

Electropneumatic Positioner Type 3730-5 with FOUNDATION™ fieldbus communication

Application

Positioner for attachment to pneumatic control valves

Travel: 3.6 to 200 mm · Opening angle: 24° to 100°

Smart, bus-powered field unit conforming to FOUNDATION™ fieldbus specification based on IEC 61158-2 transmission technology.



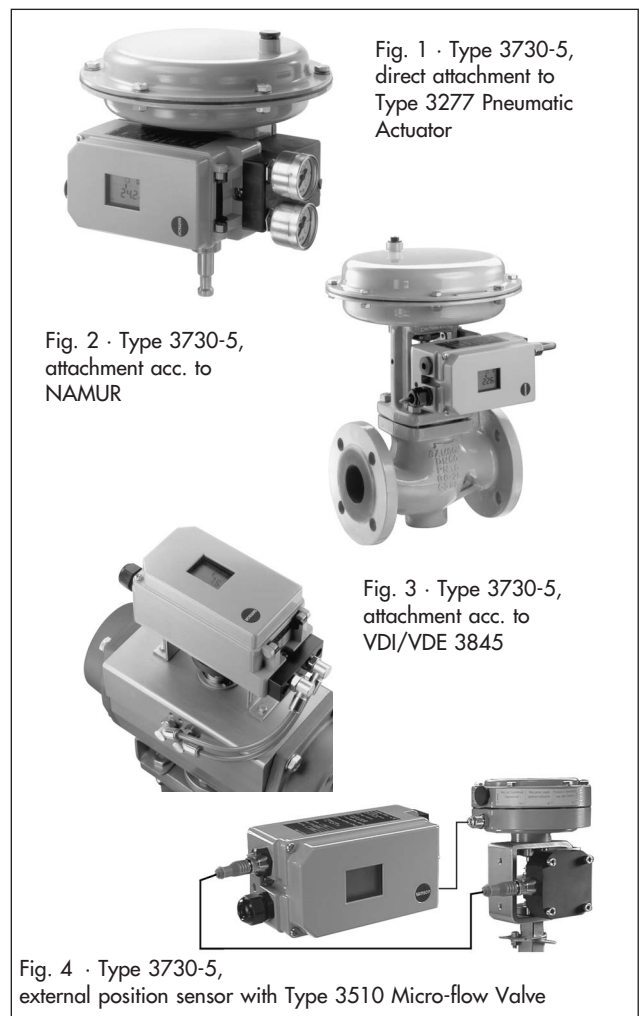
The microprocessor-controlled positioner compares the reference variable cyclically transmitted over the FOUNDATION™ fieldbus network to the travel or opening angle of the control valve and issues a corresponding output signal pressure.

The Type 3730-5 Positioner communicates according to FOUNDATION™ fieldbus specification with field devices, programmable logic controllers and process control systems.

An integrated PID Function Block allows the control of process variables required directly in the field. The shift to distributed control reduces the number of control tasks to be performed by the higher-level automation system. The Link Master Capability allows autonomous closed control loops to be set up in the field.

Special features

- Integrated function blocks: 1 PID Control (PID), 1 Analog Output (AO), 1 Multiple Analog Output (MAO), 1 Multiple Analog Input (MAI), 2 Discrete Outputs (DO), 2 Discrete Inputs (DI)
- Link Master Capability
- DO function blocks for discrete analysis of the reference variable for on/off valves and to start/execute diverse functions (e.g. start partial stroke test)
- Two DI function blocks to analyze binary input signals
- Easy attachment to common linear actuators over SAMSON direct attachment interface (Fig. 1), over NAMUR rib (Fig. 2) or to control valves with rod-type yokes acc. to IEC 60534-6 or to rotary actuators according to VDI/VDE 3845 (Fig. 3)
- Any desired mounting position
- Simple one-knob, menu-driven operation
- Automatic start-up
- LCD easy to read in any mounting position due to selectable reading direction
- Integrated EXPERTplus diagnostics (see T 8389 EN) suitable for throttling and on/off valves and with additional partial stroke test for valves in safety-instrumented systems
- Classified status alarms acc. to NAMUR Recommendation NE 107
- Control parameters can be changed online
- Automatic monitoring of zero point
- Calibrated travel sensor without gears susceptible to wear
- Permanent storage of all parameters in non-volatile EEPROM (protection against power failure)
- Adjustable output pressure limitation
- Activatable tight-closing function



- Binary input for DC voltage signals
- Certified according to IEC 61508/SIL

Additional options

- Inductive limit switch with proximity switch
- Integrated solenoid valve
- Binary input for floating contact
- External position sensor (Fig. 4)
- Stainless steel housing

Principle of operation

The electropneumatic positioner is attached to pneumatic control valves. It is used to assign the valve stem position (controlled variable x) to the control signal (reference variable w). The input signal received from a control system is compared to the travel or rotational angle of the control valve, and a pneumatic signal pressure (output variable y) is produced.

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 unit with microcontroller.

When a deviation occurs, the actuator is pressurized or vented. If required, the changes in the signal pressure can be slowed down by a connectable Q restriction. The signal pressure supplied to the actuator can be limited by software or on site to 1.4, 2.4 or 3.7 bar.

A constant air stream to the atmosphere is created by the 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 regulator (8) to make it independent of the supply air pressure.

The positioner communicates and is powered using IEC 61158-2 transmission technology conforming to FOUNDATION™ fieldbus specification.

As a standard feature, the positioner comes with a binary input used to signalize process information over the FOUNDATION™ fieldbus network.

Operation

The positioner is operated using a user-friendly rotary pushbutton. 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° at the push of a button.

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 (pre)set parameters. After initialization is completed, the positioner immediately starts control operation.

Configuration with 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 online. The control valve is linked to the process over the FOUNDATION™ fieldbus network.

The PID Function Block integrated in the positioner can likewise be configured using TROVIS-VIEW. The configuration of the network connections for the PID Function Block is made using the NI-FBUS Configurator or a corresponding digital process control system.

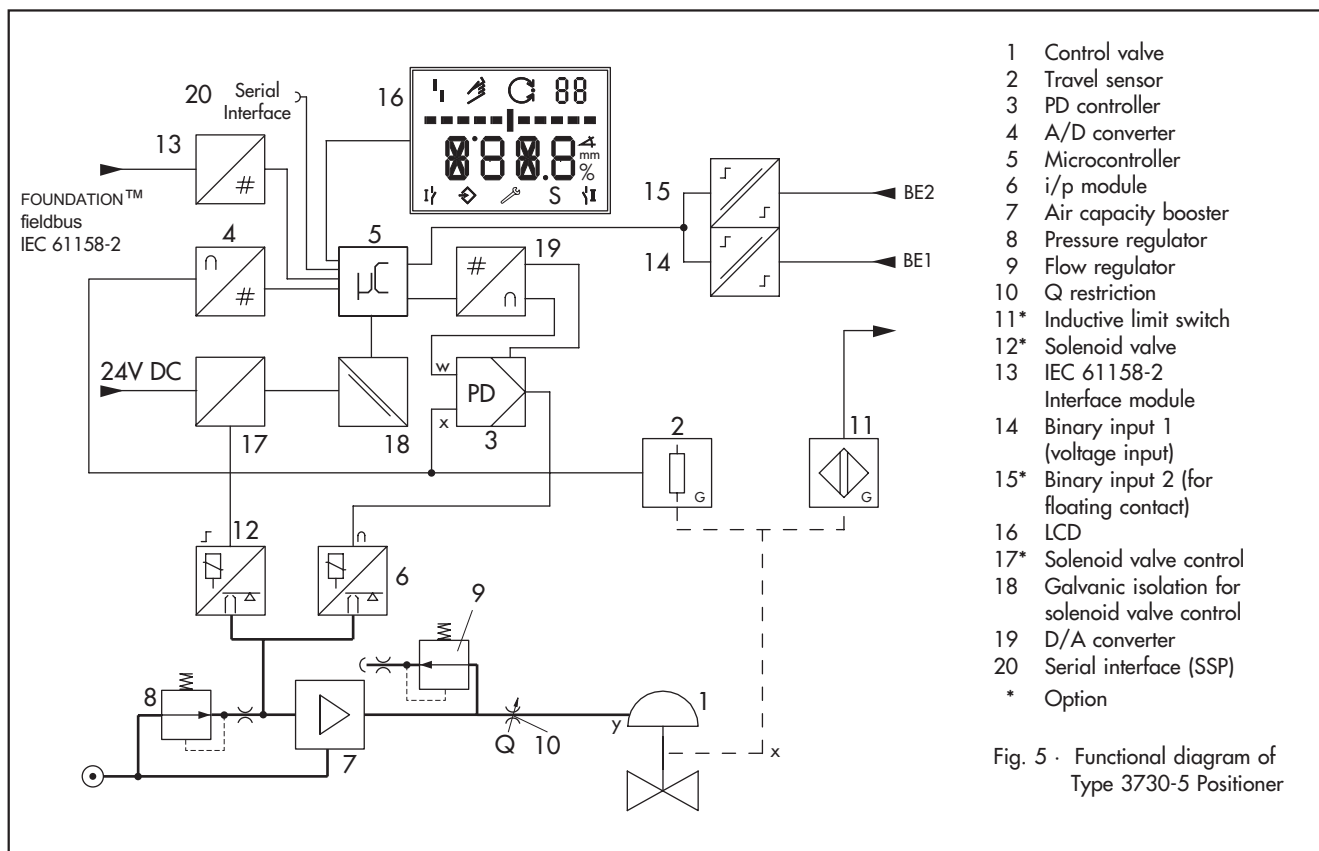


Table 1 · Technical data

Type 3730-5 FOUNDATION™ fieldbus Positioner (technical data in test certificates additionally apply for explosion-protected devices)			
Rated 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 (VDI/VDE 3845)	24 to 100° opening angle
Travel range	adjustable	Within the initialized travel/angle of rotation; restricted to 1/5 at the maximum	
Bus connection		Fieldbus interface	IEC 61158-2, bus-powered
		Physical Layer Class	113 (without explosion protection) 111 (explosion-protected version)
		Field device acc. to	FM 3610 entity, FISCO and FNICO
Communication			
Fieldbus		Data transmission conforming to FOUNDATION™ fieldbus specification, Communication Profile Class: 31 PS, 32 L; Interoperability tested acc. to ITK 5.2	
Software requirements (local)		SAMSON SSP interface and serial interface adapter TROVIS-VIEW with database module 3730-5	
Permissible operating voltage		9 to 32 V DC · Power over bus line The limits in the test certificate additionally apply for explosion-protected devices.	
Maximum operating current		15 mA	
Additional current in case of error		0 mA	
Supply air	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 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 capacity of the supply pressure	
Characteristics		Linear/equal percentage/reverse equal percentage · User-defined (over operating software and communication) · Butterfly valve linear/equal percentage · Rotary plug valve linear/equal percentage · Segmented ball valve linear/equal percentage Deviation from characteristic ≤ 1 %	
Hysteresis		≤ 0.3 %	
Sensitivity		≤ 0.1 %	
Direction of action		Reversible	
Air consumption		Independent of supply air < 110 l _n /h	
Air output capacity	Actuator pressurized	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	
Perm. ambient temperature		-45 to +80 °C · -25 to +80 °C with inductive limit switch (SJ2-S1N) Limits in test certificate also apply for explosion-protected devices.	
Influences	Temperature	≤ 0.15 %/10 K	
	Supply air	None	
	Vibrations	≤ 0.25 % up to 2000 Hz and 4 g acc. to IEC 770	
Electrical connections		One M20x1.5 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	
Electromagnetic compatibility		Complying with the requirements of EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21	
Degree of protection		IP 66 / NEMA 4X	
Implementation in safety-instrumented systems in compliance with IEC 61508/SIL		Probability of failure on demand of safety functions PFD < 2.8 × 10 ⁻⁷ for a confidence level of 95 %. The safe failure fraction (SFF) according to Table A1 in IEC 61508-2 is greater or equal to 0.99. Suitable for implementation in safety-instrumented systems with a hardware fault tolerance of 1 or 2 up to and including SIL 4.	
Binary input 1			
Input		0 to 30 V DC with reverse polarity protection · Static destruction limit 40 V Current consumption 3.5 mA at 24 V, galvanically isolated	
Signal		Signal '1' at U _e > 5 V	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 in stainless steel 1.4581	
External parts		Stainless steel 1.4571 and 1.4301	
Cable gland		Nickel-plated brass, M20 x 1.5	
Weight		Approx. 1.0 kg	

Network and positioner configuration with NI-FBUS™ configurator

The positioner can also be configured over the NI-FBUS™ configurator from National Instruments.

The NI-FBUS™ configurator can be used to perform the planning of the FOUNDATION™ fieldbus network. It also allows the use of PID Controller to allow the implementation of an independent control in the field.

Electrical and bus connection

The Type 3730-5 Positioner with FOUNDATION™ fieldbus communication must be connected to bus segments conforming to IEC 61158-2. A shielded two-wire line is used for both supply power and data communication.

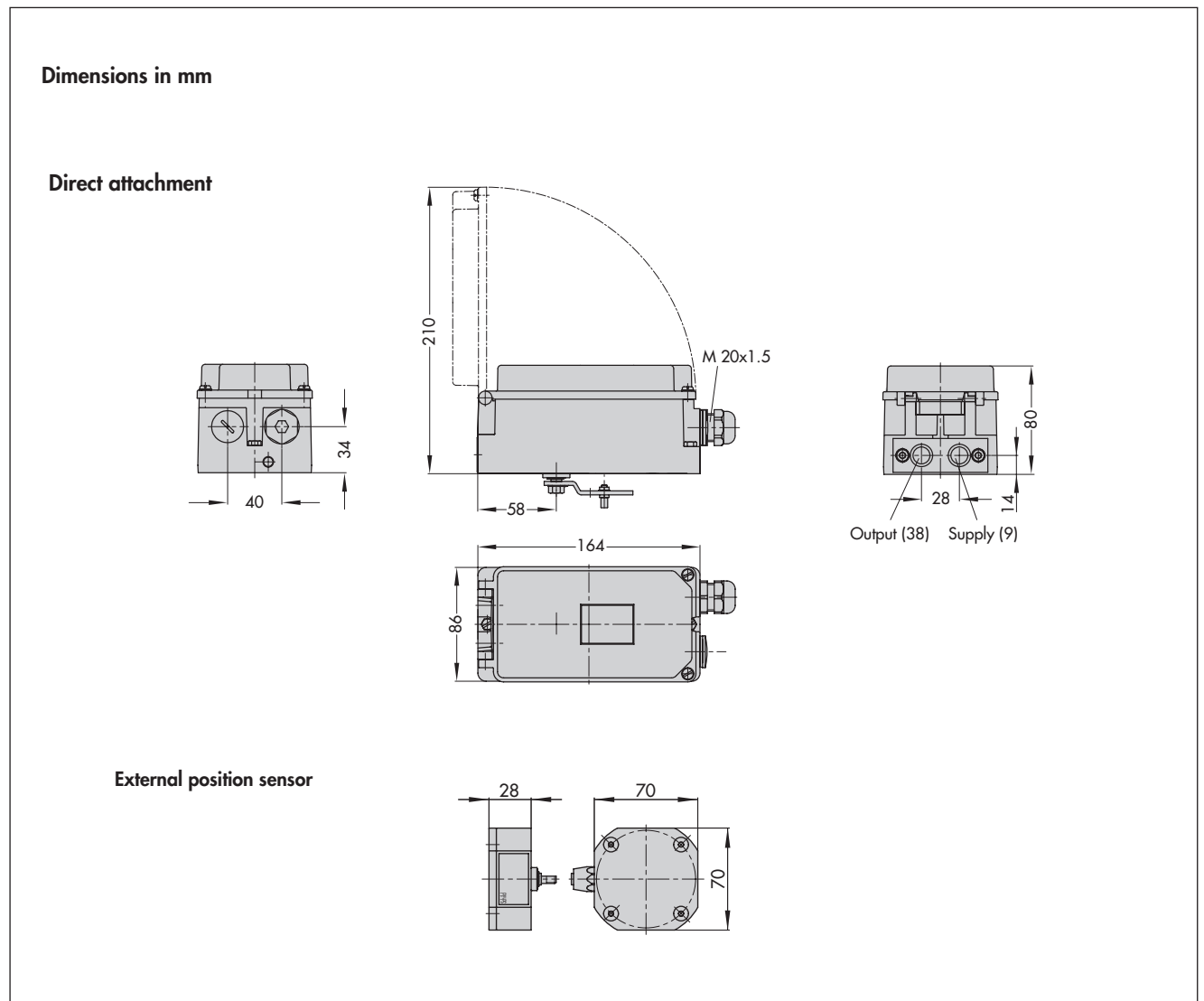
Positioner attachment

The Type 3730-5 Positioner with FOUNDATION™ fieldbus communication can be attached directly to the Type 3277 Actuator with a connection block. In actuators with fail-safe action "Actuator stem extends" and Type 3277-5 Actuator (120 cm²), the signal pressure is transmitted over an internal bore in the actuator yoke to the actuator. In actuators with fail-safe action "Actuator stem retracts" and in actuators with effective diaphragm areas of 240 cm² or larger, the signal pressure is transmitted to the actuator over a ready-made external pipe connection.

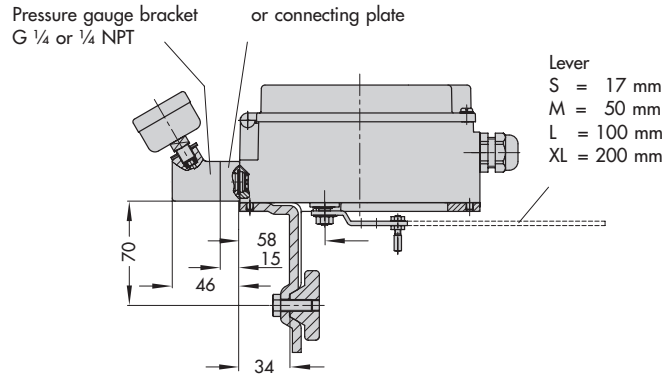
Using the appropriate bracket, the positioner can also be attached according to IEC 60534-6 (NAMUR recommendation). The positioner can be mounted on any side of the control valve.

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 over a coupling wheel to the positioner. The characteristic is set over the software.

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

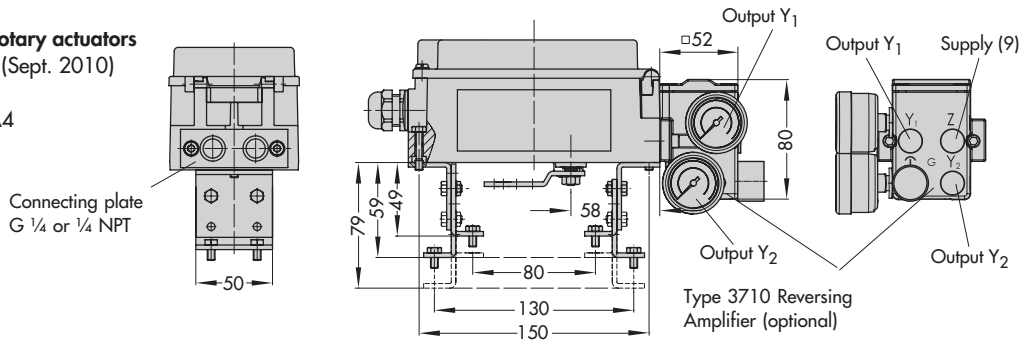


NAMUR attachment

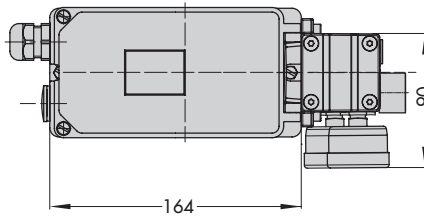


Attachment to rotary actuators
VDI/VDE 3865 (Sept. 2010)
Fixing level 1
Size AA1 to AA4

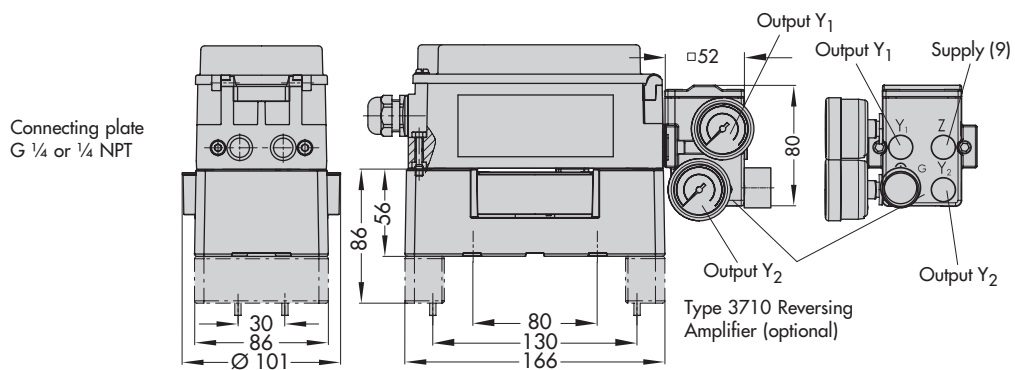
Light version



Mounting unit
CrNiMo steel bracket



Heavy-duty version



Article code

Positioner	Type 3730-	5	x	x	x	0	x	0	x	x	0	x	0	0	x	0	x	x	
With LCD and autotune, FOUNDATION™ fieldbus																			
Explosion protection																			
Without		0																	
⊕ II 2 G EEx ia IIC T6 and ⊕ II 2 D IP 65 T 80 °C acc. to ATEX		1																	
CSA/FM intrinsically safe/non incandive; Ex ia/Ex nA		3																	
⊕ II 3 G EEx nA II T6 / EEx nL IIC T6																			
⊕ II 3 D IP 65 T 80 °C acc. to ATEX		8																	
Additional equipment																			
Inductive limit switch																			
Without			0																
With SJ2-SN proximity switch			1																
With SJ2-S1N proximity switch			2																
Solenoid valve																			
Without				0															
With, 24 V DC				4															
External position sensor																			
Without						0													
With			0	0		1		0				0							
Binary input																			
Without								0											
Floating contact						0		1											
Diagnostics																			
EXPERT (standard), FF Device Revision 1										1									
EXPERT+ (extended diagnostics), FF Device Revision 1										2									
EXPERTplus (extended diagnostics), FF Device Revision 2										4									
Housing material																			
Aluminum (standard)												0							
Stainless steel 1.4581						0						1							
Special application																			
Without																0			
Device free of any substances that might impair paint adhesion																1			
Exhaust air connection with 1/4-18 NPT thread, back of housing sealed			0	0		0		0								2			
Special version																			
None																	0	0	0
NEPSI Ex ia		1															0	0	9
NEPSI Ex nL		8															0	1	0

Ordering text

FOUNDATION™ fieldbus Positioner Type 3730-5

- SAMSON direct attachment
- Attachment according to NAMUR
- Attachment to rotary actuator
- Without/with pressure gauge up to max. 6 bar
- Explosion protection
- Limit switch
- Solenoid valve
- Binary input for floating contact

Specifications subject to change without notice.



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