

## Series 3730

# Electropneumatic Positioner Type 3730-1



### Application

Single-acting or double-acting positioner for attachment to pneumatic control valves. Self-calibrating, automatic adaptation to valve and actuator.

<b>Reference variable</b>	<b>4 to 20 mA</b>
<b>Travels</b>	<b>3.75 to 200 mm</b>
<b>Opening angle</b>	<b>24° to 100°</b>



The positioner ensures a predetermined assignment of the valve stem position (controlled variable  $x$ ) to the input signal (reference variable  $w$ ). It compares the input signal received from a controller to the travel or rotational angle of the control valve and issues a corresponding output signal pressure (output variable  $y$ ).

### Special features

- Easy attachment to common linear and rotary actuators with SAMSON direct attachment interface (Fig. 1), over NAMUR rib (Fig. 2), to control valves with rod-type yokes according to IEC 60534-6-1, or to rotary actuators according to VDI/VDE 3845 (Fig. 3)
- Any desired mounting position of the positioner
- Simple one-knob, menu-driven operation
- LCD easy to read in any mounted position due to selectable reading direction
- Variable, automatic start-up
- Preset parameters - only values deviating from the standard need to be adjusted
- Calibrated travel sensor without gears susceptible to wear
- Permanent storage of all parameters in EEPROM (protected against power failure)
- Two-wire system with a small electrical load of 300  $\Omega$
- Activatable tight-closing function
- Continuous monitoring of zero point
- Two standard programmable position alarms
- Certified according to IEC 61508/SIL

### Version

- **Type 3730-1** · Electropneumatic positioner operable on site with LCD

### Additional options

- Stainless steel housing



Fig. 1 · Type 3730, direct attachment to Type 3277 Pneumatic Actuator



Fig. 2 · Type 3730, attachment to NAMUR rib



Fig. 3 · Type 3730, attachment acc. to VDI/VDE 3845

**Principle of operation**

The positioner is attached to pneumatic control valves and is used to assign the valve stem position (controlled variable  $x$ ) to the electric input signal supplied by a control system (reference variable  $w$ ). It compares this signal to the travel or rotational angle of the control valve and produces the corresponding output signal pressure (output variable  $y$ ) for the pneumatic actuator.

The positioner mainly consists of an electric travel sensor system (2), an analog i/p module with a downstream booster as well as the electronics unit with a microcontroller (5).

When a deviation occurs, the actuator is pressurized or vented. If required, the changes in the signal pressure can be slowed down by a volume restriction.

A constant air stream with a fixed set point to the atmosphere is created by flow regulator (9) with a fixed set point. The air stream is used to purge the inside of the case as well as to optimize the air capacity booster. The i/p module (6) is supplied with a constant upstream pressure by the pressure reducing valve (8) to make it independent of the supply air pressure.

**Operation**

The positioner is operated with a user-friendly rotary pushbutton system. The parameters are selected by turning the knob, pushing it activates the required setting. In the menu, all parameters are listed in one level, eliminating the need to search in submenus. All parameters can be checked and changed on site.

All values are displayed on the LCD. The reading direction of the LCD can be rotated by 180° at the push of a button.

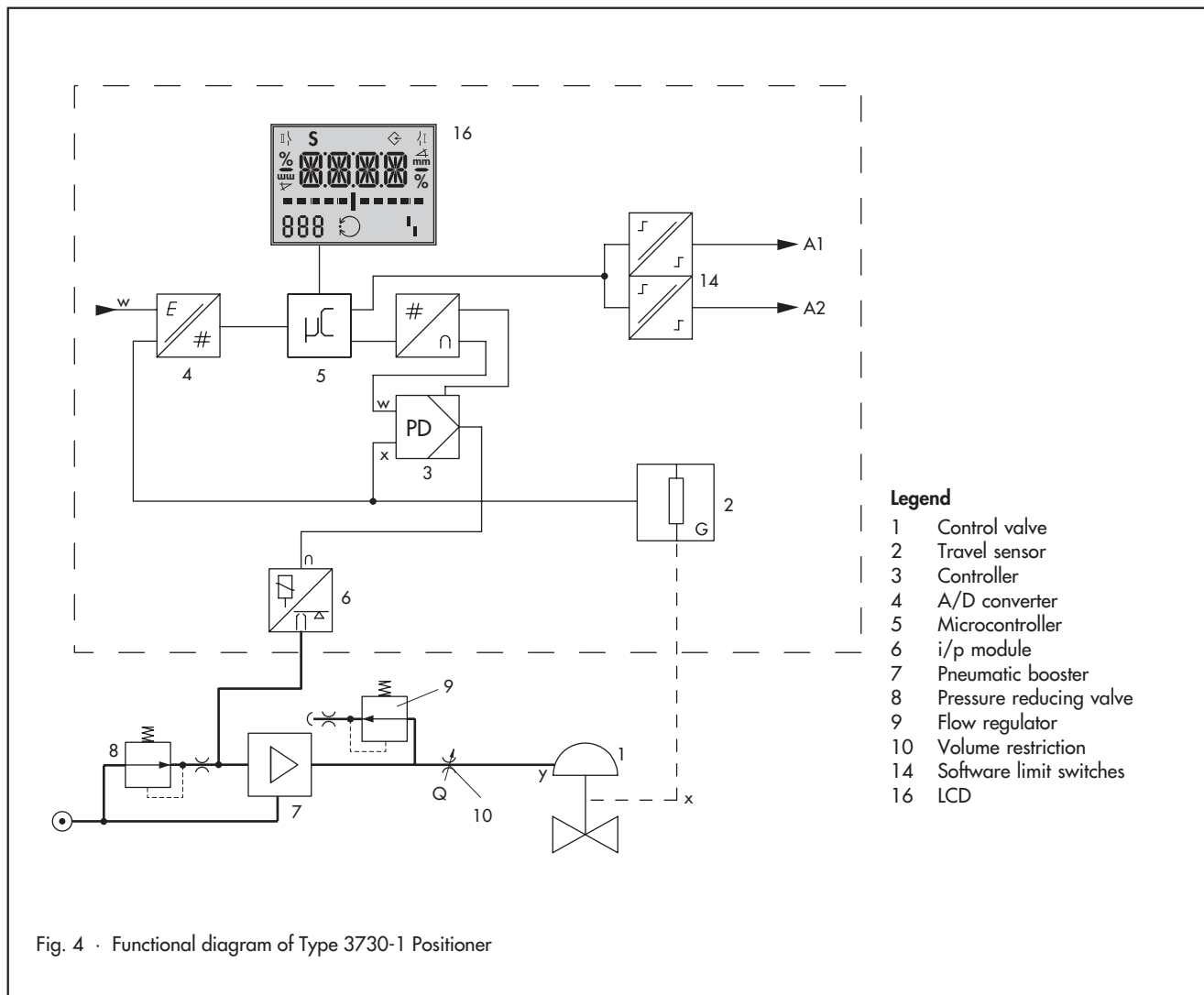


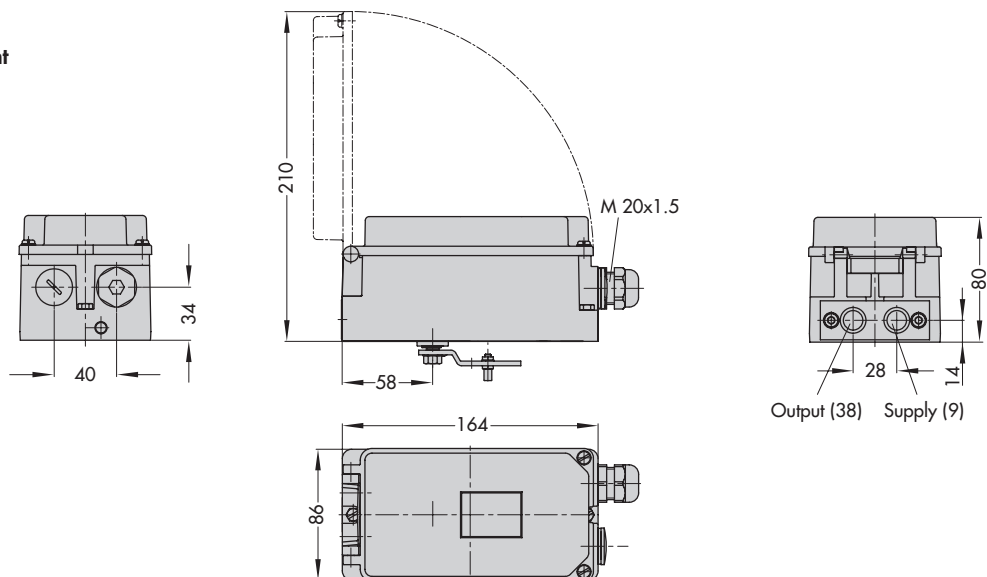
Fig. 4 · Functional diagram of Type 3730-1 Positioner

**Table 1 · Technical data**

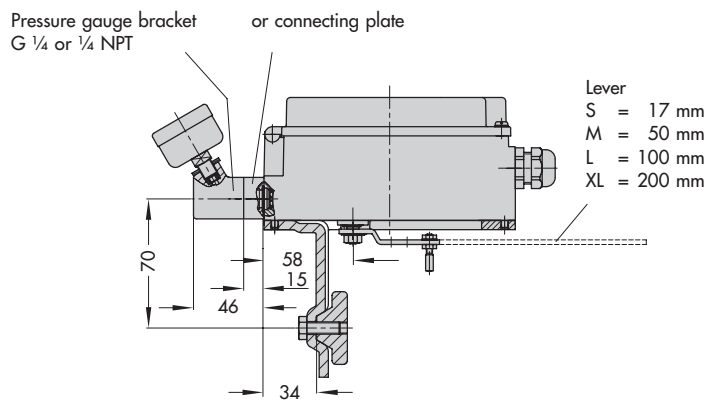
<b>Type 3730-1 Positioner</b>			
Travel	Direct attachment to Type 3277 Actuator: 3.75 to 30 mm Attachment according to IEC 60534-6-1: 3.75 to 200 mm		
Opening angle	Attachment according to VDI/VDE 3845 24 to 100°		
Travel angle	Adjustable within initialized travel/angle of rotation; restricted to 1/5 at the maximum		
Reference variable w	Signal range	4 to 20 mA	
	Split-range	4 to 11.9 and 12.1 to 20 mA	
	Static destruction limit	100 mA	
Minimum current	3.7 mA		
Load impedance	≤ 6 V (corresponds to 300 Ω at 20 mA)		
Supply air	Supply pressure	1.4 to 6 bar (20 to 90 psi)	
	Air quality acc. to ISO 8573-1 (2001)	Maximum particle size and density: Class 4 · Oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected	
Signal pressure (output)	0 bar up to the capacity of the supply pressure · Limitable to approx. 2.4 bar per software		
Characteristic	optionally	1 characteristic for linear travel · 8 characteristics for angle of rotation	
Hysteresis	≤ 1 %		
Sensitivity	≤ 0.1 %		
Direction of action	w/x reversible		
Air consumption, steady state	Independent of supply air approx. 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	-20 to +80 °C · -40 to +80 °C with metal cable gland The limits in EC Type Examination Certificate additionally apply for explosion-protected devices.		
Influences	Temperature	≤ 0.15 %	
	Supply air	None	
	Vibrations	≤ 0.25 % up to 2000 Hz and 4 g acc. to IEC 770	
Electromagnetic compatibility	Complies with EN 61000-6-2, 61000-6-3 and NAMUR Recommendation NE 21 requirements		
Electrical connections	One M20 x 1.5 cable gland for 6 to 12 mm clamping range · Second M20 x 1.5 threaded connection additionally exists · Screw terminals for 2.0 to 2.5 mm <sup>2</sup> wire cross-sections		
Explosion protection	See summary of explosion protection certificates		
Degree of protection	IP 66 / NEMA 4X		
Implementation in safety-related systems in compliance with IEC 61508/SIL	Probability of failure on demand of safety functions PFD < 2.8 x 10 <sup>-7</sup> for a confidence level of 95 %. The safe failure fraction (SFF) according to Table A1 in IEC 61508-2 is greater or equal to 0.99. Suitable for implementation in safety-related systems with a hardware fault tolerance of 1 or 2 up to and including SIL 4.		
<b>Binary contacts</b>	2 software limit switches with adjustable limit values in steps of 0.5 %, reverse polarity protection		
Signal status	Version	<b>Without explosion protection</b>	<b>Explosion-protected version</b>
	No response	Conductive (R = 348 Ω)	≥ 2.1 mA
	Response	Non-conducting	≤ 1.2 mA
Operating voltage	For connection to the binary input of a PLC acc. to EN 61131 P <sub>max</sub> = 400 mW		Only for connection to NAMUR switching amplifier acc. to EN 60947-5-6
<b>Materials</b>			
Housing	Die-cast aluminum EN AC-43400 / DIN EN 1706 · Chromated and powder paint coated Special version in stainless steel 1.4581		
External parts	Stainless steel 1.4571 and 1.4301		
Cable gland	Polyamide, black, M20 x 1.5		
Weight	Approx. 1.0 kg		

Dimensions in mm

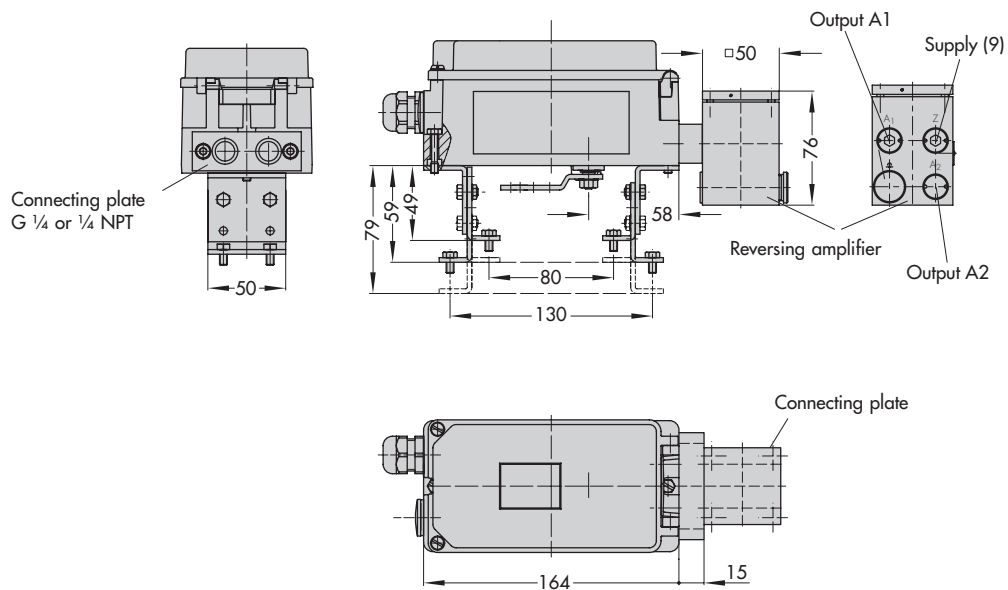
Direct attachment



Attachment acc. to IEC 60534-6 and NAMUR



Attachment to rotary actuators



**Summary of explosion protection certificates**

Type of approval	Certificate number	Date	Comments
EC Type Examination Certificate First Addendum	PTB 04 ATEX 2033	2004-04-19 2005-01-25	⊕ II 2 G EEx ia IIC T6 ⊕ II 2 D IP 65 T 80 °C; Type 3730-11
Statement of Conformity	PTB 04 ATEX 2114 X	2004-12-09	⊕ II 3 G EEx nA II T6 II 3 G EEx nL IIC T6; Zone 2 ⊕ II 3 D IP 54/65 T 80 °C; Zone 22; Type 3730-18
FM approval	3021579	2004-12-01	Cl. I, II, III; Div. 1; Gr. A, B, C, D, E, F, G Cl. I, Zone 0, AEx ia IIC T6 Cl. I; Div. 2; Gr. A, B, C, D NEMA Type 4X; Type 3730-13
CSA approval	1675820	2005-08-29	Ex ia IIC T6; Cl. I, Zone 0 Cl. II, Gr. E, F, G Ex nA II T6; Cl. II, Div. 2, Gr. E, F, G Type 4 Enclosure; Type 3730-13

**Article code**

Positioner	Type 3730-	1	x	0	0	0	0	0	0	0	0	x	0	0	x	0	0	0
With LC display and autotune, 4 ... 20 mA reference variable, two software limit switches*																		
<b>Explosion protection</b>																		
Without			0															
⊕ II 2 G EEx ia IIC T6 and ⊕ II 2 D IP 65 T 80 °C acc. to ATEX			1															
Ex ia / Ex n acc. to FM/CSA			3															
⊕ II 3 G EEx nA/nL II T6 and ⊕ II 3 D IP 54/65 T 80 °C acc. to ATEX			8															
<b>Housing material</b>																		
Standard aluminum												0						
Stainless steel 1.4581												1						
<b>Special applications</b>																		
None																		0
Device compatible with paint (lowest permissible ambient temperature -20 °C)																		1
Exhaust air connection with 1/4-18 NPT thread																		2
<b>Special version</b>																		
None																		0 0 0

\* Additional functions such as limit switches, solenoid valve, position transmitter or external position sensor, e.g. with Type 3730-2 Positioner

### Attachment of the positioner

The Type 3730-1 Electropneumatic Positioner can be attached directly to the Type 3277 Actuator over 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 routed 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 routed to the actuator over ready-made external piping.

Using the appropriate bracket, the positioner can also be attached according to IEC 60534-6-1 (NAMUR recommendation). The positioner can be mounted on any side of the control valve.

A pair of universal brackets is used to mount the Type 3730-1 Positioner to a Type 3278 Rotary Actuator or other rotary actuators according to VDI/VDE 3845. The rotary motion of the actuator is transferred to the positioner over a coupling wheel with degree scale.

### Ordering text

Positioner Type 3730-1x

- Without pneumatic connecting rail  
(only when directly attached to Type 3277)
- With pneumatic connecting rail ISO 228/1-G ¼
- With pneumatic connecting rail ¼-18 NPT
- Without/with pressure gauge for signal pressure indication
- Additional cover label with list of parameters and operating instructions in English/Spanish or English/French (standard version German/English)
- Attachment to Type 3277 Actuator (120 to 700 cm<sup>2</sup>)
- Attachment to IEC 60534-6-1 (NAMUR)  
Travel: ... mm, if applicable, stem diameter: ... mm
- Attachment to Type 3278 Rotary Actuator (160/320 cm<sup>2</sup>)
- Attachment to rotary actuators acc. to VDI/VDE 3845
- Pneumatic reversing amplifier for double-acting actuators with connection according to ISO 228/1 - G ¼ or ¼-18 NPT
- Adapter M20 x 1.5 to ½ NPT
- Metal cable gland
- Positioner free of substances that can impair surfaces to be painted
- Exhaust air connection with ¼ NPT thread
- Special version: housing made of CrNiMo steel

Specifications subject to change without notice.

