

## Series 3730

# Type 3730-3 Electropneumatic Positioner with HART® communication



### 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
Rated travels	3.6 to 200 mm
Opening angle	24 to 100°



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 all common linear and rotary actuators with interface for SAMSON direct attachment (Fig. 1), NAMUR rib (Fig. 2), 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, menu-driven 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 410  $\Omega$
- 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 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

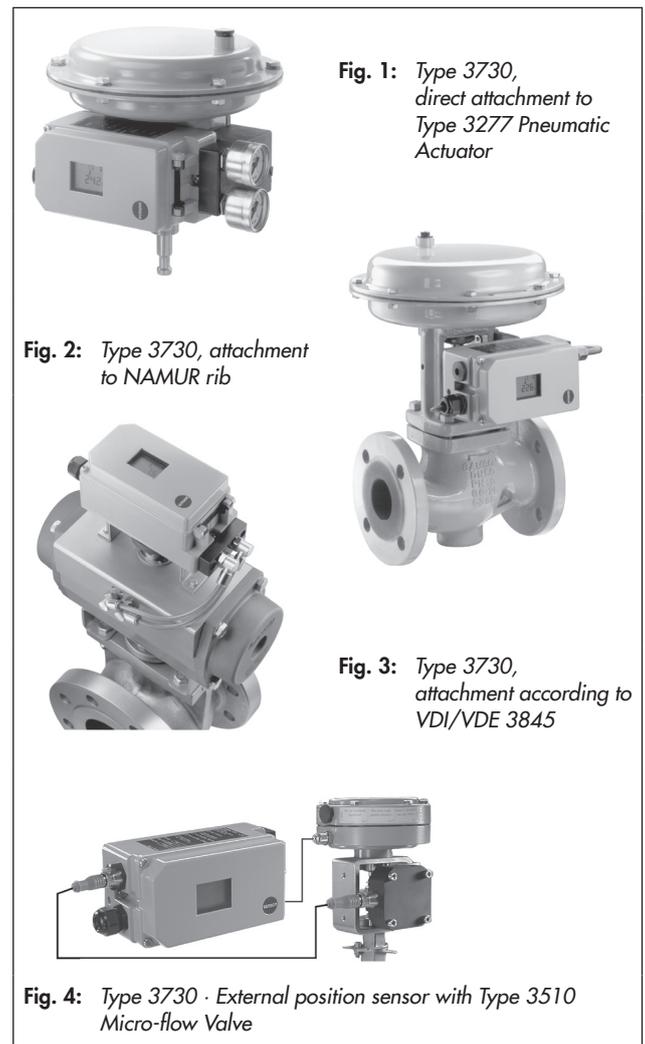


Fig. 1: Type 3730, direct attachment to Type 3277 Pneumatic Actuator

Fig. 2: Type 3730, attachment to NAMUR rib

Fig. 3: Type 3730, attachment according to VDI/VDE 3845

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

### Versions

- **Type 3730-3** · Electropneumatic positioner with LCD, on-site operation, local communication with SSP interface, EXPERTplus diagnostics, with HART® communication
- **Type 3731-3 Ex d positioner** · As above, with flameproof enclosure · See Data Sheet ▶ T 8387-3 EN



**Table 1:** Table 1 · Technical data for Type 3730-3 Positioner

Type 3730-3 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 Attachment to 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	100 mA	
Minimum current		3.6 mA for display · 3.8 mA for operation	
Load impedance		≤ 8.2 V (corresponding to 410 Ω at 20 mA)	
Supply air	Supply air	1.4 to 7 bar (20 to 105 psi)	
	Air quality acc. to ISO 8573-1	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 1.4 bar/2.4 bar/3.7 bar ± 0.2 bar by software	
Characteristic	Adjustable	Linear/equal percentage/reverse equal percentage User-defined (over operating software and communication) 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	
Direction of action		Reversible	
Air consumption, steady state		Independent of supply air approx. 110 l <sub>n</sub> /h	
Air output capacity	Actuator filled with air	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 (20 °C)</sub> = 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 (20 °C)</sub> = 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 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 M20x1.5 cable gland for 6 to 12 mm clamping range Second M20x1.5 threaded connection additionally available Screw terminals for 0.2 to 2.5 mm <sup>2</sup> wire cross-section	
Degree of protection		IP 66 /NEMA 4X	
Use in safety-instrumented systems (SIL)		Observing the requirements of IEC 61508, the systematic capability of the control valve for emergency venting as a component in safety-instrumented systems is given.	
		Use is possible on observing the requirements of IEC 61511 and the required hardware fault tolerance in safety-instrumented systems up to SIL 2 (single device/HFT = 0) and SIL 3 (redundant configuration/HFT = 1).	
<b>Explosion protection</b>		See Table 2	
Communication (local)		SAMSON SSP interface and serial interface adapter	
Software requirements (SSP)		TROVIS-VIEW with database module 3730-3	
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 3730-3	
	For PC	DTM file acc. to Specification 1.2, suitable for integrating the positioner into frame applications that support the FDT/DTM concept (e.g. PACTware); other integration options (e.g. AMS, PDM) available	
<b>Binary contacts</b>			
Two software limit switches with reverse polarity protection, configurable switching behavior, default settings according to table below			
Signal state	<b>Version</b>	<b>No explosion protection</b>	<b>Explosion-protected version</b>
	No response	Effectively non-conducting	≤ 1.2 mA
	Response	Conductive (R = 348 Ω)	≥ 2.1 mA
1 fault alarm contact			
Signal state	<b>Version</b>	<b>No explosion protection</b>	<b>Explosion-protected version</b>
	No fault alarm	Conductive (R = 348 Ω)	≥ 2.1 mA
	Fault alarm	Effectively non-conducting	≤ 1.2 mA

For connection to	Binary input of a PLC acc. to IEC 61131-2 $P_{max} = 400 \text{ mW}$ or for connection to NAMUR switching amplifier acc. to EN 60947-5-6	NAMUR switching amplifier acc. to EN 60947-5-6
<b>Materials</b>		
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	
<b>Solenoid valve · Approval acc. to IEC 61508/SIL</b>		
Input	24 V DC · Electrical isolation and reverse polarity protection · Static destruction limit 40 V Current consumption $I = \frac{U - 5.7 \text{ V}}{3840 \Omega}$ (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	
$K_V$ coefficient	0.15	
Use in safety-instrumented systems (SIL)	Same as positioner pneumatics	
<b>Analog position transmitter</b>		
Power supply	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	Issued as status current $2.4 \pm 0.1 \text{ mA}$ or $21.6 \pm 0.1 \text{ mA}$	
<b>Inductive limit switch</b>		
	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	
<b>External position sensor</b>		
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	
<b>Leakage sensor · Suitable for operation in hazardous areas</b>		
Temperature range	-40 to +130 °C	
Tightening torque	20 ±5 Nm	
<b>Binary input · Electrical isolation · Switching behavior configured over software (e.g. TROVIS-VIEW, DTM)</b>		
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, $R < 20 \Omega$	ON switching state (default setting)
	Open, $R > 400 \Omega$	OFF switching state (default setting)
Passive switching behavior		
Connection	For externally applied DC voltage, reverse polarity protection	
Electric data	0 to 30 V · Static destruction limit: 40 V · Current consumption at 24 V: 3.7 mA	
Voltage	$> 6 \text{ V}$	ON switching state (default setting)
	$< 1 \text{ V}$	OFF switching state (default setting)
<b>Analog input x · Electrical isolation · Input for externally measured valve position</b>		
Input signal	4 to 20 mA · Reverse polarity protection · Minimum span 6.4 mA	
Electric data	Load impedance at 20 mA: 6.0 V · Impedance at 20 mA: 300 $\Omega$ · Overload capacity: 24 V AC/DC	

**Table 2: Summary of explosion protection approvals**

Type of approval	Certificate number	Date	Type of protection/comments	Type 3730
EC Type Examination Certificate	PTB 02 ATEX 2174	2002-11-15	II 2G Ex ia IIC T6, II 2D Ex tb IIIC T80°C IP66	-31
First Addendum		2003-06-18	Revision: Modem PCB – Addition: Forced fail-safe function	
Second Addendum		2004-02-16	Additions: II 2D IP65 T80°C, optional position transmitter Revisions: Multi-function PCB	
Third Addendum		2007-09-10	Revision: Electrical data for forced venting, binary sensor, binary input, structure-borne sound sensor	
Fourth Addendum		2008-12-10	Revision: Extension of permissible ambient temperature range	
Fifth Addendum		2013-07-30	Adaption: Latest edition of standard	
Statement of Conformity	PTB 03 ATEX 2180 X	2003-09-30	II 3G Ex nA II T6, II 3G Ex ic IIC T6, II 3D Ex tc IIIC T80°C IP66	-38
First Addendum		2005-04-26	Addition: II 3G EEx nA II T6	
Second Addendum		2007-09-10	Revision: Electrical data for binary sensor, binary input, structure-borne sound sensor, sensor connection	
Third Addendum		2008-12-10	Revision: Extension of permissible ambient temperature range Adaption: Latest edition of standard	
Fourth Addendum		2013-07-30	Adaption: Latest edition of standard	
CSA	1330129	2009-02-19	Ex ia IIC T6; Class I, Zone 0; Class I, Groups A, B, C, D; Class II, Groups E, F, G; Class I, Zone 2; Class I, Div.2, Groups A, B, C, D; Class II, Div.2, Groups E, F, G	-33
FM	3012394	2008-11-30	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	-33
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	-31
			2Ex nA IIC T6 Gc; 2Ex ic IIC T6 Gc; 2Ex tc IIIC T80°C Dc IP66	-38
IECEX	IECEX PTB 05.0008	2005-02-21	Ex ia IIC T6/T5/T4	-31
CCoE (valid until 2016-01-26)	A/P/HQ/MH/104/1105	2011-01-27	Ex ia IIC T6	-31
INMETRO (valid until 2016-08-27)	IEx 13.0161	2013-08-28	Ex ia IIC T Gb	-3
KCS (valid until 2014-11-11)	11-KB4BO-0224	2011-11-10	Ex ia IIC T6/T5/T4	-31
NEPSI (valid until 2017-10-07)	GYJ012.1486X	2012-10-08	Ex ia IIC T4~T6 Ga	-31
	GYJ12.1487X		Ex nL IIC T4~T6 Gc; Ex nA IIC T4~T6 Gc	-38

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 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 hole in the actuator yoke to the actuator. 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 either side of the control valve.

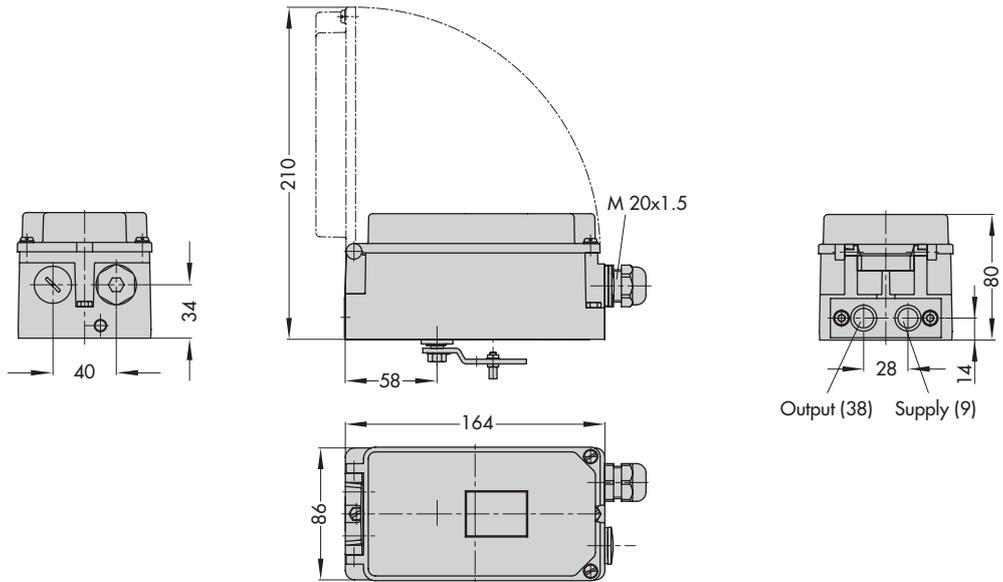
A pair of universal brackets is used for the attachment to Type 3278 Rotary Actuators or other rotary actuators according to VDI/VDE 3845. The rotary motion of the actuator is transferred to the positioner over a coupling wheel with scale.

### Ordering text

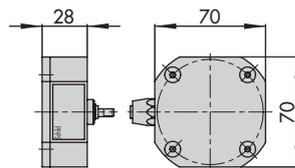
- Type 3730-3... Positioner
- Without pneumatic connecting rail (only when directly attached to Type 3277)
- With pneumatic connecting rail ISO 228/1-G ¼
- With pneumatic connecting rail ¼-18 NPT
- Without/with pressure gauge up to max. 6 bar
- Additional cover label with list of parameters and operating instructions in English/Spanish or English/French (standard version German/English)
- Attachment to Type 3277 Actuator (120 to 700 cm<sup>2</sup>)
- Attachment according to IEC 60534-6-1 (NAMUR)
- Travel: ... mm, if applicable, rod diameter: ... mm
- Attachment to Type 3278 Rotary Actuator (160/320 cm<sup>2</sup>), 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

Dimensions in mm

Direct attachment

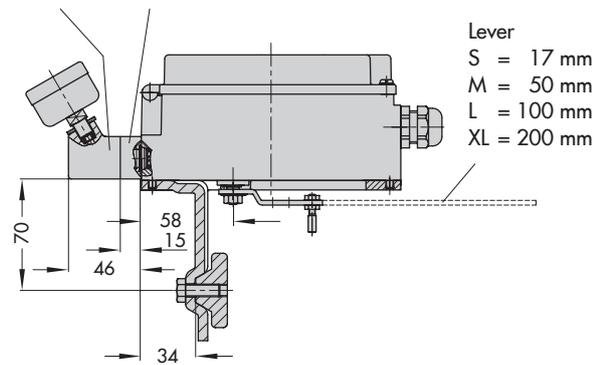


External position sensor



NAMUR attachment

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

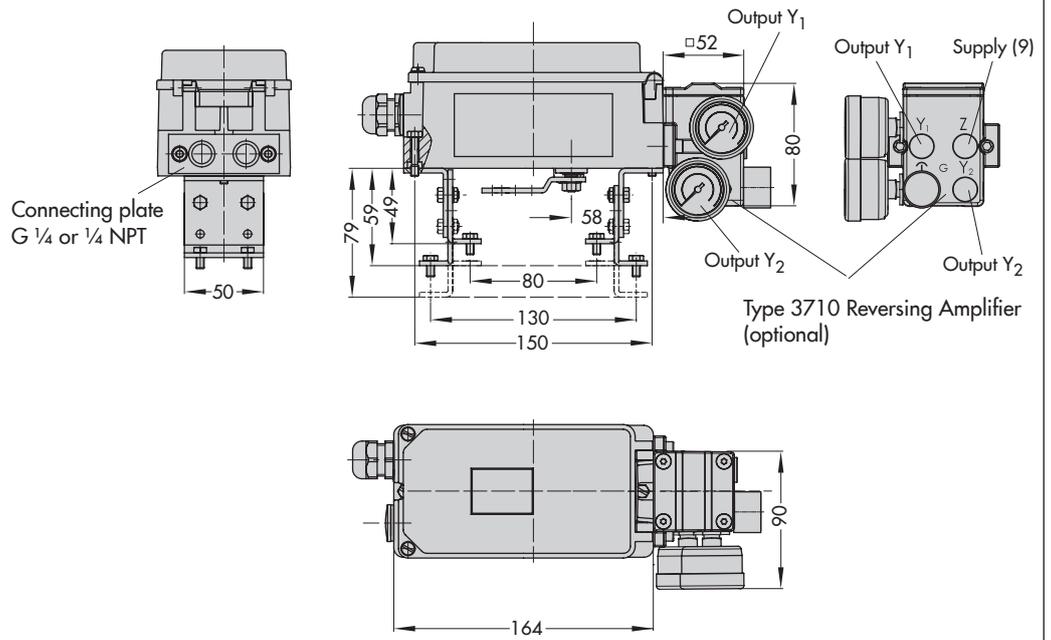


**Attachment to rotary actuators acc. to VDI/VDE 3865 (Sept. 2010)**

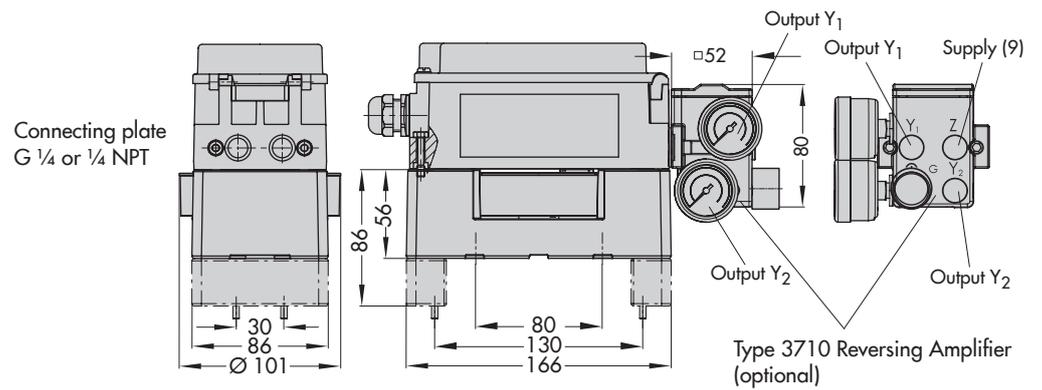
Fixing level 1  
Size AA1 to AA4

**Light version**

Mounting unit  
CrNiMo steel bracket



**Heavy-duty version**



## Article code

Positioner	Type 3730-3	x	x	x	x	x	x	x	x	0	x	0	0	x	0	x	x
With LCD and autotune, HART® communication, 4 to 20 mA two software limit switches, one fault alarm contact																	
<b>Explosion protection</b>																	
Without		0															
ATEX: II 2G Ex ia IIC T6, II 2D Ex tb IIIC T80°C 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 I, Groups A-D; Class II, Groups E-G; 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															
<b>Additional equipment</b>																	
Inductive limit switch																	
Without		0															
SJ2-SN (NC contact)		1															
SJ2-S1N (NO contact)		2															
Solenoid valve SIL 4																	
Without			0														
With, 24 V DC			4														
Position transmitter																	
Without				0													
With				1			0										
External position sensor																	
Without					0												
With		0			1				0								
Prepared connection		0			2												
Analog input x		0	0		0	3											
Leakage sensor																	
Without							0										
With							1										
Binary input																	
Without								0									
With					0			2									
<b>Diagnostics</b>																	
EXPERTplus									4								
<b>Housing material</b>																	
Aluminum (standard)										0							
Stainless steel 1.4581					0					1							
<b>Special application</b>																	
Without														0			
Device completely free of paint-impairing substances														1			
Exhaust air port with 1/4-18 NPT thread, back of housing sealed														2			
<b>Special version</b>																	
Without																0	0
IECEX: Ex ia IIC T6/T5/T4		1														1	2
GOST: 1Ex ia IIC T6 Gb; 1Ex tb IIIC T80°C Db IP66		1														1	4
GOST: 2Ex nA IIC T6 Gc, 2Ex ic IIC T6 Gc, 2Ex tc IIIC T80°C Dc IP66		8														2	0

Specifications subject to change without notice



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**T 8384-3**

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