DATA SHEET

T 8384-4 EN



Type 3730-4 Electropneumatic Positioner

with PROFIBUS-PA communication · Series 3730



Anwendung

Positioners for attachment to pneumatic control valves

Valve travel from 3.6 to 300 mm \cdot Opening angle 24 to 100 $^\circ$

Smart, bus-powered field device complying with PROFIBUS-PA specifications based on IEC 61158-2 transmission technology

The microprocessor-controlled positioner compares the set point cyclically transmitted over the PROFIBUS-PA network to the travel or opening angle of the control valve and issues a corresponding output signal pressure.

The Type 3730-4 Positioner communicates using PROFI-BUS-PA specification according to IEC 61158 and IEC 61784 to exchange data with programmable logic controllers, automation systems and various engineering tools.

Special features

- PROFIBUS-PA Profile 3.01 certified positioner fulfilling all compulsory requirements of PROFIBUS-PA Profile 3.02
- Automatic ID adaptation according to PROFIBUS-PA Profile 3.02 to facilitate replacement of positioners with Profile 2.0 or 3.0 (e.g. Type 3785)
- Classified status alarms acc. to NAMUR Recommendation NE 107
- DTM file available to integrate the positioner into FDT/ DTM in compliance with specification 1.2
- Simple attachment to all common linear and rotary actuators
 - SAMSON direct attachment (Fig. 1)
 - NAMUR rib (Fig. 2)
 - Attachment to rod-type yokes acc. to IEC 60534-6-1
 - Attachment according to VDI/VDE 3847
 - Rotary actuator attachment according to VDI/ VDE 3845 (Fig. 3)
- Any desired mounting position of the positioner (but not suspended)
- Single-knob, menu-driven operation
- Automatic start-up
- LCD easy to read in any mounted position due to selectable reading direction
- Integrated EXPERTplus diagnostics for control valves (> T 8389)
- Online changing of control parameters
- Automatic zero monitoring
- Calibrated travel sensor without gears susceptible to wear



- Permanent storage of all parameters (protected against power failure)
- Negligible influence of temperature and supply air
- Adjustable output pressure limitation
- Activatable tight-closing function
- Binary input for DC voltage signals

Additional options

Inductive limit contact with proximity switches

Integrated solenoid valve

Binary input for floating contact

External position sensor (Fig. 4)
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 (set point 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, an analog i/p module with a downstream air capacity booster and the electronics with the microcontroller.

When a set point 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. Using the software, the signal pressure to the actuator can be limited to 1.4, 2.4 or 3.7 bar.

The fixed flow regulator ensures a constant air flow to the atmosphere, which is used to flush the inside of the positioner housing and to optimize the air capacity booster. The i/p module is supplied with a constant upstream pressure by the pressure regulator to compensate for any fluctuations in the supply pressure.

The positioner communicates and is powered using IEC 61158-2 transmission technology conforming to PROFIBUS-PA specifications.

As a standard feature, the positioner comes with a binary input for DC voltage signals to signalize process information over the PROFIBUS-PA network.

Operation

A single rotary pushbutton facilitates operation. 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, meaning there is no 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 DIP 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. After initialization is completed, the positioner immediately starts closed-loop operation.

Configuration using TROVIS-VIEW

The SAMSON configuration software, TROVIS-VIEW, can be used to configure the positioner. For this purpose, the positioner is equipped with an additional digital interface to be connected to the RS-232 interface of a PC. TROVIS-VIEW adapts the positioner to any process requirements and allows the process to be checked while the process is running. The control valve is connected to the process over the PROFIBUS-PA network.

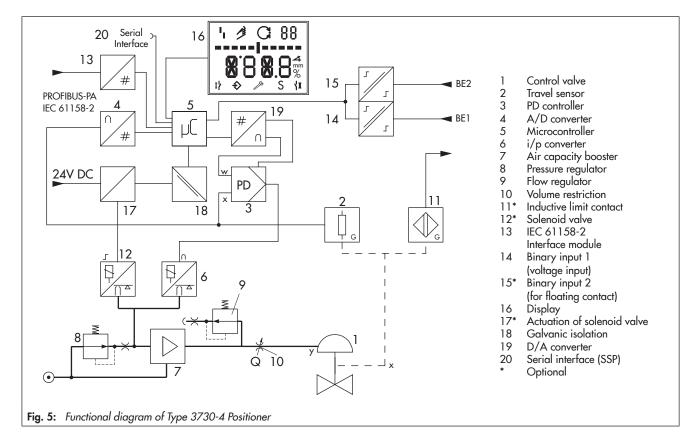


Table 1: Technical data

Type 3730-4 Positioner with PROFIBUS Technical data in test certificates addition	-PA communication nally apply to explosion-protected devices								
	Direct attachment to Type 3277 Actuator	3.6 to 30 mm							
	Attachment according to IEC 60534-6 (NAMUR)	3.6 to 300 mm							
	Attachment according to VDI/VDE 3847	3.6 to 300 mm							
	Attachment to rotary actuators (VDI/VDE 3845)	24 to 100° opening angle							
Travel range Adjustable	Adjustable within the initialized travel/angle of rotation of the valve; travel can be restricted to 1/5 at								
	the maximum.								
Bus connection	Fieldbus interface according to IEC 61158-2, bus-powered Field device according to FISCO (Fieldbus Intrinsically Safe Concept)								
Communication									
Fieldbus	Data transmission conforming to PROFIBUS-PA specification acc. to IEC 61158 and IEC 61784								
	Certified DTM file acc. to FDT specification 1.2, suitable for integrating the positioner into frame appli- cations that support the FDT/DTM concept. Other integrations, e.g. into SIMATIC PDM using EDD								
Local	SAMSON SSP interface and serial interface adapter								
Software requirements	TROVIS-VIEW with database module 3730-4								
Permissible voltage supply	9 to 32 V DC · Powered over bus line								
	The limits in the type examination certificate addition	ally apply for explosion-protected versions.							
Maximum operating current	15 mA								
Additional current in case of error	0 mA								
Supply air	1.4 to 7 bar (20 to 105 psi)								
	Air quality acc. to ISO 8573-1: 2001 Max. particle size and density: Class 4 · Oil content: Class 3 · Humidity and water: Class 3 Pressure dew point: 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	1 1							
Characteristic	Linear/equal percentage/reverse equal percentage · User-defined (over operating software and com- munication) · Butterfly valve linear/equal percentage · Rotary plug valve linear/equal percentage Segmented ball valve linear/equal percentage								
	Deviation from characteristic $\leq 1 \%$								
Hysteresis	≤0.3 %								
Sensitivity	≤0.1 %								
Direction of action	Reversible								
Air consumption	Independent of supply air approx. < 110 l _n /h								
Air output to fill actuator with air	At $\Delta p = 6$ bar: 8.5 m _n ³ /h · At $\Delta p = 1.4$ bar: 3.0	$m_n^3/h \cdot K_{Vmax(20^{\circ}C)} = 0.09$							
capacity to vent actuator	At $\Delta p = 6$ bar: 14.0 m _n ³ /h · At $\Delta p = 1.4$ bar: 4.								
Permissible ambient temperature	-20 to +80 °C for all versions -45 to +80 °C with metal cable gland Observe the limits in the test certificate for explosion								
Influences Temperature	≤0.15 %/10 K								
	None								
Supply air									
Effect of vibration	\leq 0.25 % up to 2 kHz and 4 g according to IEC 770								
EMC	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 (SIL)	Observing the requirements of IEC 61508, the systematic capability of the pilot valve for emergency venting as a component in safety-instrumented systems is given.								
Emergency venting at 0 V set point and using optional solenoid valve	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).								

Binary input 1	
Input	0 to 30 V DC with reverse polarity protection \cdot Static destruction limit 40 V/5.8 mA \cdot Current consumption 3.5 mA at 24 V \cdot Galvanic isolation
Signal	Signal '1' at U _e > 5 V \cdot Signal '0' at U _e < 3 V
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 1.4408
External parts	Stainless steel 1.4404/316L
Cable gland M20x1.5, black polyamide	
Weight	Approx. 1.0 kg

Options for Type 3730-4	
Binary input 2 for floating contact	
Switching input	R < 100 Ω · Contact load 100 mA · Static destruction limit 20 V/5.8 mA · Galvanic isolation
Solenoid valve · Approval acc. to IEC 61	508/SIL
Input	24 V DC \cdot Reverse polarity protection \cdot Static destruction limit 40 V
	Power consumption: $I = \frac{U - 5.7 \text{ V}}{3840 \Omega}$ (corresponding to 4.8 mA at 24 V/114 mW)
Signal	Signal '0' no pick-up < 12 V · Signal '1' safe pick-up > 19 V (emergency venting at 0 V)
Service life	> 5 x 10 ⁶ switching cycles
Pepperl+Fuchs inductive limit contact	For connection to switching amplifier acc. to EN 60947-5-6
SJ2-SN proximity switch	Measuring plate not detected: ≥3 mA · Measuring plate detected: ≤1 mA
External position sensor	
Valve 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 with a fixed connection between positioner and position sensor · The limits in the test certificate additionally apply for explosion-protected versions
Immunity to vibration	Up to 10 g in the range of 10 Hz to 2 kHz
Degree of protection	IP 67

Туре	е	Certification			Type of protection/comments						
			Number	A P HQ MH 104 1444							
	4	ССоЕ	Date	2018-04-21	Ex ia IIC T6						
3730			Valid until	2023-04-20							
			Number	PTB 04 ATEX 2109	II 2G Ex ia IIC Tó Gb						
	43 -41 -4	$\langle Ex \rangle_{1}$	Date	2017-05-11	II 2D Ex ia III T80°C Db						
			Number	IECEx PTB 06.0054	Ex ia IIC T6T4 Gb						
		IECEx	Date	2017-07-17	Ex ia IIC T80°C Db						
			Number	2020322307002425							
	_	CCC Ex	Date	2020-09-18	Ex ia IIC T4 ~ T6 Gb						
	4		Valid until	2025-09-17							
			Number	RU C-DE.HA65.B.00510/20							
		EAC	Date	2020-03-18	1Ex ia IIC T6/T5/T4 Gb X Ex tb IIIC T80 °C Db X						
			Valid until	2025-03-18							
			Number	ZETC/18/2018							
		STCC	Date	2018-04-27	II 2G Ex ia IIC T6 Gb II 2D Ex ia IIIC T80°C Db						
			Valid until	2021-04-26							
	-43	CSA	Number Date	1675787 2017-05-24	Ex ia IIC T6 Class I, II, Div. 1, Groups A–G Ex nA II T6, Ex nL IIC T6 Class I, Div. 2, Groups A–D Class II, Div. 1, Groups E–G Type 4 Enclosure						
3730		FM	Number Date	3023605 2006-03-15	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) 1)	Number Date	PTB 04 ATEX 2109 2017-05-11	II 2D Ex th IIIC T80°C Dh						
	-45	IECEx	Number Date	IECEx PTB 06.0054 2017-07-17	Ex the IIIC T80°C Db						
		STCC	Number Date Valid until	ZETC/18/2018 2018-04-27 2021-04-26	II 2D Ex th IIIC T80°C Db						
		$\langle Ex \rangle_{2}$	Number Date	PTB 05 ATEX 2010 X 2017-06-22	II 3G Ex nA IIC T6 Gc II 3D Ex tc IIIC T80°C Dc						
		IECEx	Number	IECEx PTB 06.0054	Ex nA IIC T6T4 Gc Ex tc IIIC T80°C Dc						
	~		Date Number	2017-07-17							
	-48	CCC Ex	Date	2020322307002425 2020-09-18	Ex ic IIC T4 ~ T6 Gc						
		CCC EX	Valid until	2020-09-18	Ex nA IIC T4 ~ T6 Gc						
		STCC	Number	ZETC/18/2018 2018-04-27	II 3G Ex nA IIC T6 Gc;						
		STCC	Date Valid until		II 3D Ex te IIIC T80°C De						
			Valid until	2021-04-26							

Table 2: Explosion protection certificates

EC type examination certificate
Statement of conformity

Electrical and bus connection

The Type 3730-4 Positioner with PROFIBUS-PA communication must be connected to bus segments complying with IEC 61158-2 requirements. A shielded two-wire line is used for both supply power and data communication.

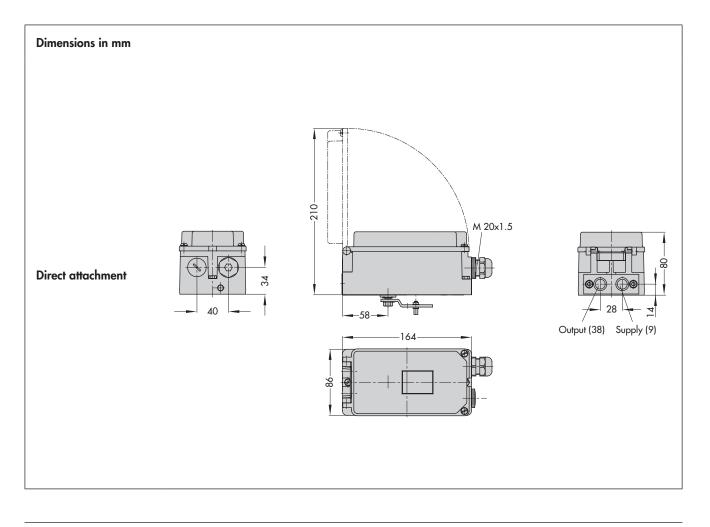
Mounting the positioner

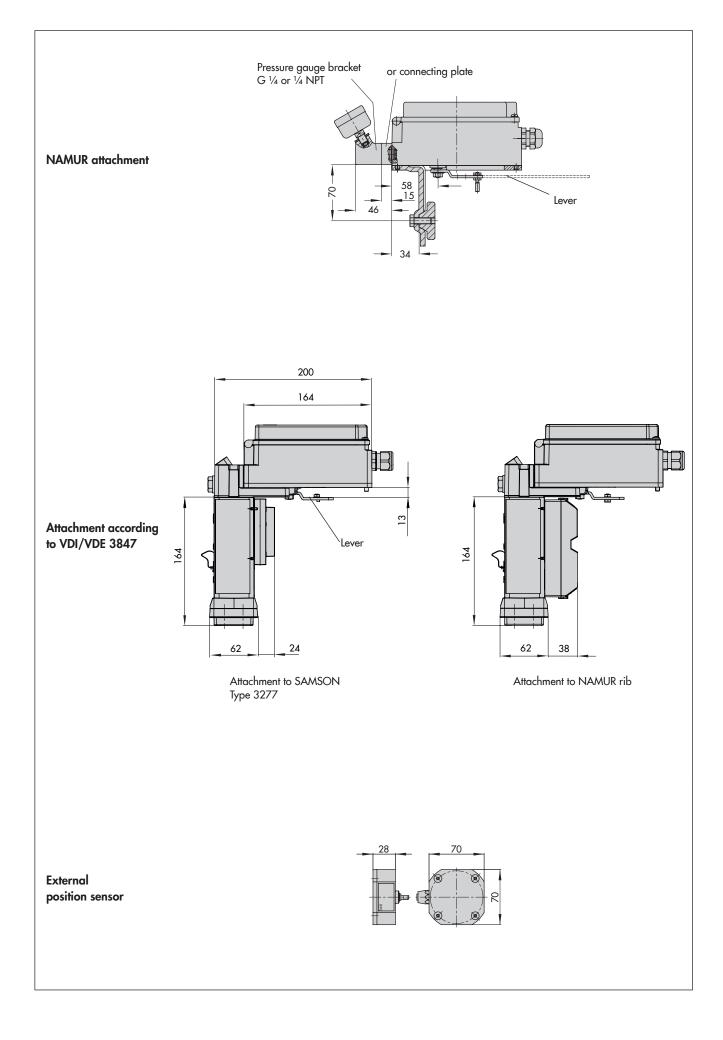
The Type 3730 Electropneumatic Positioner can be attached directly to the Type 3277 Actuator (175 to 750 cm²) over a connection block. In actuators with "actuator stem extends" fail-safe action, the signal pressure is routed over an internal hole in the actuator yoke to the actuator. In actuators with "actuator stem retracts" fail-safe action, 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 travel indication. A special version of the positioner allows it to be attached according to VDI/VDE 3847. This type of attachment allows the positioner to be replaced quickly while the process is running by blocking the air in the actuator. The positioner can be attached directly to the Type 3277 Actuator using an adapter bracket or adapter block. Alternatively, it can be attached to the NAMUR rib of a control valve using an additional NAMUR connection block.

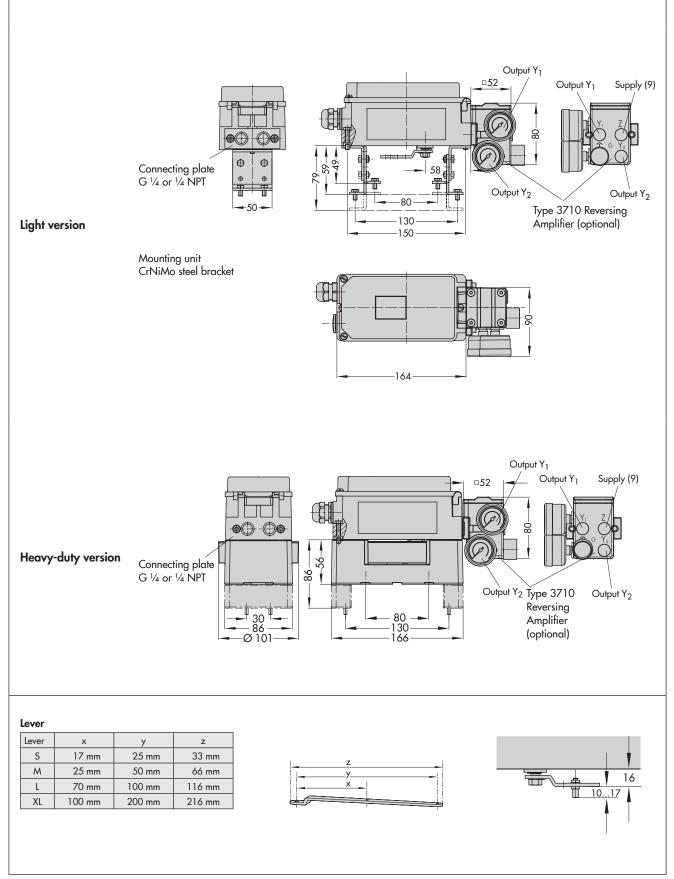
A reversing amplifier is necessary for double-acting, springless actuators for the second opposing signal pressure.







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



Ordering text

- Type 3730-4... 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 1/4-18 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)
- Valve travel: ... mm, if applicable, rod diameter: ... mm
- Attachment according to VDI/VDE 3847
- Valve 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 ¹/₄ or ¹/₄-18 NPT
- Adapter M20x1.5 to 1/2 NPT
- Metal cable gland
- Special version: housing made of CrNiMo steel

Article code

	Type 3730-4 Positioner	x	x	x	0	x	0	х	x	1	x	0	0	х	0	x	х
With LC	CD and autotune, PROFIBUS-PA																
Explosi	on protection																
Withou	t	0															
ATEX	II 2G Ex ia IIC T6 Gb; II 2D Ex ia III T80°C Db	1															
CSA	Ex ia IIC T6; Class I, II, Div.1, Groups A, B, C, D, E, F, G; Ex nA II T6; Ex nL IIC T6; Class I, Div.2, Groups A, B, C, D; Class II, Div.1, Groups E, F, G	3															
FM	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																
ATEX	II 2D Ex tb IIIC T80°C Db	5															
ATEX	II 3G Ex nA IIC T6 Gc; II 3D Ex tc IIIC T80°C Dc	8															
Additio	nal equipment																
Inductiv	re limit contact																
Wit	hout		0														
1 x	SJ2-SN (NC contact)		1			0											
Solenoi	d valve																
Wit	hout			0													
Wit	h, 24 V DC			4													
Externa	l position sensor																
	hout					0											
Wit	h		0	0		1		0			0						
Binary input																	
Without								0									
Floating contact						0		1									
Diagnostics																	
EXPERTplus									4								
	g material																
Aluminum (standard)											0						
Stainles	is steel					0					1						
-	application																
														0			
Without Version compatible with paint														1			
	t port with thread ¼-18 NPT		0	0		0		0						2			
without	dditional vent hole and VDI/VDE 3847 adapter, travel pick-off parts													6			
	dditional vent hole													7			
	version																
Withou	t														0	0	C
IECEx	Ex ia IIC T6T4 Gb; Ex ia IIC T80°C Db	1													0	1	2
IECEx	Ex tb IIIC T80°C Db	5													0	3	4
IECEx	Ex nA IIC T6T4 Gc; Ex tc IIIC T80°C Dc	8													0	1	5
EAC	1Ex ia IIC T6/T5/T4 Gb X; Ex tb IIIC T80 °C Db X	1													0	1	4