm

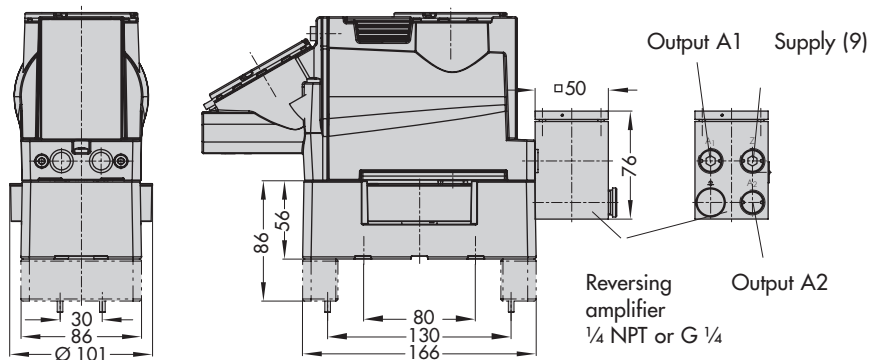
Direct attachment



Attachment acc. to IEC 60534-6 and NAMUR



Attachment to rotary actuators



## Article code

Positioner	Type 3731- 5													x	x	x	x	x	x	0	0	0	x	1	x	0	0	0
With LC display, autotune, FOUNDATION™ fieldbus																												
Explosion protection																												
⊗ II 2 G Ex d IIC T6, T5, T4 Gb/II 2 G Ex d e IIC T6, T5, T4 Gb, II 2 D Ex tb IIIC T 80 °C Db IP 66 acc. to ATEX	2	1																										
Ex d acc. to FM/CSA	2	3																										
Ex d acc. to JIS	2	7																										
Options																												
Without					0	0																						
Binary input					0	3																						
Forced venting					0	5																						
Diagnostics																												
EXPERT													1															
EXPERT+													2															
Electrical threaded connections																												
2x M20 x 1.5													1															
2x ½ NPT													2															
Explosion protection approvals																												
As specified in Explosion protection certificates																						0						
IECEX	2	1																				2						
GOST approval	2	1																				3						
Special applications																												
Without																							0					
Positioner compatible with paint (IP 41/NEMA 1)																							1					
Special version																												
None																										0	0	0

## Ordering text

FOUNDATION™ fieldbus Positioner Type 3731-5...

- With pneumatic connecting rail ISO 228/1-G ¼
- With/without pressure gauge for signal pressure indication
- Attachment to Type 3277 Actuator (120 to 700 cm²)
- Attachment according to IEC 60534-6-1 (NAMUR)  
travel: ... mm, stem diameter: ... mm, if applicable
- Attachment to Type 3278 Rotary Actuator (160 cm²)
- Attachment to rotary actuators acc. to VDI/VDE 3845
- Reversing amplifier for double-acting actuators with  
connection acc. to ISO 228/1 - G ¼ or ¼-18 NPT

Specifications subject to change without notice.



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