

Series 3730

Electropneumatic Positioner Type 3730-0



Application

Single-acting or double-acting positioner for attachment to pneumatic control valves

Reference variable 4 to 20 mA
Travels 5.3 to 200 mm



JIS

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 of the control valve and issues a corresponding output signal pressure (output variable y).

Special features

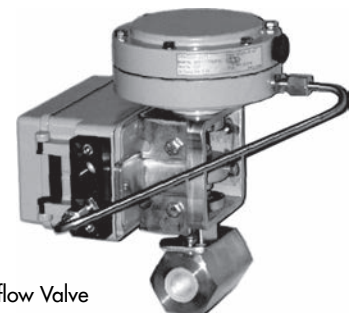
- Simple attachment to all common linear actuators with interface for SAMSON direct attachment, NAMUR rib or valves with rod-type yokes according to IEC 60534-6-1 (Fig. 1)
- Any desired mounting position of the positioner
- Calibrated travel sensor without gears susceptible to wear
- Analog pneumatic output prevents pulsing in case of leaking actuator
- Fast-reacting analog control loop
- High control accuracy (fine tuning) without dead band and continuous pneumatic output
- Two-wire system with small electrical load below 300 Ω for explosion-protected version and version without explosion protection
- Output pressure limitation enabled by DIP switch
- Selectable tight-closing function with fixed switching point
- Low air consumption of approx. 110 l_n/h independent of supply and output pressure
- Aluminum housing with IP 66 degree of protection
- Check valve in the exhaust air port
- Resistant to shock and vibrations
- Extended temperature range also for intrinsically safe operation
- Travel range selectable within the rated travel range by setting DIP switch
- Zero and span adjusted by potentiometers
- Reference variable range and direction of action adjustable by setting DIP switches, e.g. for split-range operation
- Certified according to IEC 61508/SIL

Additional options

- Stainless steel housing



Direct attachment to Type 3277
Pneumatic Actuator



Attachment to
Type 3510 Micro-flow Valve



Attachment to
NAMUR rib

Fig. 1: Type 3730-0 Positioner

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 of the control valve and issues a signal pressure (output variable y) for the pneumatic actuator.

The positioner consists of a travel sensor system proportional to resistance, an analog i/p converter with a downstream air capacity booster and the electronics with microcontroller.

The position of the valve stem is transmitted as a linear travel motion over the pick-up lever to the travel sensor (2) and supplied to an analog PD controller (3). The PD controller compares this actual value to the DC control signal coming from the control system, e.g. a 4 to 20 mA signal. In case of a system deviation, the activation of the i/p converter (6) is changed so that the actuator of the control valve (1) is pressurized or vented accordingly over the downstream booster (7).

This causes the valve plug to move to the position determined by the reference variable.

The supply air is supplied to the booster and the pressure regulator (8). An intermediate flow regulator (9) with fixed settings is used to purge the positioner and, at the same time, guarantees trouble-free operation of the booster.

The output signal pressure supplied by the booster can be limited by enabling the DIP switch setting S5 (4).

The volume restriction (10) and DIP switch setting S6 are used to optimize the positioner by adapting it to the actuator size and changing the gain factor.

Operation

The user can adjust the potentiometers and DIP switches to change the positioner settings. The configuration of the positioner is facilitated by instructions included on the inside of the cover which are intended to ensure a quick and trouble-free adaptation of the positioner to the control valve.

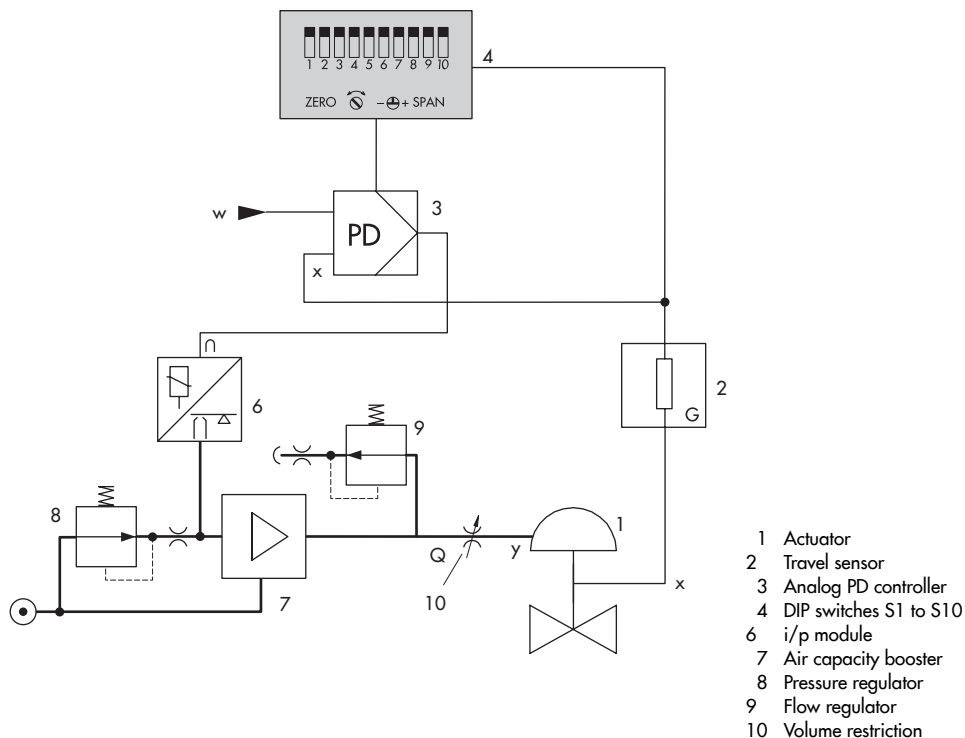


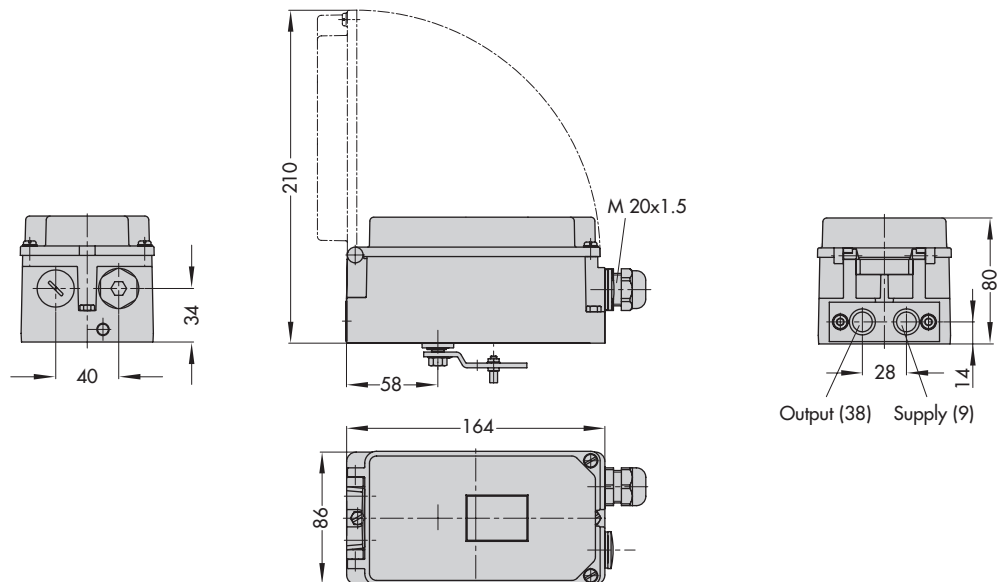
Fig. 2: Functional diagram of Type 3730-1 Positioner

Table 1: Technical data

Type 3730-0 Positioner (technical data in test certificates additionally apply to explosion-protected devices)		
Travel	Adjustable	Direct attachment to Type 3277 Actuator 5.3 to 30 mm
		Attachment to Type 3510 Micro-flow Valve 5.3 to 15 mm
		Attachment according to IEC 60534-6 (NAMUR) 5.3 to 200 mm
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, 4 to 12 mA and 12 to 20 mA selected by setting DIP switches S6 and S7
	Static destruction limit	100 mA
Minimum current		3.6 mA
Load impedance		≤ 6 V (corresponding to 300 Ω at 20 mA)
Supply air	Supply air	1.4 to 7 bar (20 to 105 psi)
	Air quality acc. to ISO 8573-1 (edition 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 Limitation to approx. 2.4 bar enabled by setting DIP switch S5
Characteristic		Linear · Deviation ≤ 1 %
Hysteresis		≤ 1 %
Sensitivity		≤ 0.1 %
Direction of action		Adjustable by changing DIP switch S4 setting
Air consumption		Independent of supply air approx. 110 l _n /h at a supply pressure of 4 bar
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 · –45 to +80 °C with metal cable gland The limits in the test certificate additionally apply for explosion-protected versions
Influences	Temperature	≤ 0.15 %/10 K
	Supply air	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 area · Second M20 x 1.5 threaded connection additionally exists · Screw terminals for 2.0 to 2.5 mm ² wire cross-section
Explosion protection		See Tabelle 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 in stainless steel 1.4581
External parts		Stainless steel 1.4571 and 1.4301
Cable gland		M20x1.5, black polyamide

Dimensions in mm

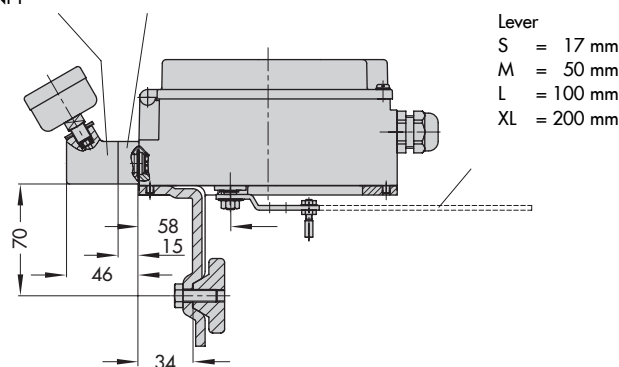
Direct attachment



Attachment according to IEC 60534-6 (NAMUR)

Pressure gauge bracket
G 1/4 or 1/4 NPT

or connecting plate



Attachment to rotary actuators VDI/VDE 3845

for all sizes of fixing level 2

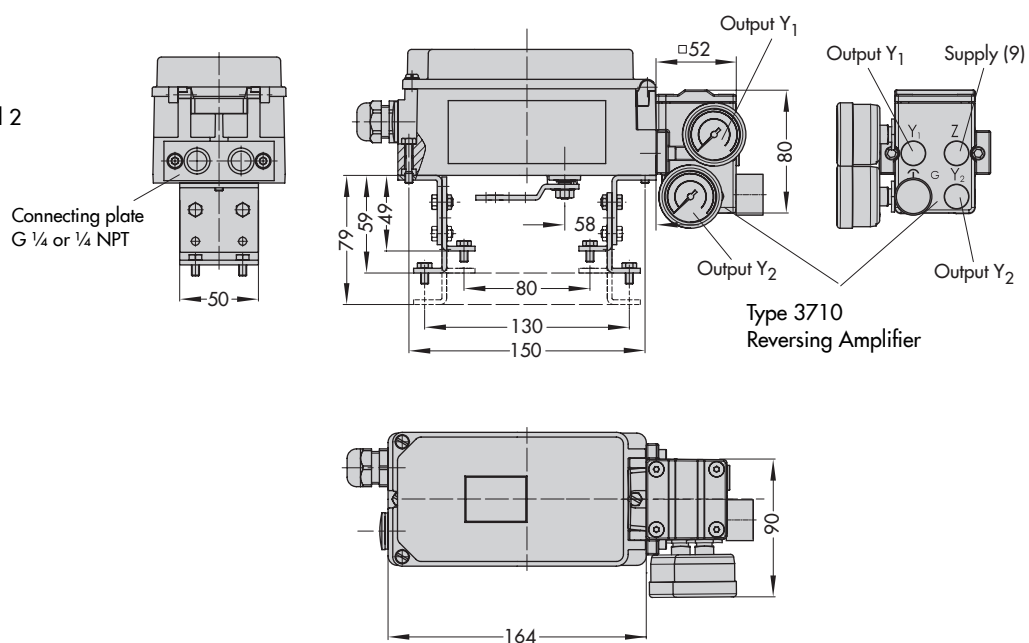


Table 2: Explosion protection certificates

Type of approval	Certificate number	Date	Type	Remarks
EC Type Examination Certificate First Addendum	PTB 03 ATEX 2099	2003-07-21 2006-08-25	3730-01	II 2G Ex ia IIC T6 Perm. ambient temperature T6/50 °C II 2D Ex tb IIIC T 80 °C IP 66
Statement of Conformity First Addendum	PTB 03 ATEX 2179 X	2003-09-30 2004-12-09	3730-08	II 3G Ex nA II T6 II 3G Ex ic IIC T6; Zone 2 II 3D Ex tc IIIC T 80 °C IP 66; Zone 22
CSA certificate	1613095	2005-02-11	3730-03	Ex ia IIC T6 Class I, Zone 0; Class II, Div. 1, Groups E, F + G; Class III Ex nA II Class I, Zone 2; Class II, Div. 2, Groups E, F + G Type 4 Enclosure
FM certificate	3021579	2004-10-01	3730-03	Class I, Zone 0, AEx ia IIC T6, 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, Class III NEMA 4X Enclosure
GOST certificate	POCC DE.05.B03115	2010-09-27	3730-01...014	1 Ex ia IIC T6 X, DIP A21 T _A 80 °C, IP 65 Ex nA II T6 X Ex nL IIC T6 X DIP A22 T _A 80 °C, IP 65
JIS approval	TC17330	2011-07-29	3730-07	Ex ia IIC T6

Article code

Positioner	Type 3730-0	x	0	0	0	0	0	0	0	0	0	x	0	0	x	0	0	0
With DIP switches, 4 ... 20 mA reference variable*																		
Explosion protection																		
Without	0																	
ATEX: II 2G Ex ia IIC T6, II 2D Ex tb IIIC T 80 °C IP 66	1																	
FM/CSA: Ex ia	3																	
JIS: Ex ia	7																	
ATEX: II 3G Ex nA II T6, II 3G Ex ic IIC T6, II 3D Ex tc IIIC T 80 °C IP 66	8																	
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	x															0	0	0
GOST: Ex ia/Ex nA	1															0	1	4

* 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.

Ordering text

Positioner Type 3730-0x

- 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
- Attachment to Type 3277 Actuator (120 to 700 cm²)
- Attachment acc. to IEC 60534-6-1 (NAMUR)
Travel: ... mm, if applicable, stem diameter: ... mm
- Adapter M20x1.5 to ½ NPT
- Metal cable gland

Specifications subject to change without notice.



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