

Series 3730

Type 3730-6 Electropneumatic Positioner with HART® communication and pressure sensors

SAMSON

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	3.6 to 200 mm
Opening angle	24 to 100°

CE Ex certified

The positioner ensures a predetermined assignment of the valve position (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 common linear and rotary actuators with interface for SAMSON direct attachment (Fig. 1), NAMUR rib (Fig. 2) or 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 single-knob operation
- LCD easy to read in any mounted position due to selectable reading direction
- Configurable with a PC over the SSP interface using the TROVIS-VIEW software
- Variable, automatic start-up with four different initialization modes
- Preset parameters - only values deviating from the standard need to be adjusted
- Calibrated travel sensor without gears susceptible to wear
- Sub initialization mode (substitution) allows the positioner to be started up in case of emergency whilst the plant is running without the valve moving through the whole travel range
- Permanent storage of all parameters in EEPROM (protected against power failure)
- Two-wire system with a small electrical load of 460 Ω
- Adjustable output pressure limitation
- Activatable tight-closing function
- Continuous monitoring of zero point
- Integrated temperature sensor and operating hours counter
- Two standard programmable position alarms
- Self-diagnostics; alarms as condensed state conforming to NAMUR Recommendation NE 107, issued over a fault alarm contact or optional analog position transmitter
- Integrated EXPERTplus diagnostics (▶ T 8389-1 EN) suitable for throttling and on/off valves and with additional partial stroke test for valves in safety-instrumented systems
- Certified according to IEC 61508/SIL

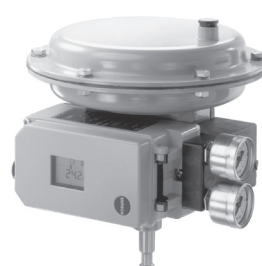


Fig. 1: Type 3730-6
Direct attachment to Type 3277
Pneumatic Actuator

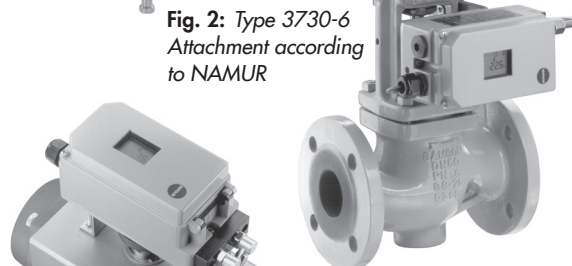


Fig. 2: Type 3730-6
Attachment according
to NAMUR

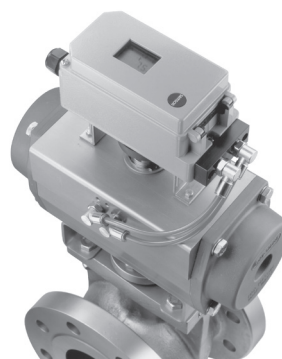


Fig. 3: Type 3730-6
Attachment according to
VDI/VDE 3845

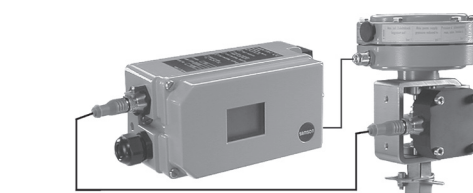


Fig. 4: Type 3730-6
External position sensor with Type 3510 Micro-flow Valve

- Pressure sensors to monitor the supply air and signal pressure

Version

- **Type 3730-6** · Electropneumatic positioner with LCD, HART® communication, on-site operation, local communication with SSP interface, EXPERTplus diagnostics, pressure sensors to monitor the supply air and signal pressure

Additional options

- Inductive limit switch with proximity switches

- Analog position transmitter with two-wire transmitter
- Electronically activated forced venting
- Solenoid valve with parallel forced venting
- Binary input
- External position sensor (Fig. 4)
- Stainless steel housing
- Leakage sensor to monitor the seat leakage

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. If necessary, the signal pressure change can be slowed down with a volume restriction that can be connected as necessary. The signal pressure to the actuator can be limited by software to 1.4, 2.4 or 3.7 bar.

A constant air stream with a fixed set point to the atmosphere is created by flow regulator (9) with a fixed set point. 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 with a user-friendly rotary pushbutton. 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°.

The closing direction of the control valve is indicated to the positioner by setting the slide switch "Air to open/Air to close". It assigns the CLOSED position of the control valve to the 0 % reading.

The INIT key activates initialization which is started according to the ready adjusted parameters (autotune). After initialization is completed, the positioner immediately starts closed-loop operation.

To configure the positioner with SAMSON's TROVIS-VIEW software, the positioner is equipped with an additional digital interface to be connected to the RS-232 interface of a PC.

Additionally, all parameters of the Type 3730-6 Positioner can be accessed using HART® communication.

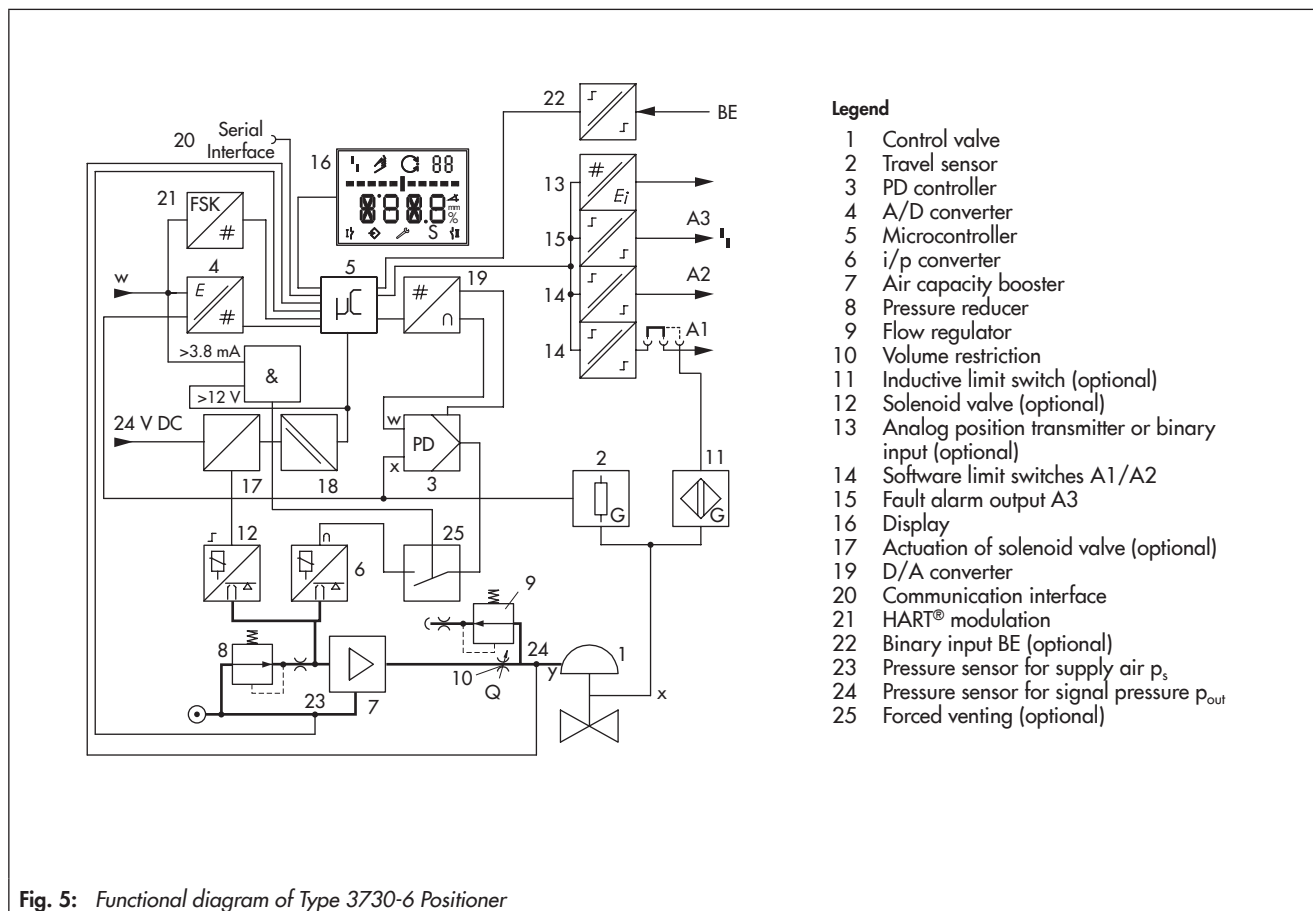


Fig. 5: Functional diagram of Type 3730-6 Positioner

Table 1: Technical data

Type 3730-6 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 60534-6-1: 3.6 to 200 mm Rotary actuators: 24 to 100° opening angle
Travel range	Adjustable	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 Minimum span 4 mA
	Static destruction limit	30 V
Minimum current		3.6 mA for display · Emergency venting at ≤ 3.8 mA or ≤ 4.4 mA depending on version
Load impedance		≤ 9.2 V (corresponding to 460 Ω at 20 mA)
Supply air		1.4 to 7 bar (20 to 105 psi)
Air quality acc. to ISO 8573-1 (2001-02)		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 · Can be limited between 1.4 and 7.0 bar by software
Characteristic	Adjustable	Linear/Equal percentage/Reverse equal percentage User-defined (over operating software) Butterfly valve, rotary plug valve and segmented ball valve: Linear/equal percentage
	Deviation	≤ 1 %
Hysteresis		≤ 0.3 %
Sensitivity		≤ 0.1 %
Transit time		Up to 240 s separately adjustable for exhaust and supply air by software
Direction of action		Reversible
Air consumption, steady state		Independent of supply air 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 = 1.4 bar: 4.5 m _n ³ /h · K _{Vmax(20 °C)} = 0.15
Permissible ambient temperature		-20 to +80 °C (all versions) · -45 to +80 °C with metal cable gland -25 to +80 °C with inductive limit switch (SJ2-S1N) and metal cable gland The limits in the type examination 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 range · Second M20x1.5 threaded connection additionally exists · Screw terminals for 0.2 to 2.5 mm ² wire cross-sections
Degree of protection		IP 66/NEMA 4X
Use in safety-instrumented systems acc. to IEC 61508/SIL		1. Suitable for use in safety-instrumented systems up to SIL 2 – triggered by the set point, emergency venting depending on positioner version at 3.8 mA or ≤ 4.4 mA – by the optional forced venting, emergency venting at ≤ 12 V 2. Suitable for use in safety-instrumented systems up to SIL 3 – The current circuit of the set point and the forced venting must both be operated in a safety-instrumented system
Communication (local)		SAMSON SSP interface and serial interface adapter Software requirement (SSP): TROVIS-VIEW with database module 3730-6
Communication (HART®)		HART® field communication protocol Impedance in HART® frequency range: Receiving 350 to 450 Ω · Sending approx. 115 Ω
Software requirements (HART®)	For handheld communicator	Device description for Type 3730-6
	For PC	DTM file acc. to Specification 1.2, suitable for integrating the positioner in frame applications that supports the FDT/DTM concept (e.g. PACTware)

Explosion protection		
ATEX, IECEx, ...	See table for explosion protection certificates	
Binary contacts		
Two software limit switches with reverse polarity protection, configurable switching behavior, default settings according to table below		
Signal state	No response	$\leq 1.2 \text{ mA}$
	Response	$\geq 2.1 \text{ mA}$
One fault alarm contact, floating		
Signal state	No response/no fault	$\geq 2.1 \text{ mA}$
	Response/fault alarm	$\leq 1.2 \text{ mA}$
For connection to	NAMUR switching amplifier acc. to EN 60947-5-6	
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	
Weight	Approx. 1.0 kg	

Table 2: Options for Type 3730-6 Positioner

Electronic forced venting · Approval acc. to IEC 61508/SIL	
Input	24 V DC · Electrical isolation and reverse polarity protection · Static destruction limit 40 V Power consumption: $I = \frac{U - 5.7 \text{ V}}{3.84 \text{ k}\Omega}$ (corresponding to 4.8 mA at 24 V/114 mW)
Signal '0' (no response)	$\leq 12 \text{ V}$
Signal '1' (response)	$> 19 \text{ V}$
Use in safety-instrumented systems acc. to IEC 61508/SIL	<ol style="list-style-type: none"> Suitable for use in safety-instrumented systems up to SIL 2 <ul style="list-style-type: none"> triggered by the set point, emergency venting depending on positioner version at 3.8 mA or $\leq 4.4 \text{ mA}$ by the optional forced venting, emergency venting at $\leq 12 \text{ V}$ Suitable for use in safety-instrumented systems up to SIL 3 <ul style="list-style-type: none"> The current circuit of the set point and the forced venting must both be operated in a safety-instrumented system
Solenoid valve · Approval acc. to IEC 61508/SIL	
Input	24 V DC · Reverse polarity protection · Static destruction limit 40 V Power consumption: $I = \frac{U - 5.7 \text{ V}}{3.84 \text{ k}\Omega}$ (corresponding to 4.8 mA at 24 V/114 mW)
Signal '0' (no response)	$\leq 12 \text{ V}$
Signal '1' (response)	$> 19 \text{ V}$
Service life	$> 5 \times 10^6$ switching cycles
Use in safety-instrumented systems acc. to IEC 61508/SIL	<ol style="list-style-type: none"> Suitable for use in safety-instrumented systems up to SIL 2 <ul style="list-style-type: none"> triggered by the set point, emergency venting depending on positioner version at 3.8 mA or $\leq 4.4 \text{ mA}$ by the optional forced venting, emergency venting at $\leq 12 \text{ V}$ Suitable for use in safety-instrumented systems up to SIL 3 <ul style="list-style-type: none"> The current circuit of the set point and the forced venting must both be operated in a safety-instrumented system
Analog position transmitter	
Supply air	12 to 30 V DC · Reverse polarity protection · Static destruction limit 40 V
Output signal	4 to 20 mA
Operating direction	Reversible
Operating range	-10 to +114 %
Characteristic	Linear
Hysteresis	Same as positioner

High-frequency influence	Same as positioner	
Other influences	Same as positioner	
Fault alarm	Can be issued as current signal 2.4 ±0.1 mA or 21.6 ±0.1 mA	
Leakage sensor · Suitable for operation in hazardous areas		
Temperature range	-40 to +130 °C	
Tightening torque	20 ±5 Nm	
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	
	NAMUR NO contact	
External position sensor		
Travel	Same as positioner	
Cable	10 m · Flexible and durable · With M12x1 connector · Flame-retardant acc. to VDE 0472 Resistant to oils, lubricants and coolants as well as other aggressive media	
Permissible ambient temperature	-60 to +105 °C · The limits in the test certificate additionally apply for explosion-protected versions	
Immunity to vibration	Up to 10 g in the range of 10 to 2000 Hz	
Degree of protection	IP 67	
Binary input · Electrical isolation · Switching behavior configured over software		
Active switching behavior (default setting)		
Connection	For external switch (floating contact) or relay contact	
Electric data	Open-circuit voltage when contact is open: max. 10 V Pulsed DC current reaching peak value of 100 mA and RMS value of 0.01 mA when contact is closed	
Contact	Closed, R < 20 Ω	ON switching state (default setting)
	Open, R > 400 Ω	OFF switching state (default setting)
Passive switching behavior		
Connection	For externally applied DC voltage, reverse polarity protection	
Electric data	3 to 30 V DC · Static destruction limit 40 V · Current consumption 3.7 mA at 24 V	
Voltage	> 6 V	ON switching state (default setting)
	< 1 V	OFF switching state (default setting)

Summary of explosion protection certificates for Type 3730-6 Positioner

Type of approval	Certificate number	Date	Type of protection/Comments	Type 3730-6
EC Type Examination Certificate	PTB 10 ATEX 2007	2010-08-18	II 2G Ex ia IIC/IIB T6; II 2D Ex tb IIIC T80°C IP66; Type 3730-6-110	-110
			With Type 3770-1 Field Barrier: II 2G Ex db [ia] IIC/IIB T6; II 2D Ex tb IIIC T80°C IP66	-210
Statement of Conformity	PTB 10 ATEX 2008 X	2010-08-18	II 3G Ex nA II T6; II 3G Ex ic IIC/IIB T6; II 3D Ex tc IIIC T80°C IP66	-810
IECEX	IECEX PTB 10.0057	2010-12-10	Ex ia IIC/IIB T6 and Ex tD A21 IP66 T80°C	-111
			Ex d[ia] IIC/IIB T6 and Ex tD A21 IP66 T80°C	-211
	IECEX PTB 10.0058X	2010-12-10	Ex nA II T6 or Ex nL IIC/IIB T6 or Ex tD A22 IP66 T80°C	-811
GOST (valid until 2018-11-14)	RU C-DE.08.B.00113	2013-11-15	1Ex ia IIC T6 Gb; 1Ex tb IIIC T80°C Db IP66	-113
			2Ex nA IIC T6 Gc; 2Ex ic IIC T6 Gc; 2Ex tc IIIC T80°C Dc IP66	-813
NEPSI (valid until 2017-10-07)	GYJ12.1109X	2012-10-08	Ex ia II CT4~T6 Gα, DIP A21 Tα, T4~T6	-112
	GYJ12.1110X	2012-10-08	Ex nL II CT4~T6 Gc, Ex nA II CT4~T6 Gc, DIP A22 Tα, T4~T6	-812

The test certificates are included in the mounting and operating instructions or are available on request.
Refer to Data Sheet ► T 8379 EN for Ex d approvals of Type 3770 Field Barrier

Mounting the positioner

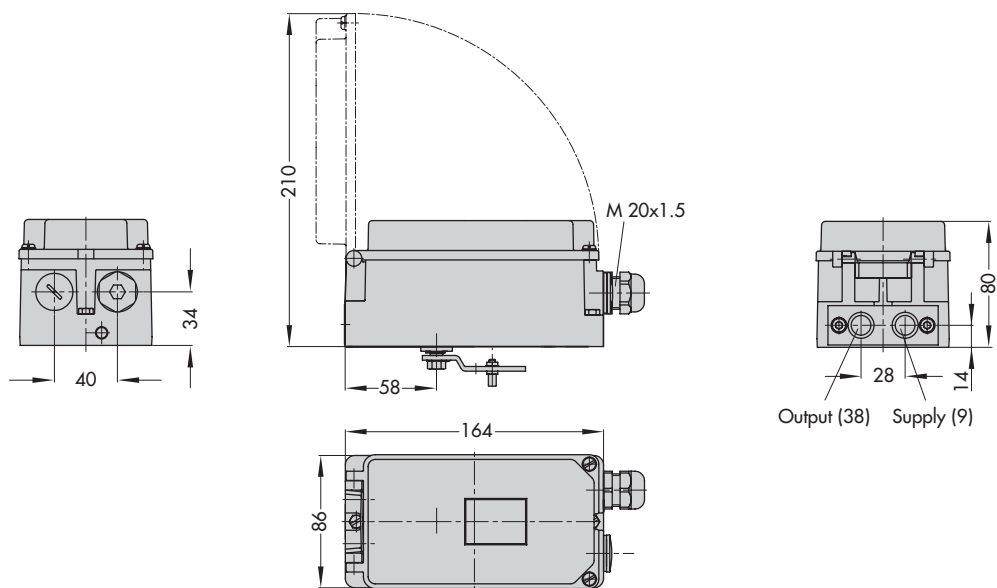
The Type 3730 Electropneumatic Positioner can be attached directly to the Type 3277 Actuator (240 to 700 cm²) over a connection block. In actuators with fail-safe action "Actuator stem extends", the signal pressure is routed over an internal hole in the actuator yoke to the actuator. In actuators with fail-safe action "Actuator stem retracts", 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.

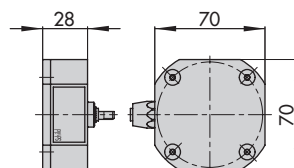
A pair of universal brackets is used for the attachment to Type 3278 Rotary Actuators or other rotary actuators according to VDI/VDE 3845. The rotary motion of the actuator is transferred to the positioner over a coupling wheel with position reading.

Dimensions in mm

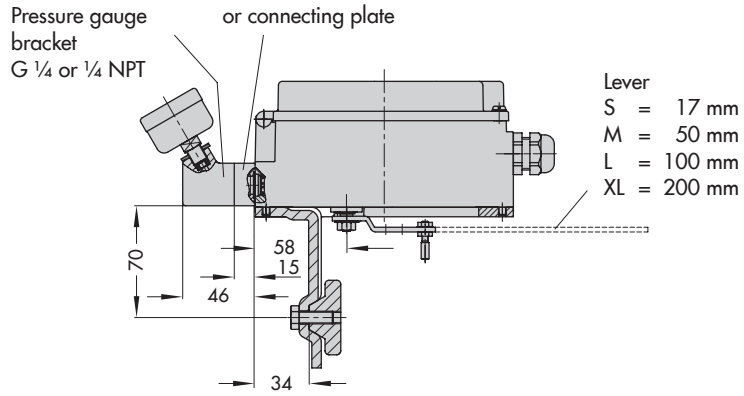
Direct attachment



External position sensor



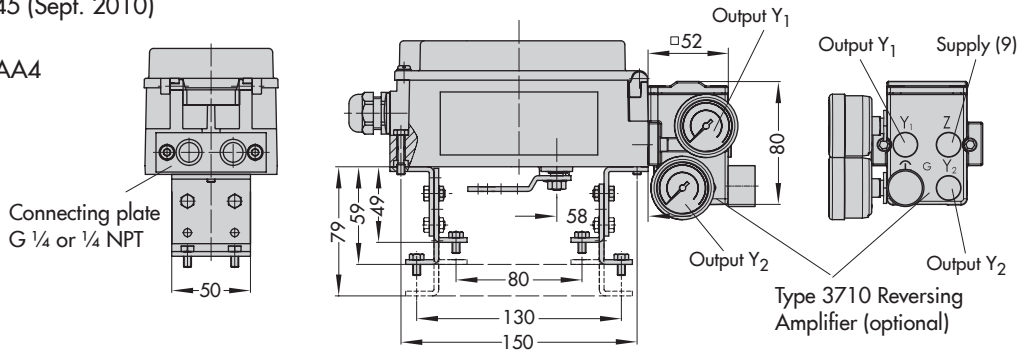
NAMUR attachment



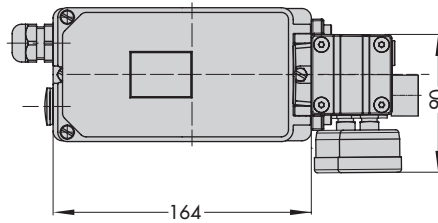
Attachment to rotary actuators

VDI/VDE 3845 (Sept. 2010)
Fixing level 1
Size AA1 to AA4

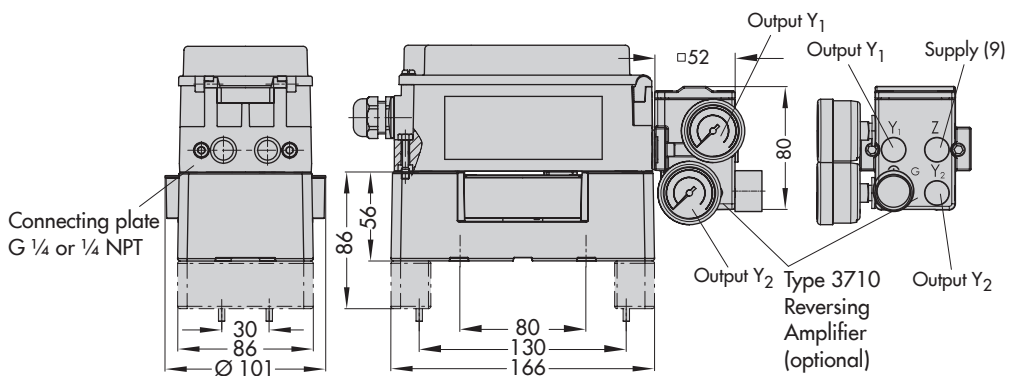
Light version



Mounting unit
CrNiMo steel bracket



Heavy-duty version



Article code

Positioner	Type 3730-6	x	x	x	x	x	x	x	0	x	x	0	x	0	0
with HART® communication and pressure sensors															
Explosion protection															
ATEX: II 2G Ex ia IIC/IIB T6; II 2D Ex tb IIIC T6 IP66	1	1	0												
IECEX: Ex ia IIC/IIB T6; Ex d[ia] IIC/IIB T6; Ex tD A21 IP66 T80°C	1	1	1												
GOST: 1Ex ia IIC T6 Gb; 1Ex tb IIIC T80°C Db IP66	1	1	3												
ATEX: II 3G Ex nA II T6; II 3G Ex ic IIC/IIB T6; II 3D Ex tc IIIC T80°C IP66	8	1	0												
IECEX: Ex nA II T6; Ex nL IIC/IIB T6; Ex tD A22 IP66 T80°C	8	1	1												
GOST: 2Ex nA IIC T6 Gc; 2Ex ic IIC T6 Gc; 2Ex tc IIIC T80°C Dc IP66	8	1	3												
Additional equipment															
Inductive limit switch															
Without						0									
SJ2-SN (NC contact)						1		0							
SJ2-S1N (NO contact)						2									
Venting function															
Without								0							
Solenoid valve, 24 V DC								1							
Forced venting, 24 V DC								2							
Additional equipment															
Without								0							
Position transmitter								1							
Leakage sensor (including cable and fixing screw)								2	0						
Binary input								3							
External position sensor															
Without									0						
Including 10 m connecting cable									1		1				
Prepared for connection, without sensor									2						
Emergency shutdown															
3.8 mA										0					
4.4 mA										1					
Housing material															
Aluminum (standard)											1				
Stainless steel 1.4581											2				
Special applications															
Without														0	
Version compatible with paint														1	
Exhaust air port with ¼-18 NPT thread, back of positioner sealed														2	
Attachment according to VDI/VDE 3847														6	

Ordering text

- Type 3730-6... 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
- Attachment to Type 3277 Actuator (240 to 700 cm²)
- Attachment according to IEC 60534-6-1 (NAMUR)
Travel: ... mm, if applicable, rod diameter: ... mm
- Attachment to Type 3278 Rotary Actuator (160/320 cm²), mounting unit with CrNiMo steel bracket or heavy-duty attachment
- Attachment to rotary actuators acc. to VDI/VDE 3845, mounting unit with CrNiMo steel bracket or heavy-duty attachment
- Pneumatic reversing amplifier for double-acting actuators with connection acc. to ISO 228/1-G ¼ or ¼-18 NPT
- Adapter M20 x 1.5 to ½ NPT
- Metal cable gland
- Special version: housing made of CrNiMo steel

Specifications subject to change without notice



SAMSON AG · MESS- UND REGELTECHNIK
 Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany
 Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
 Internet: <http://www.samson.de>

T 8384-6 EN

2014-02-04