

Series 3730

Type 3730-1 Electropneumatic Positioner



Application

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

Reference variable	4 to 20 mA
Travels	3.75 to 200 mm
Opening angle	24 to 100°



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

Special features

- Simple attachment to all common linear and rotary actuators with interface for SAMSON direct attachment, NAMUR rib or valves with rod-type yokes according to IEC 60534-6-1, or to rotary actuators according to VDI/VDE 3845
- Any desired mounting position of the positioner
- Simple single-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 non-volatile EEPROM (protected against power failure)
- Two-wire system with a small electrical load of 300 Ω
- 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 with LCD for local operation

Additional options

- Inductive limit switch with proximity switches
- Stainless steel housing



Principle of operation

The positioner is mounted on pneumatic control valves and is used to assign the valve position (controlled variable x) to the control signal (reference variable w). The positioner compares the electric control signal of a control system to the travel or rotational angle of the control valve and issues a 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 air capacity booster and the electronics with the microcontroller (5).

When a system deviation occurs, the actuator is either vented or filled with air, depending on its direction of action. If necessary, the signal pressure change 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 reducer (8) to make it independent of the supply air pressure.

Operation

The positioner is operated using a user-friendly rotary push-button system. The parameters are selected by turning the rotary pushbutton, 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.

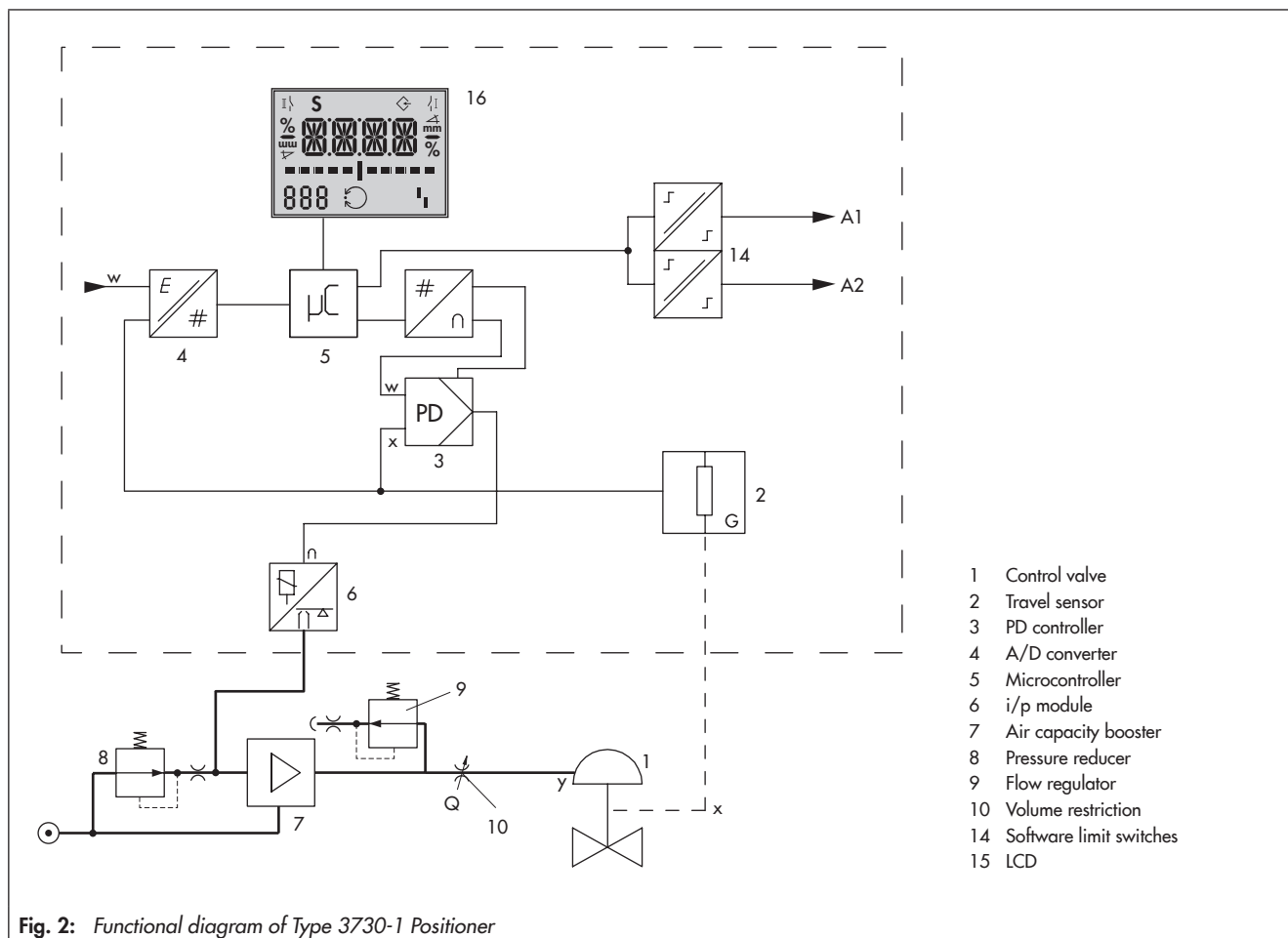


Fig. 2: Functional diagram of Type 3730-1 Positioner

Table 1 · Technical data

Type 3730-1 Positioner (technical data in test certificates additionally apply to explosion-protected devices)			
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 acc. to VDI/VDE 3845	24 to 100° opening angle
Travel range	Adjustable within the initialized travel/angle of rotation; travel can be restricted to 1/5 at the maximum		
Reference variable w	Signal range	4 to 20 mA · Two-wire device, reverse polarity protection,	
	Split-range operation	4 to 11.9 mA and 12.1 to 20 mA	
	Static destruction limit	100 mA	
Minimum current	3.7 mA		
Load impedance	≤ 6 V (corresponding to 300 Ω at 20 mA)		
Power supply	Supply air	1.4 to 7 bar (20 to 105 psi)	
	Air quality acc. to ISO 8573-1 (2001-02)	Max. particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K beneath the lowest ambient temperature to be expected	
Signal pressure (output)	0 bar up to the capacity of the supply pressure · Can be limited to approx. 2.4 bar over software		
Characteristic	Optionally, 1 characteristic for globe valves · 8 characteristics for rotary valves		
Hysteresis	≤ 1 %		
Sensitivity	≤ 0.1 %		
Transit time	< 0.5 s for initialization not permissible · Adaptation over volume restriction Q		
Direction of action	Reversible		
Air consumption	Independent from supply pressure approx. 110 l _n /h		
Air output capacity	Actuator filled with air	At Δp = 6 bar: 8.5 m _n ³ /h · At Δp = 1.4 bar: 3.0 m _n ³ /h · K _{vmax(20 °C)} = 0.09	
	Actuator vented	At Δp = 6 bar: 14.0 m _n ³ /h · At Δp = 1.5 bar: 4.5 m _n ³ /h · K _{vmax(20 °C)} = 0.15	
Permissible ambient temperature	-20 to +80 °C in all versions -45 to +80 °C with metal cable gland -25 to +80 °C with inductive limit switch (SJ2-S1N) and metal cable gland Limits in test certificate also apply for explosion-protected devices.		
Influences	Temperature	≤ 0.15 %/10 K	
	Power supply	None	
	Influence of vibrations	≤ 0.25 % up to 2000 Hz and 4 g according to IEC 770	
Electromagnetic compatibility	Complying with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21		
Electrical connections	One M20 x 1.5 cable gland for 6 to 12 mm clamping range Additional second M20 x 1.5 threaded hole Screw terminals for 0.2 to 2.5 mm ² wire cross-section		
Explosion protection	See Table 2		
Degree of protection	IP 66/NEMA 4X		
Use in safety-instrumented systems acc. to IEC 61508	Suitable for use in safety-instrumented systems up to SIL 2 (single device) and SIL 3 (with redundant configuration), emergency shutdown at a reference variable of 0 mA		
Weight	1.0 kg		
Materials			
Housing	Die-cast aluminum EN AC-ALSi12(Fe) (EN AC-44300) acc. to DIN EN 1706, chromated and powder paint coated · Special version: Stainless steel 1.4581		
External parts	Stainless steel 1.4571 and 1.4301		
Cable gland	M20x1.5, black polyamide		
Binary contacts			
Two software limit switches with adjustable limit values (in steps of 0.5 %), reverse polarity protection, floating · See below for default settings			
Signal state	Version without explosion protection	Explosion-protected version	
	No response: Conductive (R = 348 Ω) Response: Non-conducting	No response: ≥ 2.1 mA Response: ≤ 1.2 mA	
Operating voltage	For connection to the binary input of the PLC acc. to IEC 61131-2, P _{max} = 400 mW or for connection to NAMUR switching amplifier acc. to EN 60947-5-6	For connection to NAMUR switching amplifier acc. to EN 60947-5-6	

Options	
Inductive limit switch	For connection to switching amplifier acc. to EN 60947-5-6. Can be used in combination with a software limit switch.
SJ2-SN proximity switch	NAMUR NC contact
SJ2-S1N proximity switch	NAMUR NO contact

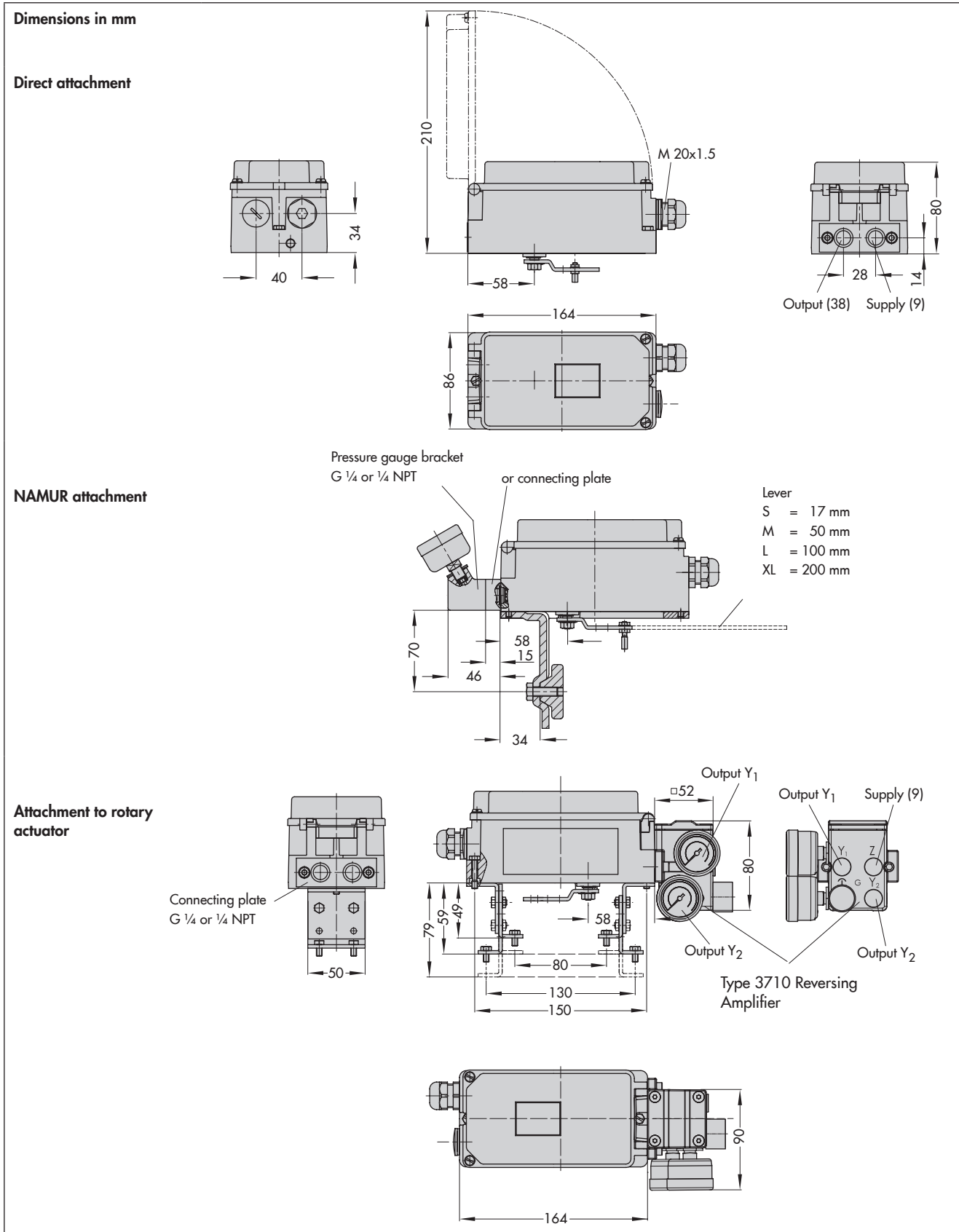


Table 2 - Explosion protection certificates

Type of approval	Certificate number	Date	Remarks	Type 3730
EC Type Examination Certificate	PTB 04 ATEX 2033	2004-04-19	II 2G Ex ia IIC T6 Gb, II 2D Ex tb IIIC T80°C Db IP66*	-11
First Addendum		2005-01-25	Addition: LCD	
Second Addendum		2008-02-25	Addition: Module to hold an inductive limit switch Adaption: Latest edition of standard	
Third Addendum		2013-11-27	Adaption: Latest edition of standard	
Statement of Conformity	PTB 04 ATEX 2114 X	2004-12-09	II 3G Ex nA II T6, II 3G Ex ic IIC T6, II 3D Ex td A21 IP54/IP66 T80°C*	-18
First Addendum		2008-02-26	Addition: LCD, module to hold an inductive limit switch Adaption: Latest edition of standard	
CSA	1675820	2010-07-19	Ex ia IIC T6; Class I, Zone 0; Class II, Groups E, F, G; Ex nA II T6; Class I, Zone 2 Class I, Div.2, Groups A, B, C, D Class II, Div.2, Groups E, F, G Class III: Type 4 Enclosure	-13
FM	3023478	2008-11-03	Class I, Zone 0 AEx ia IIC Class I, II, III, Div.1, Groups A, B, C, D, E, F, G Class I, Div.2, Groups A, B, C, D Class II, Div.2, Groups F, G NEMA Type 4X	-13
GOST (valid until 2018-11-14)	RU C-DE08.B.00113	2013-11-15	1Ex ia IIC T6 Gb, 1Ex tb IIIC T80°C Db IP66 2Ex nA IIC T6 Gc, 2Ex ic IIC T6 Gc, 2Ex tc IIIC T80°C Dc IP66	-11 -18
IECEX	IECEX PTB 06.0055	2006-11-02	Ex ia IIC T6	-11
INMETRO	On request			
NEPSI	On request			

* Designation according to the EN 60079 standard series

Article code

Positioner	Type 3730-1	x	x	0	0	0	0	0	0	0	0	x	0	0	x	0	0	0
With LCD and autotune, 4 to 20 mA reference variable, two software limit switches*																		
Explosion protection																		
Without		0																
ATEX: II 2G Ex ia IIC T6 Gb, II 2D Ex tb IIIC T80°C Db IP66		1																
FM/CSA: Class I, Zone 0 AEx ia IIC; Class I, II, III, Div.1, Groups A-G; Class I, Div.2, Groups A-D; Class II, Div.2, Groups F, G/ Ex ia IIC T6; Class I, Zone 0; Class II, Groups E-G; Ex nA II T6; Class I, Zone 2; Class I, Div.2, Groups A-D; Class II, Div.2, Groups E-G		3																
ATEX: II 3G Ex nA II T6, II 3G Ex ic IIC T6, II 3D Ex tc IIIC T80°C IP66		8																
Option: Inductive limit switch																		
Without		0																
With SJ2-SN proximity switch		1																
With SJ2-S1N proximity switch		2																
Housing material																		
Aluminum (standard)												0						
Stainless steel 1.4581												1						
Special applications																		
Without																		0
Device compatible with paint (lowest permissible ambient temperature -20 °C)																		1
Exhaust air port with ¼ NPT thread, back of housing sealed																		2
Special version																		
Without																		0 0 0

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

Mounting the positioner

The Type 3730 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 cm²), the signal pressure is routed over an internal hole in the actuator yoke to the actuator.

In actuators with effective diaphragm areas of 240 cm² 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 either side of the control valve.

A pair of universal brackets is used to mount the Type 3730 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 scale.

Ordering text

Type 3730-1x Positioner

- 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 up to max. 6 bar
- Additional information inside the cover with a list of parameters and operating instructions in English/Spanish or English/French (standard version in German/English)
- Attachment to Type 3277 Actuator (120 to 700 cm²)
- Attachment to IEC 60534-6-1 (NAMUR)
Travel: ... mm, if applicable, stem diameter: ... mm
- Attachment to Type 3278 Rotary Actuator (160/320 cm²)
- 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 M20x1.5 to ½ NPT
- Metal cable gland
- Free of substances that impair paint adhesion
- Exhaust air port with ¼ NPT thread
- Special version: housing made of CrNiMo steel

Specifications subject to change without notice.



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